# Faculty of Engineering, Built Environment and Information Technology

**Welcome to the Faculty of Engineering, Built Environment and Information Technology**

The Faculty is a leading source of locally relevant and internationally competitive programmes in Engineering, the Built Environment and Information Technology, at both undergraduate and graduate levels. It attracts high-quality students and staff, and offers extended programmes to facilitate inclusiveness. It is well resourced in terms of teaching and research facilities, and houses several research institutes. The Faculty maintains close links with industry that supports both the teaching and research programmes. The multidisciplinary nature of the Faculty facilitates interaction across disciplines in both teaching and research activities.

## Faculty regulations and information

*The rules for the degrees published in this Yearbook are subject to change and may be amended after the publication of this information.*

*The General Regulations (G. Regulations) and General Rules apply to all faculties of the University of Pretoria. It is expected of all students to familiarise themselves well with these regulations and rules as well as all faculty-specific and programme-specific regulations and information as stipulated in the online yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression.*

Please read the faculty regulations in conjunction with the General Regulations.

**Academic literacy**

It is expected of all new undergraduate students who wish to study at the University to sit for an academic literacy test. Certain modules which address shortcomings in this respect, are included in the undergraduate curriculum. In addition, modules which have the purpose of developing specific language and communication skills in the context of the requirements of the engineering profession are also included in the curriculum.

**Change of field of study**

Transfer from one field of study to another may only take place with the Dean’s approval, after consultation with the relevant Head of Department.

**Examinations**

**Examinations, projects and research reports/mini-dissertations**

i. An examination in a module may be written and/or oral. Projects and research reports/mini-dissertations are prepared and examined as stipulated in the study guide of the module, in accordance with the regulations and procedures as described below.
ii. The examinations for modules of the first semester are held in May/June, while all other examinations (third and fourth-quarter modules, second-semester modules and year modules) are held in October/November.

**Examination admission**

A minimum semester/year mark of 40% is required in order to be admitted to the final examination in a specific module, with the exception of first-semester modules at first-year level where a minimum semester mark of 30%

is required for admission to an examination. In addition, all other examination admission requirements, applicable to the relevant module, must have been met.

**Special examinations (including the aegrotat)**

Refer to G Regulation G.12.5.

i. A medical certificate stating that a student appeared ill or declared him-/herself unfit to write the examination **will not be accepted**.
ii. The doctor must be consulted **on or before the date** on which the examination was scheduled.

**Ancillary examinations**

Refer to G Regulation G.12.3.

Please note: No ancillary or special examinations are granted in any design modules (all ONT modules) in the Department of Architecture.

**Other special examinations**

Refer also to G Regulation G.12.6.

i. The Dean may, on the recommendation of the Head of Department concerned, grant a special examination in a module to a student who failed that module in the final year of study, and consequently does not comply with degree requirements.
ii. In the schools of **Built Environment** and **Information Technology**: A student may at most, be admitted to either one special examination in a year module or two special examinations in semester modules or four special examinations in quarter modules.
iii. In the **School of Engineering**: A student may be granted at the most two such special examinations. To be taken into consideration for a special examination, a student should have obtained a minimum final mark of 40% and should also have complied with all other examination admission requirements which are applicable to the relevant module.
iv. A student must apply in writing to the Dean before consideration will be given to admission to a special examination. The Head of Department decides when the special examination will take place and may prescribe work that must be satisfactorily completed before a student may write the examination.
v. During calculation of the final mark the semester mark is retained and the final mark is calculated as the weighted average of the special examination mark and the semester mark, in accordance with the formula as published in the study guide of the specific module. The candidate should also comply with the subminimum requirements. The highest final mark that may be awarded is 50%.
vi. No special examinations will be allowed for modules with a project or design component.

**Please note:**

- In the **School for the Built Environment**, the pass mark required for a special examination is 50%, a higher mark is not allocated and the semester/year mark is not taken into consideration.
- **School of Information Technology**: If a test or examination clash occurs between modules within the prescribed curriculum, an adjustment of the test date and/or time will only be considered if the student completes an official application form at the department's administration office and submits a copy and supporting documentation to the relevant lecturer at least seven (7) days prior to the scheduled test. A module from a higher year level receives preference to that of a lower year level within the prescribed curriculum.
- In the **School of Engineering**: no special examinations will be allowed for modules with a project or design component in any discipline of engineering. No other special examinations are granted in the School of Engineering.

**Re-marking of examination scripts**

Refer to G Regulation G.14.

**Supplementary examinations in the School of Engineering**

Refer to General Regulation G.12.4.

In the School of Engineering a supplementary examination is only granted in instances where:

i. A final mark of between 45% and 49% was achieved;
ii. A final mark of between 40% and 44% was achieved and where the candidate also achieved either a semester mark or an examination mark of 50% or higher;
iii. A pass mark has been obtained, but the required subminimum in the examination section of the module or divisions thereof has not been obtained.
iv. A final mark of between 40% and 49% has been obtained in first-year modules in the first semester.

Calculation of the final supplementary examination mark:

i. The semester mark is retained and the final mark is calculated as the weighted average of the supplementary examination mark and the semester mark, in accordance with the formula as published in the study manual of the specific module, with the proviso that the maximum final mark awarded may be no more than 50%. The only exception to this rule is in the case of first-year modules at first-semester level, where the semester mark is not considered, and where the supplementary examination mark is taken as the final mark, with the proviso that the maximum final mark awarded may be no more than 50%.
ii. All other pass requirements, as published in the study manual of each specific module, remain so and are applicable during the determination of the final result of a supplementary examination in the module.

Special supplementary examinations will not be arranged for students who were not able to write the supplementary examinations during scheduled times, as given in the examinations timetable.

**Supplementary examinations in the School for the Built Environment**

Refer to G Regulation G.12.4.

Except for first-semester modules in the first year where supplementary examinations are compulsory between 40% and 49%, a supplementary examination is only granted in instances where:

i. a final mark of between 45% and 49% was obtained;
ii. a final mark of between 40% and 44% was obtained and where the candidate also obtained either a semester mark or an examination mark of 50% or higher;
iii. a pass mark has been obtained, but the required subminimum in the examination section of the module or divisions thereof has not been obtained.

Regulations (i) to (iii) do not apply to third-year modules of any of the programmes in the Department of Architecture. No supplementary examinations are granted in any year of study for the design module (ONT modules).

**Supplementary examinations in the School of Information Technology**

Refer to G Regulation G.12.4.

In the School of Information Technology all supplementary examinations are considered and granted in accordance with the stipulations of G Regulation G.12.4, and is calculated as follows:

i. The semester mark is retained and the final mark is calculated as the weighted average of the supplementary examination mark and the semester mark, in accordance with the formula as published in the study manual of the specific module, with the proviso that the maximum final mark awarded may be no more than 50%. The only exception to this rule is in the case of first-year modules at first-semester level, where the semester mark is not considered, and where the supplementary examination mark is taken as the final mark, with the proviso that the maximum final mark awarded may be no more than 50%.
ii. All other pass requirements, as published in the study manual of each specific module, remain so and are

applicable during the determination of the final result of a supplementary examination in the module.

Special supplementary examinations will not be arranged for students who were not able to write the supplementary examinations during scheduled times, as provided in the examinations timetable.

**Pass requirements**
Refer also to G Regulations G.11.1(a) and G.12.2.2

a. In order to pass a module, a student must obtain an examination mark of at least 40% and a final mark of at least 50% except if stated otherwise in the study guide. A student passes a module with distinction if a final mark of at least 75% is obtained. The final mark is compiled from the semester/year mark and the examination mark.

**Please note**: In the School of Engineering, borderline cases (e.g. a mark of 49% or 74%) must be reconsidered by both the internal and external examiners, for determination of the possible merit of an upward adjustment of the mark. Marks may not be adjusted downwards, except when obvious marking and adding errors were detected. The pass mark is a minimum final mark of 50% and a student fails the module if a lower mark (e.g. 49%) was obtained.

b. Calculation of the final mark: The semester/year mark must account for no less than 40% and no more than 60% of the final mark, with the exception of modules such as design and research projects and research reports/essays, as well as in modules where the development of general skills is the primary learning activity, where appropriate alternative norms are determined individually by schools or departments. The specific details and/or formula for the calculation of the final mark are set out in the study guide of each module. Also, a schedule listing this information (for all the modules presented in each school) will be compiled, for approval by the Dean.
c. Calculation of the semester/year mark: The semester/year mark is compiled from formative assessment of learning activities such as assignments, presentations, practicals and group projects, as well as from class tests and semester tests. For each module the specific formula for the calculation of the semester/year mark is determined by the lecturer(s) responsible for the presentation of the module and the details are set out in the study guide. Also, a schedule listing this information for all the modules presented in each school will be compiled, for approval by the Dean.

Refer also to G Regulation G.11.1(b).

d. In some modules specific requirements in respect of certain components of the semester/year mark may be set in order for a student to pass the module (for example that satisfactory performance in and attendance of practical classes are required). Thus, even if a pass mark is obtained in the module, a pass is not granted unless these requirements are met. For such modules these specific requirements are set out in the study guide. Also, a schedule containing this information (for all such modules presented in each school) will be compiled, for approval by the Dean.
e. A student must comply with the subminimum requirements in subdivisions of certain modules. For such modules these specific requirements are set out in the study guide of the module. Also, a schedule containing this information (for all such modules presented in each school) will be compiled, for approval by the Dean.
f. A student may be promoted (exempted from the examination) in certain modules in the School of Information Technology should a specified semester/year mark (minimum 65%) be obtained. For such modules these specific requirements are set out in the study guide of the module. Refer also to G Regulation G.10.3.

**Please note**: General Regulation G.10.3 is normally not applied by the School of Engineering and no promotion (exemption from the examination) is allowed in any module, except in special cases where permission of the Dean is required.

**Dean's Merit List (Eng. 10.2)**
The Dean's Merit List will be published annually on the website of the Faculty and will contain the names of the students whose academic performance over the year has been excellent and deserves recognition. Letters of commendation will be sent to students who qualify for inclusion on the Dean's Merit List.
To be eligible for inclusion in the Dean's Merit List, a student in the School for Engineering must pass all the modules as prescribed in the curriculum of a specific year of study as published. A student registered for the first, second or third year of the four-year programme must obtain a minimum weighted average of 75% and a student registered on the first, second, third or fourth year of the five year programme must obtain a minimum weighted average of 75%.

**Additional regulations and information for the School of Engineering**
**Selection**
A selection procedure takes place prior to admission to any programme in the School of Engineering. Restrictions may be placed on the number of students admitted to the School and/or its departments. Postgraduate selection takes place as stipulated in the respective departmental rules.

**Renewal of registration (Eng.4)**
Should a student who is repeating a year of study, with the exception of first-year students, fail to obtain sufficient credits to be promoted to the subsequent year of study at the end of the year of repetition, he or she will forfeit his or her right to readmission. Students who forfeit the right to readmission, may apply in writing to the Admissions Committee for readmission to the Faculty. Provisions regarding promotion, including provisions for first-year students, appear in the regulations of the relevant fields of study.

**Equivalent modules**
A BEng student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student’s group in another semester, and providing that no timetable clashes occur.

**Duration of examinations in undergraduate modules in the School of Engineering**
The duration of an examination in an 8-credit module will not exceed 90 minutes and in a 16-credit module will not exceed 180 minutes, except where special approval is granted by the Dean to exceed these limits.
The duration of a supplementary examination or a special examination in all under-graduate modules will not exceed 90 minutes, except where special approval is granted by the Dean to exceed this limit. In the event of an aegrotat, the duration of the examination can be extended to a maximum period of 180 minutes, depending on an arrangement made between the lecturer and the student.

**Exposure to the practice of engineering (Eng. 8)**
Engineering students are exposed in three ways to the practice of engineering during the course of their studies:

a. Workshop practice – a module comprising a period at the end of the first year of study during which students are trained in workshop practice. Students in electrical, electronic and computer engineering attend the Introduction to Laboratory Measurements and Computer Simulations’ module.
b. Practical training – specific periods of work at firms during which experience is gained in the practice of engineering. Students may deviate from this stipulation only with the permission of the Dean.
c. Excursions – study excursions arranged for students to visit various engineering firms and installations in order to obtain insight into the industry. This training is compulsory. Details of the modules regarding these aspects of training are explained in the sections of this publication which deal with the curricula and syllabi of the various programmes.

**Additional regulations and information for the School for the Built Environment**
**Selection**

Selection takes place prior to admission to the following programmes in the School for the Built Environment:

a. All undergraduate programmes: A restricted number of students are admitted to all undergraduate programmes.
b. Postgraduate programmes: A restricted number of students are admitted to the following taught programmes: BArchHons, BIntHons, BLArchHons, BScHons (Applied Science), BScHons Quantity Surveying, BScHons Construction Management, MArch(Prof), MInt(Prof), ML(Prof), MSc (Applied Science), MSc Quantity Surveying, MSc Construction Management, MSc Real Estate, MSc Real Estate Retail Property and Master of Town and Regional Planning. Applications close on 31 October for South African students. Admission to the MSc and PhD programmes by research is subject to approval by the Head of Department and the Dean.

**International students**
Applications close on 31 August for international students.
International students wanting to be considered for selection must have their qualifications audited and verified by the South African Qualifications Authority (SAQA). Those candidates wanting to register for professional postgraduate degree programmes for purposes of professional registration must further have their qualifications verified by the relevant registering council as to the equivalence of the registration category. All costs are for the direct account of the applicant. All documentation must accompany the application and be submitted before the closing date.
**Please Note**: Contact details for the various bodies are to be found on the relevant departmental web page.

**Promotion requirements in the School for the Built Environment**

a. Students whose academic progress is not acceptable can be suspended from further studies. Refer to the following important regulations: G Regulation G.3 and/or regulations as they appear for the applicable programmes.
b. A student who is excluded from further studies in terms of the stipulations of the abovementioned regulations will be notified in writing by the Dean or admissions committee at the end of the relevant semester.
c. A student who has been excluded from further studies may apply in writing to the admissions committee of the School for the Built Environment for readmission on or before 12 January.
d. Should the student be readmitted by the admissions committee, strict conditions will be set which the student must comply with in order to proceed with studies.
e. Should the student not be readmitted to further studies by the admissions committee, he/she will be informed in writing.
f. Students who are not readmitted by the admissions committee have the right to appeal to the Senate Committee for Admission, Evaluation and Academic Support.
g. Any decision taken by the Senate Committee for Admission, Evaluation and Academic Support is final.

**Additional regulations and information for the School of Information Technology**

**Selection**
A selection procedure takes place prior to admission to the degree programmes in the School of Information Technology. The number of students admitted to the under-graduate programmes in the school may be limited. Postgraduate selection takes place in accordance with departmental policy.

**Academic literacy**
All first-year students in the School of Information Technology enroll for ALL 121, a specialised module in academic literacy for Information Technology. For students in the Four-year programmes, Language, life and study skills 1 and 2 are compulsory in both the first semester and second semester (LST 133 and LST 143).

**Requirements for specific modules (IT.3)**
A candidate who has:

a. passed the Grade 12 examination in Mathematics with at least 50% will be admitted to WTW 134, WTW 115 and WTW 152, and 60% for WTW 114, WTW 126, WTW 158 and WTW 161 in Mathematics and to WST 111 etc. or obtained at least 3 (40-49%) for Mathematics in Grade 12, will be admitted to WTW 133 and WTW 143
b. obtained at least 4 (50-59%) in Mathematics in the Grade 12 examination, or at least 50% in both Statistics 113, 123, will be admitted to Informatics 112; Economics 113, 123 and 120;
c. obtained at least 5 (60-69%) in Mathematics, or obtained at least 4 (50 – 59%) in Mathematics and has passed WTW 133 and WTW 143, will be admitted to Informatics 154 and 171.
d. not passed at least four Computer science modules at second-year level, will not be permitted to register for the Computer science modules at third-year level, unless special permission has been granted by the Head of Department.

**Minimum study period**

The minimum period of study for the degree is indicated at the relevant degree programme. Students registering for a three-year degree, must complete the degree in a maximum of five years. Students registering for a four-year degree, must complete the degree in a maximum of six years.

**Additional regulations and information for the Graduate School of Technology Management (GSTM)**

**Selection**

A selection procedure takes place prior to admission to any programme in the GSTM Restrictions may be placed on the number of students admitted to the School. Postgraduate selection takes place as stipulated in the respective departmental rules. (www.up.ac.za/gstm)

**Supplementary examinations in the GSTM**

Supplementary or special examinations are not granted in any modules at the GSTM.

**Minimum/Maximum study period**

The minimum period of study for the degree is indicated at the relevant degree programme. Students registering for the honours degree as well as master’s degrees, must complete the degree in a maximum of three years.

# Undergraduate Degree

## BEng Chemical Engineering (12130002)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is

deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student’s group in another semester, and providing that no timetable clashes occur.

**Please note**:
1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.

2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the**

**fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the

ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and

ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 160

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
General chemistry 181 (CHM 181) - Credits: 16.00
Chemical engineering 113 (CIR 113) - Credits: 8.00
Chemical engineering 123 (CIR 123) - Credits: 8.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 162

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Chemistry 215 (CHM 215) - Credits: 12.00
Chemistry 226 (CHM 226) - Credits: 8.00
Chemical engineering materials 210 (CIM 210) - Credits: 8.00
Chemical engineering 211 (CIR 211) - Credits: 12.00
Thermodynamics 223 (CTD 223) - Credits: 16.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Biochemical engineering 310 (CBI 310) - Credits: 16.00
Chemical engineering design 320 (CIO 320) - Credits: 16.00
Chemical engineering 310 (CIR 310) - Credits: 8.00
Professional and technical communication 310 (CJJ 310) - Credits: 8.00
Kinetics 321 (CKN 321) - Credits: 16.00
Laboratory 321 (CLB 321) - Credits: 16.00
Mass transfer 310 (CMO 310) - Credits: 16.00
Transfer processes 311 (COP 311) - Credits: 16.00
Process dynamics 321 (CPN 321) - Credits: 16.00
Practical training 311 (CPY 311) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 144

### Core modules

Particle technology 410 (CPA 410) - Credits: 16.00
Process control 410 (CPB 410) - Credits: 16.00
Design project 421 (CPJ 421) - Credits: 24.00
Chemical engineering practice 420 (CPR 420) - Credits: 8.00
Process synthesis 410 (CPS 410) - Credits: 8.00
Process analysis 420 (CPS 420) - Credits: 8.00
Practical training 411 (CPY 411) - Credits: 16.00
Reactor design 410 (CRO 410) - Credits: 16.00
Research project 411 (CSC 411) - Credits: 16.00
Research project 421 (CSC 421) - Credits: 16.00
Specialisation 420 (CSS 420) - Credits: 16.00

# BEng Chemical Engineering ENGAGE (12136002)

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| **Minimum duration of study** | 5 years |

## Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study (Eng. 14)

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of

department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.

f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.

b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Chemistry 1 111 (JPO 111) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Physics 122 (JPO 122) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2
Minimum credits: 136

### Core modules
General chemistry 181 (CHM 181) - Credits: 16.00
Chemical engineering 113 (CIR 113) - Credits: 8.00
Chemical engineering 123 (CIR 123) - Credits: 8.00
Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Chemistry 2 121 (JPO 121) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3
Minimum credits: 138

### Core modules
Engineering statistics 220 (BES 220) - Credits: 8.00
Chemistry 215 (CHM 215) - Credits: 12.00
Chemistry 226 (CHM 226) - Credits: 8.00
Chemical engineering materials 210 (CIM 210) - Credits: 8.00
Chemical engineering 211 (CIR 211) - Credits: 12.00
Thermodynamics 223 (CTD 223) - Credits: 16.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4
Minimum credits: 144

### Core modules
Engineering management 310 (BSS 310) - Credits: 8.00
Biochemical engineering 310 (CBI 310) - Credits: 16.00
Chemical engineering design 320 (CIO 320) - Credits: 16.00
Chemical engineering 310 (CIR 310) - Credits: 8.00
Professional and technical communication 310 (CJJ 310) - Credits: 8.00
Kinetics 321 (CKN 321) - Credits: 16.00
Laboratory 321 (CLB 321) - Credits: 16.00
Mass transfer 310 (CMO 310) - Credits: 16.00
Transfer processes 311 (COP 311) - Credits: 16.00
Process dynamics 321 (CPN 321) - Credits: 16.00

Practical training 311 (CPY 311) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

### Curriculum: Final year

Minimum credits: 144

#### Core modules

Particle technology 410 (CPA 410) - Credits: 16.00
Process control 410 (CPB 410) - Credits: 16.00
Design project 421 (CPJ 421) - Credits: 24.00
Chemical engineering practice 420 (CPR 420) - Credits: 8.00
Process synthesis 410 (CPS 410) - Credits: 8.00
Process analysis 420 (CPS 420) - Credits: 8.00
Practical training 411 (CPY 411) - Credits: 16.00
Reactor design 410 (CRO 410) - Credits: 16.00
Research project 411 (CSC 411) - Credits: 16.00
Research project 421 (CSC 421) - Credits: 16.00
Specialisation 420 (CSS 420) - Credits: 16.00

## BEng Civil Engineering (12130007)

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| **Minimum duration of study** | 4 years |

### Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**

Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics, Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements |
|---|

| Achievement level | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to

the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.

f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to

any module of the fourth year of study.

c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 113 (NMC 113) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Workshop practice 121 (SWP 121) - Credits: 6.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 152

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Geology for engineering 256 (GLY 256) - Credits: 16.00

Community-based project 203 (JCP 203) - Credits: 8.00
Civil engineering measurement techniques 221 (SBZ 221) - Credits: 8.00
Pavement materials and design 221 (SGM 221) - Credits: 16.00
Structural analysis 223 (SIN 223) - Credits: 16.00
Professional and technical communication 210 (SJJ 210) - Credits: 8.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Statics 211 (SWK 211) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

### Curriculum: Year 3

Minimum credits: 154

#### Core modules

Programming and information technology 213 (MPR 213) - Credits: 16.00
Civil building materials 321 (SBM 321) - Credits: 16.00
Soil mechanics 311 (SGM 311) - Credits: 16.00
Geotechnical engineering 323 (SGM 323) - Credits: 16.00
Hydraulics 310 (SHC 310) - Credits: 16.00
Hydraulics 321 (SHC 321) - Credits: 16.00
Timber design 310 (SIB 310) - Credits: 8.00
Civil engineering economics 310 (SIE 310) - Credits: 8.00
Structural analysis 311 (SIN 311) - Credits: 8.00
Structural concrete 325 (SIN 325) - Credits: 16.00
Transportation engineering 323 (SVC 323) - Credits: 16.00

### Curriculum: Final year

Minimum credits: 158

#### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00
Civil engineering construction management 420 (SBZ 420) - Credits: 16.00
Computer applications in civil engineering 420 (SCA 420) - Credits: 16.00
Detailed design 420 (SDO 420) - Credits: 24.00
Environmental geotechnology 421 (SEV 421) - Credits: 16.00
Hydraulics 410 (SHC 410) - Credits: 16.00
Structural steel 415 (SIN 415) - Credits: 16.00
Practical training 410 (SPY 410) - Credits: 16.00
Research project 412 (SSC 412) - Credits: 30.00
Infrastructure planning 412 (SVC 412) - Credits: 16.00

## BEng Civil Engineering ENGAGE (12136007)

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|---|---|
| **Minimum duration of study** | 5 years |

## Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study (Eng. 14)

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of

study.

c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits

per semester by more than 16 credits.

d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00

Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Chemistry 1 111 (JPO 111) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Physics 122 (JPO 122) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Workshop practice 121 (SWP 121) - Credits: 6.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 128

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Geology for engineering 256 (GLY 256) - Credits: 16.00
Civil engineering measurement techniques 221 (SBZ 221) - Credits: 8.00
Pavement materials and design 221 (SGM 221) - Credits: 16.00
Structural analysis 223 (SIN 223) - Credits: 16.00
Professional and technical communication 210 (SJJ 210) - Credits: 8.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Statics 211 (SWK 211) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 154

### Core modules

Programming and information technology 213 (MPR 213) - Credits: 16.00
Civil building materials 321 (SBM 321) - Credits: 16.00
Soil mechanics 311 (SGM 311) - Credits: 16.00
Geotechnical engineering 323 (SGM 323) - Credits: 16.00
Hydraulics 310 (SHC 310) - Credits: 16.00
Hydraulics 321 (SHC 321) - Credits: 16.00
Timber design 310 (SIB 310) - Credits: 8.00
Civil engineering economics 310 (SIE 310) - Credits: 8.00
Structural analysis 311 (SIN 311) - Credits: 8.00
Structural concrete 325 (SIN 325) - Credits: 16.00
Transportation engineering 323 (SVC 323) - Credits: 16.00

### Curriculum: Final year

Minimum credits: 158

#### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00
Civil engineering construction management 420 (SBZ 420) - Credits: 16.00
Computer applications in civil engineering 420 (SCA 420) - Credits: 16.00
Detailed design 420 (SDO 420) - Credits: 24.00
Environmental geotechnology 421 (SEV 421) - Credits: 16.00
Hydraulics 410 (SHC 410) - Credits: 16.00
Structural steel 415 (SIN 415) - Credits: 16.00
Practical training 410 (SPY 410) - Credits: 16.00
Research project 412 (SSC 412) - Credits: 30.00
Infrastructure planning 412 (SVC 412) - Credits: 16.00

## BEng Computer Engineering (12130009)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**

A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.

f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| Minimum requirements |
| --- |

| Achievement level | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics, Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.

d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of**

**study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

**Please Note:** Cos 222 has been replaced by Cos122 as from 2017 academic year. Students who have already passed Cos 222 will be credited for Cos 122.

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Electricity and electronics 111 (EBN 111) - Credits: 16.00
Information technology practice 121 (EIW 121) - Credits: 8.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00

Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 144

#### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Data structures and algorithms 212 (COS 212) - Credits: 16.00
Electrical engineering 211 (EIR 211) - Credits: 16.00
Information technology practice 221 (EIW 221) - Credits: 8.00
Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Digital systems 220 (ERS 220) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Materials science 113 (NMC 113) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

#### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Intelligent systems 320 (EAI 320) - Credits: 16.00
Control systems 320 (EBB 320) - Credits: 16.00
Digital communication 310 (EDC 310) - Credits: 16.00
Information technology practice 320 (EIW 320) - Credits: 8.00
Electromagnetic compatibility 310 (EME 310) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
Software engineering 321 (EPE 321) - Credits: 16.00
Computer engineering design 320 (ERD 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 136

#### Core modules

Computer engineering: Architecture and systems 410 (EAS 410) - Credits: 16.00
e-Business and network security 410 (EHN 410) - Credits: 16.00
Project 402 (EPR 402) - Credits: 64.00

Practical training and report 423 (EPY 423) - Credits: 16.00
Research project 420 (ERP 420) - Credits: 16.00
DSP programming and application 411 (ESP 411) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

## BEng Computer Engineering ENGAGE (12136009)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to

any module at third year level (level 300).

c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

**Please Note:** Cos 222 has been replaced by Cos122 as from 2017 academic year. Students who have already passed Cos 222 will be credited for Cos 122.

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Information technology practice 121 (EIW 121) - Credits: 8.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Additional Physics 152 (JPO 152) - Credits: 8.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 112

### Core modules

Program design: Introduction 110 (COS 110) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Electricity and electronics 111 (EBN 111) - Credits: 16.00
Information technology practice 221 (EIW 221) - Credits: 8.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Programming 1 114 (JPO 114) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Programming 2 124 (JPO 124) - Credits: 8.00
Materials science 123 (NMC 123) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 128

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Operating systems 122 (COS 122) - Credits: 16.00
Data structures and algorithms 212 (COS 212) - Credits: 16.00
Electrical engineering 211 (EIR 211) - Credits: 16.00

Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Digital systems 220 (ERS 220) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 144

#### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Intelligent systems 320 (EAI 320) - Credits: 16.00
Control systems 320 (EBB 320) - Credits: 16.00
Digital communication 310 (EDC 310) - Credits: 16.00
Information technology practice 320 (EIW 320) - Credits: 8.00
Electromagnetic compatibility 310 (EME 310) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
Software engineering 321 (EPE 321) - Credits: 16.00
Computer engineering design 320 (ERD 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 136

#### Core modules

Computer engineering: Architecture and systems 410 (EAS 410) - Credits: 16.00
e-Business and network security 410 (EHN 410) - Credits: 16.00
Project 402 (EPR 402) - Credits: 64.00
Practical training and report 423 (EPY 423) - Credits: 16.00
Research project 420 (ERP 420) - Credits: 16.00
DSP programming and application 411 (ESP 411) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

# BEng Electrical Engineering (12130003)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

## Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**

A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admisssion : a candidate who is in posession of a certificate that is deemed by the University to be equivalent to the required Grade 12 cerificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution ; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid National Senior Certificate (NSC) with admission to degree studies is required.
- Minimum subject and achievement requirements as set out below are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases tuition may be presented in English only for example in electives where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the Four-year degree in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.

**Note**

Candidates who do not comply with the minimum requirements set out above but who have obtained a minimum APS of 30 an achievement level of 5 for English or Afrikaans 6 for Mathematics and 5 for Physical Science will be considered for provisional admission to either the Four-year Programme or the ENGAGE Programme based on the results of the compulsory NBT.

Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT NSC results an achievement level of 5 in Mathematics and 4 in Physical Science as well as an achievement level of 4 in Afrikaans or English together with an APS of 25.

Students may apply directly to be considered for the ENGAGE Programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.

b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of

credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.

d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 113 (NMC 113) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 124

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Imperative programming 132 (COS 132) - Credits: 16.00
Electrical engineering 211 (EIR 211) - Credits: 16.00
Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Practical wiring 200 (EPW 200) - Credits: 4.00
Digital systems 220 (ERS 220) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Dynamics 210 (MSD 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Control systems 320 (EBB 320) - Credits: 16.00
Power electronics 320 (EDF 320) - Credits: 16.00
Power system components 320 (EKK 320) - Credits: 16.00
Electrical machines 311 (ELX 311) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Electromagnetism 310 (EMZ 310) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
DSP programming 300 (ESP 300) - Credits: 4.00
Electrical engineering design 320 (EWE 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 136

**Core modules**
Electrical drives 410 (EAD 410) - Credits: 16.00
Automation 410 (EBT 410) - Credits: 16.00
Power system analysis 410 (EKK 410) - Credits: 16.00
Research project 420 (ENR 420) - Credits: 16.00
Project 400 (EPR 400) - Credits: 64.00
Practical training and report 423 (EPY 423) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

## BEng Electrical Engineering ENGAGE (12136003)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO

110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second",**

**"third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and

ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Additional Physics 152 (JPO 152) - Credits: 8.00
Additional Chemistry 1 161 (JPO 161) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00
Practical wiring 200 (EPW 200) - Credits: 4.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 120

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00

Imperative programming 132 (COS 132) - Credits: 16.00
Electrical engineering 211 (EIR 211) - Credits: 16.00
Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Digital systems 220 (ERS 220) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Control systems 320 (EBB 320) - Credits: 16.00
Power electronics 320 (EDF 320) - Credits: 16.00
Power system components 320 (EKK 320) - Credits: 16.00
Electrical machines 311 (ELX 311) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Electromagnetism 310 (EMZ 310) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
DSP programming 300 (ESP 300) - Credits: 4.00
Electrical engineering design 320 (EWE 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 136

### Core modules

Electrical drives 410 (EAD 410) - Credits: 16.00
Automation 410 (EBT 410) - Credits: 16.00
Power system analysis 410 (EKK 410) - Credits: 16.00
Research project 420 (ENR 420) - Credits: 16.00
Project 400 (EPR 400) - Credits: 64.00
Practical training and report 423 (EPY 423) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

# BEng Electronic Engineering (12130008)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

## Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE

programme based on the results of the NBT.

- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics, Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student’s group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the

Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.

b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and

with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.

d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules
General chemistry 171 (CHM 171) - Credits: 16.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 113 (NMC 113) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2
Minimum credits: 144

### Core modules
Engineering statistics 220 (BES 220) - Credits: 8.00
Imperative programming 132 (COS 132) - Credits: 16.00
Electrical engineering 211 (EIR 211) - Credits: 16.00
Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Digital systems 220 (ERS 220) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Dynamics 210 (MSD 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3
Minimum credits: 144

### Core modules
Engineering management 310 (BSS 310) - Credits: 8.00
Control systems 320 (EBB 320) - Credits: 16.00
Electronic engineering design 320 (ELO 320) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Modulation systems 310 (EMS 310) - Credits: 16.00
Electromagnetism 310 (EMZ 310) - Credits: 16.00
Microwaves and antennas 320 (EMZ 320) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
Stochastic communications systems 320 (ESC 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

## Curriculum: Final year
Minimum credits: 136

### Core modules

Automation 410 (EBT 410) - Credits: 16.00
Research project 424 (EES 424) - Credits: 16.00
Advanced electronics 410 (ENE 410) - Credits: 16.00
Project 400 (EPR 400) - Credits: 64.00
Practical training and report 423 (EPY 423) - Credits: 16.00
DSP programming and application 411 (ESP 411) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

## BEng Electronic Engineering ENGAGE (12136008)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO

110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second",**

**"third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and

ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Additional Physics 152 (JPO 152) - Credits: 8.00
Additional Chemistry 1 161 (JPO 161) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Introduction to laboratory measurements and computer simulations 101 (EMR 101) - Credits: 4.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 120

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Imperative programming 132 (COS 132) - Credits: 16.00

Electrical engineering 211 (EIR 211) - Credits: 16.00
Professional and technical communication 210 (EJJ 210) - Credits: 8.00
Linear systems 220 (ELI 220) - Credits: 16.00
Digital systems 220 (ERS 220) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

### Curriculum: Year 4

Minimum credits: 144

#### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Control systems 320 (EBB 320) - Credits: 16.00
Electronic engineering design 320 (ELO 320) - Credits: 16.00
Microprocessors 310 (EMK 310) - Credits: 16.00
Modulation systems 310 (EMS 310) - Credits: 16.00
Electromagnetism 310 (EMZ 310) - Credits: 16.00
Microwaves and antennas 320 (EMZ 320) - Credits: 16.00
Analogue electronics 310 (ENE 310) - Credits: 16.00
Stochastic communications systems 320 (ESC 320) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

### Curriculum: Final year

Minimum credits: 136

#### Core modules

Automation 410 (EBT 410) - Credits: 16.00
Research project 424 (EES 424) - Credits: 16.00
Advanced electronics 410 (ENE 410) - Credits: 16.00
Project 400 (EPR 400) - Credits: 64.00
Practical training and report 423 (EPY 423) - Credits: 16.00
DSP programming and application 411 (ESP 411) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

## BEng Industrial Engineering (12130001)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**

A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.

- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student’s group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of

study.

c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits

per semester by more than 16 credits.

d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 144

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Professional and technical communication 210 (BJJ 210) - Credits: 8.00
Productivity 220 (BPZ 220) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Manufacturing and design 217 (MOW 217) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 154

### Core modules

Industrial analysis 313 (BAN 313) - Credits: 8.00
Facilities planning 320 (BFB 320) - Credits: 8.00
Information systems design 320 (BID 320) - Credits: 16.00
Industrial logistics 320 (BLK 320) - Credits: 16.00
Operational management 310 (BOB 310) - Credits: 16.00
Operational research 312 (BOZ 312) - Credits: 16.00
Practical training 310 (BPY 310) - Credits: 16.00
Business engineering 321 (BPZ 321) - Credits: 16.00
Engineering management 310 (BSS 310) - Credits: 8.00
Simulation modelling 321 (BUY 321) - Credits: 16.00
Financial management 110 (FBS 110) - Credits: 10.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Manufacturing systems 311 (MVS 311) - Credits: 16.00

## Curriculum: Final year

Minimum credits: 144

### Core modules

Labour relations 320 (ABV 320) - Credits: 20.00
Business law 310 (BER 310) - Credits: 16.00
Quality assurance 410 (BGC 410) - Credits: 16.00
Engineering economics 420 (BIE 420) - Credits: 8.00
Operational research 410 (BON 410) - Credits: 16.00
Project 410 (BPJ 410) - Credits: 16.00
Project 420 (BPJ 420) - Credits: 24.00
Practical training 410 (BPY 410) - Credits: 16.00
Business engineering 421 (BPZ 421) - Credits: 16.00
Management accounting 410 (BSR 410) - Credits: 16.00
Systems engineering 410 (BSS 410) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

## BEng Industrial Engineering ENGAGE (12136001)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set

out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Chemistry 1 111 (JPO 111) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Physics 122 (JPO 122) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 122

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Professional and technical communication 210 (BJJ 210) - Credits: 8.00
Productivity 220 (BPZ 220) - Credits: 16.00
Manufacturing and design 217 (MOW 217) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 154

### Core modules

Industrial analysis 313 (BAN 313) - Credits: 8.00
Facilities planning 320 (BFB 320) - Credits: 8.00
Information systems design 320 (BID 320) - Credits: 16.00
Industrial logistics 320 (BLK 320) - Credits: 16.00
Operational management 310 (BOB 310) - Credits: 16.00
Operational research 312 (BOZ 312) - Credits: 16.00
Practical training 310 (BPY 310) - Credits: 16.00
Business engineering 321 (BPZ 321) - Credits: 16.00
Engineering management 310 (BSS 310) - Credits: 8.00
Simulation modelling 321 (BUY 321) - Credits: 16.00
Financial management 110 (FBS 110) - Credits: 10.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Manufacturing systems 311 (MVS 311) - Credits: 16.00

## Curriculum: Final year

Minimum credits: 144

### Core modules

Labour relations 320 (ABV 320) - Credits: 20.00
Business law 310 (BER 310) - Credits: 16.00
Quality assurance 410 (BGC 410) - Credits: 16.00
Engineering economics 420 (BIE 420) - Credits: 8.00
Operational research 410 (BON 410) - Credits: 16.00
Project 410 (BPJ 410) - Credits: 16.00
Project 420 (BPJ 420) - Credits: 24.00
Practical training 410 (BPY 410) - Credits: 16.00
Business engineering 421 (BPZ 421) - Credits: 16.00
Management accounting 410 (BSR 410) - Credits: 16.00
Systems engineering 410 (BSS 410) - Credits: 16.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00

# BEng Mechanical Engineering (12130004)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

## Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.

- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| **Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Science** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics, Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| **ENGAGE Programme: Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Science** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

**Please note:** For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Electricity and electronics 111 (EBN 111) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 146

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Community-based project 203 (JCP 203) - Credits: 8.00
Professional and technical communication 210 (MJJ 210) - Credits: 8.00
Manufacturing and design 217 (MOW 217) - Credits: 16.00
Structural design 227 (MOW 227) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Solid mechanics 321 (MKM 321) - Credits: 16.00
Machine design 312 (MOW 312) - Credits: 16.00
Simulation-based design 323 (MOW 323) - Credits: 16.00
Practical training 315 (MPY 315) - Credits: 16.00
Structural mechanics 310 (MSY 310) - Credits: 16.00
Thermoflow 310 (MTV 310) - Credits: 16.00
Thermodynamics 311 (MTX 311) - Credits: 16.00
Vibration and noise 320 (MVR 320) - Credits: 16.00

### Curriculum: Final year

Minimum credits: 144

#### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00
Control systems 410 (MBB 410) - Credits: 16.00
Computational fluid dynamics 411 (MKM 411) - Credits: 16.00
Design project 410 (MOX 410) - Credits: 16.00
Practical training 415 (MPY 415) - Credits: 16.00
Research project 412 (MRN 412) - Credits: 16.00
Research project 422 (MRN 422) - Credits: 24.00
Thermoflow 410 (MTV 410) - Credits: 16.00
Thermal and fluid machines 420 (MTV 420) - Credits: 16.00

#### Elective modules

Porous flow 420 (MAN 420) - Credits: 16.00
Mechatronics 421 (MEG 421) - Credits: 16.00
Heat and mass transfer 420 (MHM 420) - Credits: 16.00
Maintenance engineering 420 (MII 420) - Credits: 16.00
Nuclear engineering 420 (MKI 420) - Credits: 16.00
Aeronautics 420 (MLV 420) - Credits: 16.00
Optimum design 420 (MOO 420) - Credits: 16.00
Fossil fuel power stations 420 (MUU 420) - Credits: 16.00
Vehicle engineering 420 (MVE 420) - Credits: 16.00
Numerical methods 420 (MWN 420) - Credits: 16.00

## BEng Mechanical Engineering ENGAGE (12136004)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study (Eng. 14)

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by

the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.

d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00

Additional Physics 152 (JPO 152) - Credits: 8.00
Additional Chemistry 1 161 (JPO 161) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 122

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Professional and technical communication 210 (MJJ 210) - Credits: 8.00
Manufacturing and design 217 (MOW 217) - Credits: 16.00
Structural design 227 (MOW 227) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Solid mechanics 321 (MKM 321) - Credits: 16.00
Machine design 312 (MOW 312) - Credits: 16.00
Simulation-based design 323 (MOW 323) - Credits: 16.00
Practical training 315 (MPY 315) - Credits: 16.00
Structural mechanics 310 (MSY 310) - Credits: 16.00

Thermoflow 310 (MTV 310) - Credits: 16.00
Thermodynamics 311 (MTX 311) - Credits: 16.00
Vibration and noise 320 (MVR 320) - Credits: 16.00

## Curriculum: Final year

Minimum credits: 144

### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00
Control systems 410 (MBB 410) - Credits: 16.00
Computational fluid dynamics 411 (MKM 411) - Credits: 16.00
Aeronautics 420 (MLV 420) - Credits: 16.00
Design project 410 (MOX 410) - Credits: 16.00
Practical training 415 (MPY 415) - Credits: 16.00
Research project 412 (MRN 412) - Credits: 16.00
Research project 422 (MRN 422) - Credits: 24.00
Thermoflow 410 (MTV 410) - Credits: 16.00
Thermal and fluid machines 420 (MTV 420) - Credits: 16.00

### Elective modules

Porous flow 420 (MAN 420) - Credits: 16.00
Mechatronics 421 (MEG 421) - Credits: 16.00
Heat and mass transfer 420 (MHM 420) - Credits: 16.00
Maintenance engineering 420 (MII 420) - Credits: 16.00
Nuclear engineering 420 (MKI 420) - Credits: 16.00
Aeronautics 420 (MLV 420) - Credits: 16.00
Optimum design 420 (MOO 420) - Credits: 16.00
Fossil fuel power stations 420 (MUU 420) - Credits: 16.00
Vehicle engineering 420 (MVE 420) - Credits: 16.00

# BEng Metallurgical Engineering (12130005)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

## Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**

A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.

c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

- Only presented in English from second year

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or Engels | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C-symbols  for Mathematics, Physics and Chemistry will be considered for admission provinding the required APS has been obtained.

| ENGAGE Programme: Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student’s group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application

on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.

d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.

e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1
Minimum credits: 144

### Fundamental modules
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules
General chemistry 171 (CHM 171) - Credits: 16.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00

Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 113 (NMC 113) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 162

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Mineralogy 210 (GMI 210) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Professional and technical communication 210 (NJJ 210) - Credits: 8.00
Materials science 223 (NMC 223) - Credits: 16.00
Process thermodynamics 220 (NPT 220) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Thermoflow 310 (MTV 310) - Credits: 16.00
Electrochemistry 310 (NEC 310) - Credits: 16.00
Excursions 320 (NEX 320) - Credits: 8.00
Hydrometallurgy 322 (NHM 322) - Credits: 16.00
Materials science 313 (NMC 313) - Credits: 16.00
Mechanical metallurgy 320 (NMM 320) - Credits: 16.00
Minerals processing 310 (NMP 310) - Credits: 16.00
Pyrometallurgy 321 (NPM 321) - Credits: 16.00
Industrial training 316 (NPY 316) - Credits: 16.00
Refractory materials 321 (NVM 321) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 136

### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00

Hydrometallurgy 412 (NHM 412) - Credits: 16.00
Minerals processing 411 (NMP 411) - Credits: 16.00
Process design 421 (NOP 421) - Credits: 32.00
Process metallurgy and control 412 (NPB 412) - Credits: 8.00
Metals processing 411 (NPW 411) - Credits: 16.00
Industrial training 416 (NPY 416) - Credits: 16.00
Literature survey 412 (NSC 412) - Credits: 8.00
Project 422 (NSC 422) - Credits: 32.00

## BEng Metallurgical Engineering ENGAGE (12136005)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g. Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO

110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second",**

**"third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and

ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Additional Physics 152 (JPO 152) - Credits: 8.00
Additional Chemistry 1 161 (JPO 161) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 123 (NMC 123) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 138

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Electrical engineering 221 (EIR 221) - Credits: 16.00

Mineralogy 210 (GMI 210) - Credits: 16.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Professional and technical communication 210 (NJJ 210) - Credits: 8.00
Materials science 223 (NMC 223) - Credits: 16.00
Process thermodynamics 220 (NPT 220) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

### Curriculum: Year 4

Minimum credits: 144

#### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Thermoflow 310 (MTV 310) - Credits: 16.00
Electrochemistry 310 (NEC 310) - Credits: 16.00
Excursions 320 (NEX 320) - Credits: 8.00
Hydrometallurgy 322 (NHM 322) - Credits: 16.00
Materials science 313 (NMC 313) - Credits: 16.00
Mechanical metallurgy 320 (NMM 320) - Credits: 16.00
Minerals processing 310 (NMP 310) - Credits: 16.00
Pyrometallurgy 321 (NPM 321) - Credits: 16.00
Industrial training 316 (NPY 316) - Credits: 16.00
Refractory materials 321 (NVM 321) - Credits: 8.00

### Curriculum: Final year

Minimum credits: 136

#### Core modules

Engineering professionalism 410 (IPI 410) - Credits: 8.00
Hydrometallurgy 412 (NHM 412) - Credits: 16.00
Minerals processing 411 (NMP 411) - Credits: 16.00
Process design 421 (NOP 421) - Credits: 32.00
Process metallurgy and control 412 (NPB 412) - Credits: 8.00
Metals processing 411 (NPW 411) - Credits: 16.00
Industrial training 416 (NPY 416) - Credits: 16.00
Literature survey 412 (NSC 412) - Credits: 8.00
Project 422 (NSC 422) - Credits: 32.00

## BEng Mining Engineering (12130006)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority

(SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics, engineering practice (11%).

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the conditional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required.
- Conditional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below. ?
- **Note:** Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English, 6 for Mathematics and 5 for Physical Science, will be

considered for conditional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.

- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in English, together with an APS of 25.
- Students may apply directly to be considered for the ENGAGE programme.
- Tuition will be presented in English only.

| **Minimum requirements** | | | | | | |
|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | |
| **English Home Language or English First Additional Language** | | **Mathematics** | | **Physical Science** | | **APS** |
| NSC/IEB | AS Level | NSC/IEB | AS Level | NSC/IEB | AS Level | |
| 5 | C | 6 | B | 6 | B | **35** |

* Cambridge A level candidates who obtained at least a D in the required subjects, will be considered for admission. International Baccalaureate (IB) HL candidates who obtained at least a 4 in the required subjects, will be considered for admission.

| **ENGAGE Programme minimum requirements** | | | | | | |
|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | |
| **English Home Language or English First Additional Language** | | **Mathematics** | | **Physical Science** | | **APS** |
| NSC/IEB | AS Level | NSC/IEB | AS Level | NSC/IEB | AS Level | |
| 4 | D | 5 | C | 4 | D | **25** |

## Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.

5. Offering of electives depends on the availability of resources and industry support.

## Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to

any module at third year level (level 300).

c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Physics 176 (FSK 176) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Materials science 113 (NMC 113) - Credits: 16.00
Workshop practice 121 (PWP 121) - Credits: 8.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 154

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Community-based project 203 (JCP 203) - Credits: 8.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Professional and technical communication 210 (PJJ 210) - Credits: 8.00
Introduction to mining 210 (PMY 210) - Credits: 8.00
Experiential training 220 (PPY 220) - Credits: 16.00
Surveying 220 (SUR 220) - Credits: 14.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Geology for engineering 256 (GLY 256) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Thermoflow 310 (MTV 310) - Credits: 16.00
Minerals processing 310 (NMP 310) - Credits: 16.00
Mineral economics 320 (PME 320) - Credits: 16.00

Surface mining and geotechnics 311 (PMY 311) - Credits: 16.00
Mining 320 (PMY 320) - Credits: 16.00
Industrial excursions 300 (PNB 300) - Credits: 8.00
Experiential training 320 (PPY 320) - Credits: 16.00
Explosives engineering 321 (PRX 321) - Credits: 8.00
Introduction to project 321 (PSC 321) - Credits: 8.00

### Curriculum: Final year

Minimum credits: 154

#### Core modules

Structural geology 254 (GLY 254) - Credits: 12.00
Geodynamics and ore formation 352 (GLY 352) - Credits: 18.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00
Mine ventilation engineering 410 (PEE 410) - Credits: 16.00
Mining 410 (PMY 410) - Credits: 16.00
Mine operational risk management 423 (PMY 423) - Credits: 8.00
Mine design and research 422 (PMZ 422) - Credits: 42.00
Industrial excursions 400 (PNB 400) - Credits: 8.00
Project 411 (PSC 411) - Credits: 10.00
Strata control 410 (PSZ 410) - Credits: 16.00

## BEng Mining Engineering ENGAGE (12136006)

| | |
|---|---|
| **Minimum duration of study** | 5 years |

### Programme information

**Please note:** The Engineering Augmented Degree Programme (ENGAGE) is an extended degree programme with a five-year curriculum. It is designed to enable students who show academic potential but who do not meet the normal entry requirements for the four-year degree programme, to obtain an Engineering degree. ENGAGE students spend the first three years of the programme covering the content of the first two years of the four-year degree programme. They also take compulsory augmented modules in each of the Level 1 subjects. These augmented modules provide students with background knowledge and skills needed to succeed in an engineering degree. The curriculum for years four and five of the ENGAGE programme are identical to the curriculum for years 3 and 4 of the 4-year programme, respectively. Students may apply directly for admission to the programme.

- Students must register for the entire programme, not components of it. The curriculum is fixed; there are no electives.
- Attendance at all components of years 1 to 3 of the programme is compulsory. Non-attendance will only be condoned in the case of illness (sick note required) or family crisis (e.g. a death in the family), in which case students must inform the programme administration immediately.
- Students who fail to meet the attendance requirement for any module in any semester of years 1 to 3 of the programme will be excluded from the programme.
- No augmented module may be repeated more than once.
- Selection into the programme will be based on a combination of performance in the National Senior Certificate examinations or equivalent and other selection tests approved by the faculty.
- A student who fails a mainstream module (e.g. Chemistry) but passes the associated augmented module (e.g.

Additional chemistry) does not need to repeat the augmented module.
- A student who fails an augmented module (e.g. Additional chemistry) but passes the associated mainstream module (e.g. Chemistry) does not need to repeat the mainstream module.
- A student must meet the attendance requirement and obtain at least 40% for both the continuous assessment and test components as well as a final mark of 50% in order to pass an augmented module.

i. The curricula of the fourth and the fifth years of study are identical to those of the third and the fourth years of the four-year programme.
ii. JPO 110 is a prerequisite for JPO 120. Credit for JPO is obtained with a final mark of more than 50%. Conditional admission to JPO 120: If the final mark for JPO 110 is between 45% and 49%, a student can register for JPO 120 but credit for JPO 110 and JPO 120 will only be obtained if the final combined mark for JPO 110 and JPO 120 is above 50%.

**Please note:** All students will be required to successfully complete JCP 203, Community-based project 203, as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study (Eng. 14)

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed that each student will have easy access to a personal computer.
ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean

may, on recommendation of the relevant head of department, permit a student to exceed the above limit.

d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

## Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 128

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

General chemistry 172 (CHM 172) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Professional orientation 110 (JPO 110) - Credits: 8.00
Additional Mathematics 1 116 (JPO 116) - Credits: 8.00
Professional orientation 120 (JPO 120) - Credits: 8.00
Additional Mathematics 2 126 (JPO 126) - Credits: 8.00
Additional Physics 152 (JPO 152) - Credits: 8.00
Additional Chemistry 1 161 (JPO 161) - Credits: 8.00
Workshop practice 121 (PWP 121) - Credits: 8.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 120

### Core modules

Electricity and electronics 111 (EBN 111) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Additional Electricity and electronics 112 (JPO 112) - Credits: 8.00
Additional Graphical communication 113 (JPO 113) - Credits: 8.00
Additional Materials science 123 (JPO 123) - Credits: 8.00
Additional Mechanics 125 (JPO 125) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00

Materials science 123 (NMC 123) - Credits: 16.00
Experiential training 220 (PPY 220) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

## Curriculum: Year 3

Minimum credits: 130

### Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Dynamics 210 (MSD 210) - Credits: 16.00
Thermodynamics 221 (MTX 221) - Credits: 16.00
Professional and technical communication 210 (PJJ 210) - Credits: 8.00
Introduction to mining 210 (PMY 210) - Credits: 8.00
Surveying 220 (SUR 220) - Credits: 14.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00

## Curriculum: Year 4

Minimum credits: 144

### Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Geology for engineering 256 (GLY 256) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00
Thermoflow 310 (MTV 310) - Credits: 16.00
Minerals processing 310 (NMP 310) - Credits: 16.00
Mineral economics 320 (PME 320) - Credits: 16.00
Surface mining and geotechnics 311 (PMY 311) - Credits: 16.00
Mining 320 (PMY 320) - Credits: 16.00
Industrial excursions 300 (PNB 300) - Credits: 8.00
Experiential training 320 (PPY 320) - Credits: 16.00
Explosives engineering 321 (PRX 321) - Credits: 8.00
Introduction to project 321 (PSC 321) - Credits: 8.00

## Curriculum: Final year

Minimum credits: 154

### Core modules

Structural geology 254 (GLY 254) - Credits: 12.00
Geodynamics and ore formation 352 (GLY 352) - Credits: 18.00
Engineering professionalism 410 (IPI 410) - Credits: 8.00
Mine ventilation engineering 410 (PEE 410) - Credits: 16.00
Mining 410 (PMY 410) - Credits: 16.00
Mine operational risk management 423 (PMY 423) - Credits: 8.00

Mine design and research 422 (PMZ 422) - Credits: 42.00
Industrial excursions 400 (PNB 400) - Credits: 8.00
Project 411 (PSC 411) - Credits: 10.00
Strata control 410 (PSZ 410) - Credits: 16.00

## BIS Information Science (12131012)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Prof MA Holmner marlene.holmner@up.ac.za +27 (0)124205215 |

### Programme information

The increasing amount of information available and developing information needs have necessitated the training of information intermediaries to effectively facilitate the bringing together of users and the information they require.

This package focuses on the use of information technology and the processing of information products and is designed to train students in the management, retrieval and organisation of information, as well as to teach them how to add value to, package and distribute information. Students will also have the opportunity to develop knowledge and skills in the management of one of the most important resources of enterprises – information and knowledge. Two or three specialisation options are available, depending on the electives chosen.

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 25 to 27, consideration for admission will be based on the results of the NBT, provided the quotas regarding student numbers have not been reached. If informatics is selected at first-year level, an achievement level of 5 is required in Mathematics.

| **Minimum requirements** | | | | |
|---|---|---|---|---|
| **Achievement level** | | | | |
| **Afrikaans or English** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | |

| | | | | |
|---|---|---|---|---|
| 4 | 3 | D | D | 28 (25-27 admission based on the NBT) |

## Other programme-specific information

Because credits are not calculated in the same way in all faculties, students should ensure note that the total number of credits required for this package is at least 415-458 depending on the choice of elective modules (as required for Group A, B or C).

## Curriculum: Year 1

Minimum credits: 110

Elective modules: Select one group in consultation with the package organiser, at least 30 credits from any modules at year level one OR Select 50 credits from INF elective group.

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Information science 110 (INL 110) - Credits: 12.00
Information science 120 (INL 120) - Credits: 12.00
Information science 130 (INL 130) - Credits: 12.00
Information science 140 (INL 140) - Credits: 12.00
Business management 114 (OBS 114) - Credits: 10.00
Business management 124 (OBS 124) - Credits: 10.00

### Elective modules

Afrikaans 110 (AFR 110) - Credits: 12.00
Afrikaans 120 (AFR 120) - Credits: 12.00
Archaeology 110 (AGL 110) - Credits: 12.00
Archaeology 120 (AGL 120) - Credits: 12.00
Industrial and organisational psychology 110 (BDO 110) - Credits: 10.00
Industrial and organisational psychology 120 (BDO 120) - Credits: 10.00
Heritage and cultural tourism 110 (EFK 110) - Credits: 12.00
Heritage and cultural tourism 120 (EFK 120) - Credits: 12.00
English 110 (ENG 110) - Credits: 12.00
English 120 (ENG 120) - Credits: 12.00
Informatics 112 (INF 112) - Credits: 10.00
Informatics 154 (INF 154) - Credits: 10.00
Informatics 164 (INF 164) - Credits: 10.00
Informatics 171 (INF 171) - Credits: 20.00
Criminology 110 (KRM 110) - Credits: 12.00
Criminology 120 (KRM 120) - Credits: 12.00
Public administration 112 (PAD 112) - Credits: 10.00

Public administration 122 (PAD 122) - Credits: 10.00
Psychology 110 (SLK 110) - Credits: 12.00
Psychology 120 (SLK 120) - Credits: 12.00
Sociology 110 (SOC 110) - Credits: 12.00
Sociology 120 (SOC 120) - Credits: 12.00

## Curriculum: Year 2

Minimum credits: 160

Elective modules: Select one group in consultation with the package organiser, at least 63 credits from INF elective group OR Select 60 credits from INL elective group.

### Fundamental modules

Community-based project 202 (JCP 202) - Credits: 8.00

### Core modules

Information science 210 (INL 210) - Credits: 20.00
Information science 220 (INL 220) - Credits: 20.00
Information science 240 (INL 240) - Credits: 20.00
Business management 210 (OBS 210) - Credits: 16.00
Business management 220 (OBS 220) - Credits: 16.00

### Elective modules

Informatics 214 (INF 214) - Credits: 14.00
Informatics 225 (INF 225) - Credits: 14.00
Informatics 261 (INF 261) - Credits: 7.00
Informatics 271 (INF 271) - Credits: 14.00
Informatics 272 (INF 272) - Credits: 14.00
Information science 230 (INL 230) - Credits: 20.00
Information science 260 (INL 260) - Credits: 20.00
Information science 270 (INL 270) - Credits: 20.00

## Curriculum: Final year

Minimum credits: 145

Elective modules: Select one group in consultation with the package organiser,

Group A (70 credits) Select two INF modules and at least 40 credits OBS modules at year level 3.

Group B (90 credits) Select three INL modules

Group C (90 credits) Select two INF modules and at least 60 credits from Group B.

### Core modules

Information science: Information organisation 310 (INL 310) - Credits: 30.00
Information science: Information and knowledge management 320 (INL 320) - Credits: 30.00
Information science 370 (INL 370) - Credits: 15.00

### Elective modules

Informatics 315 (INF 315) - Credits: 15.00
Informatics 324 (INF 324) - Credits: 15.00
Information science: Digital repositories 340 (INL 340) - Credits: 30.00

Information science: Socio-political aspects of information in global context 360 (INL 360) - Credits: 30.00
Information science: Competitive intelligence 380 (INL 380) - Credits: 30.00

## BIS Multimedia (12131013)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Mr JW de Beer koos.debeer@up.ac.za +27 (0)124202833 |

### Programme information

Modern information technology offers the possibility of information products being designed and created comprising various types of media over and above the traditional text medium. Information technology therefore results in the convergence of various previously separate traditional media. There is not a single discipline that handles the combination of information products. The multimedia qualification in the department of Information science addresses this shortcoming. Any type of institution in all economic spheres, including government, may profit from a multimedia approach to information design, organisation and retrieval.

Multimedia documents include text, graphics, sound, video and animation. The purpose of this qualification is to enable students to understand the necessary concepts to build multimedia products and maintain the products. This programme is therefore a combination of theory and practice. The explosion of the web, as well as the exponential growth and power of information technology, requires the introduction of this degree following international trends.

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 26 to 29, consideration for admission will be based on the results of the NBT, provided that quotas regarding student numbers have not been reached.

| **Minimum requirements** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 30 (26-29 admission based on the NBT) |

## Other programme-specific information

**Please Note:**

The semester in which these modules are offered may vary from year to year.

Students who wish to continue with a BScHons (CS) should consult the Computer Science department for the correct admission requirements to the degree. COS 301 and three COS electives are compulsory admission requirements for BScHons (CS).

## Pass with distinction

A degree (undergraduate) in the School of IT is conferred with distinction on a student who did not repeat any module of his/her final year, obtained a weighted average of at least 75% in all the prescribed modules for the final year, provided that a subminimum of 65% is obtained in each of these modules and provided that the degree is completed in the prescribed minimum period of time. Ad hoc cases will be considered by the Dean, in consultation with the head of the relevant department.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Introduction to computer science 151 (COS 151) - Credits: 8.00
Multimedia 110 (IMY 110) - Credits: 12.00
Multimedia 120 (IMY 120) - Credits: 12.00
Information science 110 (INL 110) - Credits: 12.00
Information science 120 (INL 120) - Credits: 12.00
Information science 140 (INL 140) - Credits: 12.00
Visual design (1) 102 (VIO 102) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 184

### Fundamental modules

Community-based project 202 (JCP 202) - Credits: 8.00

### Core modules

Data structures and algorithms 212 (COS 212) - Credits: 16.00
Software modelling 214 (COS 214) - Credits: 16.00
Netcentric computer systems 216 (COS 216) - Credits: 16.00
Concurrent systems 226 (COS 226) - Credits: 16.00

Computer organisation and architecture 284 (COS 284) - Credits: 16.00
Multimedia 210 (IMY 210) - Credits: 16.00
Multimedia 211 (IMY 211) - Credits: 20.00
Multimedia 220 (IMY 220) - Credits: 16.00
Publishing 210 (PUB 210) - Credits: 20.00
Visual design (2) 202 (VIO 202) - Credits: 24.00

## Curriculum: Final year

Minimum credits: 141

### Core modules

Multimedia: Project 300 (IMY 300) - Credits: 45.00
Multimedia 310 (IMY 310) - Credits: 30.00
Multimedia 320 (IMY 320) - Credits: 30.00

### Elective modules

Software engineering 301 (COS 301) - Credits: 27.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Database systems 326 (COS 326) - Credits: 18.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Computer networks 332 (COS 332) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Compiler construction 341 (COS 341) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00

# BIS Publishing (12131014)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Prof EH le Roux beth.leroux@up.ac.za +27 (0)124202426 |

## Programme information

This package contextualises the South African publishing industry, with specific application to book publishing and corporate publishing. The objectives are to equip students with background knowledge on the industry, role players and trends, as well as with specific skills linked to the publishing value chain. These skills include: the commissioning of manuscripts aimed at specific markets; the management of the design, reproduction and printing phase; copy-editing and proofreading; financial and marketing management. Students are empowered to act as responsible information intermediaries who can add value to publications during the various phases of the publishing process.

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.

- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 25 to 27, consideration for admission will be based on the results of the NBT, provided the quotas regarding student numbers have not been reached.

| Minimum requirements | | | | |
|---|---|---|---|---|
| Achievement level | | | | |
| Afrikaans or English | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 28 (25-27 admission based on the NBT) |

## Other programme-specific information

- Select a **language** up to year-level 3, from one of the language module groups, e.g. Afrikaans, English, German, French or an African language in consultation with the package organiser. A language for beginners may not be selected.
- Select modules to the level of **24 credits** on **year-level 1** of the selected language.
- Continue with the same **language** as selected on year-level 1 up to year-level 3.
- Select modules to the value of **40 credits** on **year-level 2** of the selected language.
- Select modules to the value of **30 credits** on **year-level** 3 of the selected language.
- Students who wish to continue with language studies at postgraduate level should consult the specific department for the selection of their modules and may possibly have to select additional modules.

See Language groups for more information

**LANGUAGE GROUPS FOR SELECTION IN PROGRAMMES**

Note: You should consult the alphabetical list of modules for full information on all the language modules listed below, as some of these modules have specific requirements/prerequisites.

**Module group 1 – Afrikaans**

**Year level 1**

• As a first language: AFR 110,120

• For speakers of other languages (also for speakers of other languages who are registered for qualifications in education and law) AFR 114

• For law students (first language): AFR 110 Note: AFR 120 may be taken additionally.

• For students following a programme in education: AFR 110,120; (first language); AFR 114 (speakers of other languages)

**Year level 2**

• As a first language: AFR 214, AFR 210,220

• For students following a programme in education: AFR 214, AFR 220

• Language, culture, communication and media: LCC 210,220

**Year level 3**

• As a first language: AFR 311,321

• For students following a programme in education: Any modules with alpha codes AFR and LCC offered at year level 3.
• Language, culture, communication and media: LCC 312,320,322

**Module group 2 – English**

**Year level 1**

• For special purposes: ENG 118
• For academic purposes: ENG 110,120

**Year level 2**

ENG 210,220

**Year level 3**

• ENG 310,320
• ENG 311,322

**Module group 3 – French**

**Year level 1**

• For beginners: FRN 104,181 (LLM students)
• Cultural-professional (for students who have passed French in Grade 12): FRN 113,123

**Year level 2**

FRN 211,221

**Year level 3**

Cultural-professional: FRN 361,362,363,364

**Module group 4 – German**

**Year level 1**

• For beginners: DTS 104
• Cultural-professional (for students who have passed German in Grade 12): DTS 113,123

**Year level 2**

DTS 211,221

**Year level 3**

Cultural-professional: DTS 361,362,363,364

**Module group 5 – Greek**

**Year level 1**

GRK 110,120

**Year level 2**

GRK 210,220

**Module group 6 – Hebrew**

**Year level 1**

HEB 110,120

**Year level 2**

HEB 210,220

**Module group 7 – Latin**

**Year level 1**

LAT 110,120 (students who passed Latin in Grade 12 may start immediately with Latin at year level 2)

**Year level 2**

LAT 210,220

**Year level 3**
LAT 310,320

**Module group 8 – IsiNdebele**

**Year level 1**
For speakers of isiNdebele as home language or first or second additional language
NDE 110, AFT 121

**Year level 2**
NDE 210, AFT 220

**Year level 3**
NDE 310, AFT 320

**Module group 9 – IsiZulu**

**Year level 1**
- For beginners: ZUL 110,120
- For speakers of isiZulu as home language or first or second additional language: ZUL 111, AFT 121

**Year level 2**
- For students who did ZUL 110,120 at year level 1: ZUL 210,220
- For students who did AFT 121: ZUL 111 at year level 1: AFT 220, ZUL 211

**Year level 3**
ZUL 310, AFT 320

**Module group 10 – Sepedi**

**Year level 1**
- For beginners: SEP 110,120
- For speakers of Sepedi as home language or first or second additional language: SEP 111, AFT 121

**Year level 2**
- For students who did SEP 110,120 at year level 1: SEP 210,220
- For students who did AFT 121, SEP 111 at year level 1: AFT 220, SEP 211

**Year level 3**
SEP 310, AFT 320

**Module group 11 – Setswana**

**Year level 1**
- For beginners: STW 110,120
- For speakers of Setswana as home language or first or second additional language: STW 111, AFT 121

**Year level 2**
- For students who did STW 110,120 at year level 1: STW 210,220
- For students who did AFT 121, STW 111 at year level 1: AFT 220, STW 211

**Year level 3**
STW 310, AFT 320

**Module group 12 – Spanish**

**Year level 1**
For beginners: SPN 101,102

**Year level 2**
SPN 211,221

**Year level 3**

SPN 311,321

**Module group 13 – Portuguese**

**Year level 1**

• For beginners: PTG 101

• Portuguese language and culture (for students who have passed Portuguese in Gr 12): PTG 113,123

**Year level 2**

PTG 211,221

**Year level 3**

PTG 311,321

## Pass with distinction

A degree (undergraduate) in the School of IT is conferred with distinction on a student who did not repeat any module of his/her final year, obtained a weighted average of at least 75% in all the prescribed modules for the final year, provided that a subminimum of 65% is obtained in each of these modules and provided that the degree is completed in the prescribed minimum period of time. Ad hoc cases will be considered by the Dean, in consultation with the head of the relevant department.

## Curriculum: Year 1

Minimum credits: 142

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
English for specific purposes 118 (ENG 118) - Credits: 12.00
Academic orientation 112 (UPO 112) - Credits: 0.00
Visual culture studies 111 (VKK 111) - Credits: 12.00

### Core modules

Marketing Management 120 (BEM 120) - Credits: 10.00
Information science 110 (INL 110) - Credits: 12.00
Information science 130 (INL 130) - Credits: 12.00
Information science 140 (INL 140) - Credits: 12.00
Publishing: Introduction to publishing 110 (PUB 110) - Credits: 12.00
Publishing 120 (PUB 120) - Credits: 12.00
Visual culture studies 123 (VKK 123) - Credits: 12.00

### Elective modules

Afrikaans 110 (AFR 110) - Credits: 12.00
Afrikaans 120 (AFR 120) - Credits: 12.00
African languages literature: Capita selecta 121 (AFT 121) - Credits: 12.00
German: Cultural-professional (1) 113 (DTS 113) - Credits: 12.00
German: Cultural-professional (2) 123 (DTS 123) - Credits: 12.00
English 110 (ENG 110) - Credits: 12.00
English 120 (ENG 120) - Credits: 12.00
French: Cultural-professional (1) 113 (FRN 113) - Credits: 12.00

French: Cultural-professional (2) 123 (FRN 123) - Credits: 12.00
Introduction to isiNdebele Grammar – Capita selecta 110 (NDE 110) - Credits: 12.00
Introduction to Sepedi grammar - Capita Selecta 111 (SEP 111) - Credits: 12.00
Introduction to isiZulu grammar – Capita selecta 111 (ZUL 111) - Credits: 12.00

## Curriculum: Year 2

Minimum credits: 148

### Fundamental modules

Community-based project 202 (JCP 202) - Credits: 8.00

### Core modules

Information science 240 (INL 240) - Credits: 20.00
Popular fiction 220 (LCC 220) - Credits: 20.00
Publishing 210 (PUB 210) - Credits: 20.00
Publishing 220 (PUB 220) - Credits: 20.00
Visual culture studies 211 (VKK 211) - Credits: 20.00

### Elective modules

Afrikaans 214 (AFR 214) - Credits: 20.00
Afrikaans 220 (AFR 220) - Credits: 20.00
African languages literature: Capita selecta 220 (AFT 220) - Credits: 20.00
German: Intermediate (1) 211 (DTS 211) - Credits: 20.00
German: Intermediate (2) 221 (DTS 221) - Credits: 20.00
Modern English literature and English studies 210 (ENG 210) - Credits: 20.00
English 220 (ENG 220) - Credits: 20.00
French: Intermediate (1) 211 (FRN 211) - Credits: 20.00
French: Intermediate (2) 221 (FRN 221) - Credits: 20.00
isiNdebele 210 (NDE 210) - Credits: 20.00
Sepedi grammar – Capita selecta 211 (SEP 211) - Credits: 20.00
IsiZulu grammar – Capita selecta 211 (ZUL 211) - Credits: 20.00

## Curriculum: Final year

Minimum credits: 150

### Core modules

Publishing 310 (PUB 310) - Credits: 30.00
Publishing 311 (PUB 311) - Credits: 30.00
Publishing 320 (PUB 320) - Credits: 30.00
Publishing 321 (PUB 321) - Credits: 30.00

### Elective modules

Afrikaans 311 (AFR 311) - Credits: 30.00
Afrikaans 321 (AFR 321) - Credits: 30.00
African languages literature: Capita selecta 320 (AFT 320) - Credits: 30.00
German: Cultural-professional (7) 361 (DTS 361) - Credits: 15.00
German: Cultural-professional (8) 362 (DTS 362) - Credits: 15.00
German: Cultural-professional (9) 363 (DTS 363) - Credits: 15.00
German: Cultural-professional (10) 364 (DTS 364) - Credits: 15.00

English 310 (ENG 310) - Credits: 30.00
English 311 (ENG 311) - Credits: 30.00
English 320 (ENG 320) - Credits: 30.00
English 322 (ENG 322) - Credits: 30.00
French: Cultural-professional (7) 361 (FRN 361) - Credits: 15.00
French: Cultural-professional (8) 362 (FRN 362) - Credits: 15.00
French: Cultural-professional (9) 363 (FRN 363) - Credits: 15.00
French: Cultural-professional (10) 364 (FRN 364) - Credits: 15.00
isiNdebele 310 (NDE 310) - Credits: 30.00
Sepedi 310 (SEP 310) - Credits: 30.00
isiZulu 310 (ZUL 310) - Credits: 30.00

## BIT (12131020)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 26 to 29, consideration for admission will be based on the results of the NBT, provided the quotas regarding student numbers have not been reached.

| **Minimum requirements** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 5 | 3 | C | C | 30 (26-29 admission based on the NBT) |

### Other programme-specific information

Note that a student who wishes to continue with an MSc(Computer Science) or MCom(Informatics) or MIS (Information Science) should take four of the five honours modules from that specific department in their fourth year of study.

## Promotion to next study year

Also consult the G Regulations.

i. A student is promoted to the following year of study after obtaining the required credits as mentioned below:

- Second year of study after obtaining at least 70% of the credits of the first year of study.
- Third year of study after obtaining at least 70% of the credits of the second year of study.
- Fourth year of study after obtaining at least 70% of credits of the third year of study.

ii. The degree is conferred if all the prescribed modules have been passed.

## Curriculum: Year 1

Minimum credits: 144

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Introduction to computer science 151 (COS 151) - Credits: 8.00
Informatics 171 (INF 171) - Credits: 20.00
Information science 110 (INL 110) - Credits: 12.00
Business management 114 (OBS 114) - Credits: 10.00
Business management 124 (OBS 124) - Credits: 10.00
Discrete structures 115 (WTW 115) - Credits: 8.00
Mathematics 134 (WTW 134) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 156

### Core modules

Data structures and algorithms 212 (COS 212) - Credits: 16.00
Software modelling 214 (COS 214) - Credits: 16.00
Netcentric computer systems 216 (COS 216) - Credits: 16.00
Computer organisation and architecture 284 (COS 284) - Credits: 16.00
Multimedia 210 (IMY 210) - Credits: 16.00
Multimedia 220 (IMY 220) - Credits: 16.00
Informatics 214 (INF 214) - Credits: 14.00
Informatics 271 (INF 271) - Credits: 14.00
Information science 210 (INL 210) - Credits: 20.00
Information science 240 (INL 240) - Credits: 20.00
Discrete structures 285 (WTW 285) - Credits: 12.00

## Curriculum: Year 3
Minimum credits: 131

### Core modules
Software engineering 301 (COS 301) - Credits: 27.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Computer networks 332 (COS 332) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Compiler construction 341 (COS 341) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00
Multimedia: Project 300 (IMY 300) - Credits: 45.00
Informatics 315 (INF 315) - Credits: 15.00
Informatics 324 (INF 324) - Credits: 15.00
Informatics 370 (INF 370) - Credits: 35.00
Information science: Information organisation 310 (INL 310) - Credits: 30.00
Information science: Information and knowledge management 320 (INL 320) - Credits: 30.00
Community-based project 202 (JCP 202) - Credits: 8.00

## Curriculum: Final year
Minimum credits: 127

### Core modules
Industry-based learning 700 (SIT 700) - Credits: 52.00

### Elective modules
Computer and information security (I) 720 (COS 720) - Credits: 15.00
Software engineering (I) 730 (COS 730) - Credits: 15.00
Software engineering (II) 731 (COS 731) - Credits: 15.00
Formal aspects of computing (I) 740 (COS 740) - Credits: 15.00
Formal aspects of computing (II) 741 (COS 741) - Credits: 15.00
Educational software development 750 (COS 750) - Credits: 15.00
Data mining 781 (COS 781) - Credits: 15.00
Generic programming 782 (COS 782) - Credits: 15.00
Digital forensics and investigations 783 (COS 783) - Credits: 15.00
Computer networks 784 (COS 784) - Credits: 15.00
Parallel and distributed computing 786 (COS 786) - Credits: 15.00
Spatial databases 787 (COS 787) - Credits: 15.00
Multimedia trends 771 (IMY 771) - Credits: 15.00
Hypermedia and mark-up languages 772 (IMY 772) - Credits: 15.00
Multimedia technology 773 (IMY 773) - Credits: 15.00
Animation theory and practice 777 (IMY 777) - Credits: 15.00
Human-computer interaction 779 (IMY 779) - Credits: 15.00
Enterprise architecture 715 (INF 715) - Credits: 15.00
Capita selecta 716 (INF 716) - Credits: 15.00
Electronic commerce 782 (INF 782) - Credits: 15.00
Advanced database systems 785 (INF 785) - Credits: 15.00
Managing projects and end-users 787 (INF 787) - Credits: 15.00

Information systems development 788 (INF 788) - Credits: 15.00
Capita selecta 790 (INF 790) - Credits: 15.00
Knowledge acquisition and sharing 791 (INF 791) - Credits: 15.00
Information and knowledge management (I) 713 (INY 713) - Credits: 15.00
Information ethics 715 (INY 715) - Credits: 15.00
Information and knowledge management (II) 716 (INY 716) - Credits: 15.00
Information society 722 (INY 722) - Credits: 15.00
Competitive intelligence (I) 726 (INY 726) - Credits: 15.00
Competitive intelligence (II) 727 (INY 727) - Credits: 15.00
Information communication 730 (INY 730) - Credits: 15.00

## BSc Architecture (12132018)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Dr N Botes nico.botes@up.ac.za +27 (0)124204600 |

### Programme information

Architecture entails the design of buildings and the spaces between those buildings. Art and science are employed to create liveable environments, that contribute towards the spiritual and material prosperity of the country. Architects are often innovative, critical thinkers that lead and form part of consultant teams. Although they are employed by organisations involved with development, investment, research, marketing, the industry or even education, many architects prefer to be independent consultants and entrepreneurs.

BScArch is regarded as an exit level that enables the graduate to register as a candidate architectural technologist, and BArchHons as candidate senior architectural technologist, at the South African Council for the Architectural Profession. A architectural technologist is a professional person registered by the SACAP in terms of the Act on the Architectural Profession (Act 44 of 2000). Such practitioners provide assistance in the practices of the disciplines of architecture, interior architecture, landscape architecture and urban design where their responsibilities would be the documentation of projects, project administration and site management.

Students are advised to work in the offices of an architect to gain practical experience during the university recesses and during a year out after completion of the BScArch degree.

A graduate wishing to become a professional architect must apply for, and pursue, a further two years of full-time studies in the professional degree programme. The Master of Architecture (Professional) degree is recognised by the South African Council for the Architectural Profession as qualifying the graduate to register as a candidate professional architect in terms of the Act on the Architectural Profession (Act 44 of 2000).

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in

English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- BSc (Architecture) will only be considered as first study choice. Selection programme: Selection includes an interview.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Sciences | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 4 | 3 | D | D | 4 | 3 | D | D | 27 |

## Additional requirements

**Please Note:** Students wishing to transfer to other programmes in the Department of Architecture must obtain written consent from the admissions committee.

## Other programme-specific information

**Concurrent presentation**

In the third year of study Design, Construction, Design communication, Environmental studies and Earth studies must initially be examined in the same year.

The degree is awarded to those students obtaining all the prescribed credits for the programme modules.

## Promotion to next study year

A student is promoted to a subsequent year of study after acquiring all the prerequisite module credits of the preceding year of study.
A student is deemed to be in the year of study for which he or she is registered in Design.
If the student is not registered for Design the highest passed year of Design determines the year of study.

**Please Note**: Students not promoted to the next year of study must obtain the approval of the programme coordinator and the Head of Department to register for modules in the subsequent year of study. Students must re-apply for admission to the Department of Architecture in instances where:

i. a student is not promoted to the second year of study;
ii. a student after repeating any year of study, is not promoted to the following year of study.

## Pass with distinction

The degree is conferred with distinction on a student who, at first registration, passes all modules of the final year of study with a weighted average of 75%. The degree must have been completed within the minimum prescribed time and no supplementary/special examinations may have been written.

## Curriculum: Year 1

Minimum credits: 116

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Earth studies 110 (AAL 110) - Credits: 10.00

Academic information management 102 (AIM 102) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Elective module 110 (ARC 110) - Credits: 6.00
Construction 111 (KON 111) - Credits: 8.00
Construction 121 (KON 121) - Credits: 8.00
Design communication 120 (OKU 120) - Credits: 6.00
Environmental theory 110 (OML 110) - Credits: 6.00
Environmental studies 120 (OML 120) - Credits: 6.00
Design 100 (ONT 100) - Credits: 60.00

### Curriculum: Year 2

Minimum credits: 136

#### Core modules

Earth studies 210 (AAL 210) - Credits: 8.00
Earth studies 224 (AAL 224) - Credits: 4.00
Geomorphology of the built environment 265 (GGY 265) - Credits: 12.00
Community-based project 201 (JCP 201) - Credits: 8.00
Construction 210 (KON 210) - Credits: 8.00
Construction 220 (KON 220) - Credits: 8.00
Environmental theory 210 (OML 210) - Credits: 6.00
Environmental studies 220 (OML 220) - Credits: 6.00
Design 200 (ONT 200) - Credits: 60.00
Theory of structures 211 (STU 211) - Credits: 8.00
Theory of structures 221 (STU 221) - Credits: 8.00

### Curriculum: Final year

Minimum credits: 152

#### Core modules

Earth studies 320 (AAL 320) - Credits: 6.00
Business law 310 (BER 310) - Credits: 16.00
Construction 310 (KON 310) - Credits: 8.00
Construction 320 (KON 320) - Credits: 8.00
Design communication 313 (OKU 313) - Credits: 6.00
History of the environment 310 (OMG 310) - Credits: 6.00
History of the environment 320 (OMG 320) - Credits: 6.00
Environmental studies 310 (OML 310) - Credits: 6.00
Environmental studies 320 (OML 320) - Credits: 6.00
Design 300 (ONT 300) - Credits: 60.00
Practice management 320 (PJS 320) - Credits: 8.00
Theory of structures 311 (STU 311) - Credits: 8.00
Theory of structures 321 (STU 321) - Credits: 8.00

## BSc Computer Science (12134001)

| | |
|---|---|
| **Minimum duration of study** | 3 years |

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 26 to 29, consideration for admission will be based on the results of the NBT, provided the quotas regarding student numbers have not been reached.

| Minimum requirements | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 5 | 3 | C | C | 30 (26-29 admission based on the NBT) |

## Additional requirements

Please note that additional admission requirements may result from certain electives.

Candidates who do not comply with these requirements are advised to register for BSc IT, depending on whether they comply with the admission requirements the programme.

## Promotion to next study year

### General

a. A student must pass all the modules of the first year of study, before he or she is permitted to register for any module of the third year of study. Module prerequisites remain applicable. Exceptions to this rule will be considered by the relevant Head of Department and the Dean.
b. A student must pass all the modules of the second year of study, before he or she is permitted to register for any module of the fourth year of study (in the case of a four-year degree). Module prerequisites remain applicable. Exceptions to this rule will be considered by the relevant Head of Department and the Dean.
c. A new first-year student, who has failed in all the prescribed modules of the programme at the end of the first semester, will not be permitted to proceed to the second semester in the School of Information Technology.
d. A student who has not passed at least 70% of the credits of the current year of study after the November examinations will not be re-admitted to the School of Information Technology.
e. Students who fail a module for a second time, forfeit the privilege of registering for any modules of an

advanced year of study.

f. Students whose academic progress is not acceptable can be suspended from further studies.

**Procedure: Exclusion from and re-admission to further studies in the School of Information Technology**

a. A student who is excluded from further studies in terms of the stipulations of the abovementioned regulations will be notified in writing by the Dean or admissions committee of the School of Information Technology at the end of the relevant semester.
b. A student who has been excluded from further studies may apply in writing to the admissions committee of the School of Information Technology on level 6 in the Engineering building I for re-admission.
c. Written applications for re-admission to the second semester must be submitted at least 7 days before lectures resume for the second semester.
d. Written applications for re-admission to the new academic year must be submitted before 12 January.
e. Late applications will be accepted only in exceptional circumstances after approval by the Dean.
f. Should a student not be re-admitted to further studies by the admissions committee of the School of Information Technology, he/she will be informed in writing.
g. A student who is not re-admitted by the admissions committee of the School of Information Technology has the right to appeal to the Appeals Committee: Admissions in the Administration building, room 3-13.
h. Any decision taken by the Appeals Committee: Admissions is final.
i. Should the student be re-admitted by the Admissions Committee, strict conditions will be set which the student must comply with in order to proceed with his/her studies.
j. A student, who is repeating his or her year, may be permitted by the Dean, on recommendation of the relevant head(s) of department, to register for modules of the following year of study in addition to the outstanding modules he or she has failed, providing that he or she complies with the prerequisites of these modules and no timetable clashes occur. In no semester may the total credits for which a student registers, exceed the normal number of credits per semester by more than 16 credits, except with special permission from the relevant Head of Department.

## Pass with distinction

A degree (undergraduate) in the School of IT is conferred with distinction on a student who did not repeat any module of his/her final year, obtained a weighted average of at least 75% in all the prescribed modules for the final year, provided that a subminimum of 65% is obtained in each of these modules and provided that the degree is completed in the prescribed minimum period of time. Ad hoc cases will be considered by the Dean, in consultation with the head of the relevant department.

## Curriculum: Year 1

Minimum credits: 174

Students wishing to continue with Mathematics or Mathematical Statistics on year level 2 or 3 need to take WTW114, WTW124 & WTW162. Students not wishing to continue with Mathematics or Mathematical Statisctics on year level 2 or 3, need to take WTW134, WTW146, WTW148.

Students are required to choose a science elective as part of the BSc Computer Science first year.  The choice is dependent on the Grade 12 Physical Science results.  A student who achieved a level 5 in Physical Science in Grade 12 may choose between Physics (PHY 114 and PHY 124) and Chemistry (CMY 117 and CMY 127).  A level 4 in Physical Science allows the student to choose Biological Science (MLB 111, BOT 161 and MBY161).  A student who does not have Physical Science in Grade 12 must choose Geology (GLY 155 and GLY 163).

Students have a choice between Mathematical Statistics (WST 111 and WST 121) and Statistics (STK 110 and STK 120) to fulfil the statistics requirement for the degree programme

**Fundamental modules**

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

**Core modules**

Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Introduction to computer science 151 (COS 151) - Credits: 8.00
Calculus 114 (WTW 114) - Credits: 16.00
Discrete structures 115 (WTW 115) - Credits: 8.00
Mathematics 124 (WTW 124) - Credits: 16.00
Mathematics 134 (WTW 134) - Credits: 16.00
Linear algebra 146 (WTW 146) - Credits: 8.00
Calculus 148 (WTW 148) - Credits: 8.00
Mathematical modelling 152 (WTW 152) - Credits: 8.00
Dynamical processes 162 (WTW 162) - Credits: 8.00

**Elective modules**

Plant biology 161 (BOT 161) - Credits: 8.00
General chemistry 117 (CMY 117) - Credits: 16.00
General chemistry 127 (CMY 127) - Credits: 16.00
Introduction to geology 155 (GLY 155) - Credits: 16.00
Earth history 163 (GLY 163) - Credits: 16.00
Introduction to microbiology 161 (MBY 161) - Credits: 8.00
Molecular and cell biology 111 (MLB 111) - Credits: 16.00
First course in physics 114 (PHY 114) - Credits: 16.00
First course in physics 124 (PHY 124) - Credits: 16.00
Statistics 110 (STK 110) - Credits: 13.00
Statistics 120 (STK 120) - Credits: 13.00
Mathematical statistics 111 (WST 111) - Credits: 16.00
Mathematical statistics 121 (WST 121) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 124

### Fundamental modules

Community-based project 202 (JCP 202) - Credits: 8.00

### Core modules

Theoretical computer science 210 (COS 210) - Credits: 8.00
Data structures and algorithms 212 (COS 212) - Credits: 16.00
Software modelling 214 (COS 214) - Credits: 16.00
Netcentric computer systems 216 (COS 216) - Credits: 16.00
Introduction to database systems 221 (COS 221) - Credits: 16.00
Concurrent systems 226 (COS 226) - Credits: 16.00
Computer organisation and architecture 284 (COS 284) - Credits: 16.00
Discrete structures 285 (WTW 285) - Credits: 12.00

## Curriculum: Final year

Minimum credits: 144

Students have a choice of electives (43 credits) from Computer Science (COS 314, COS 344 and COS 326); Information Science (IMY 310 and IMY 320); Mathematics; Mathematical Statistics or Statistics; Physics and Chemistry.  The module choices for Mathematics, Mathematical Statistics or Statistics, Physics and Chemistry must be done in consultation with the programme organizer and may require second year elective modules to be included in the degree programme.

### Core modules

Software engineering 301 (COS 301) - Credits: 27.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Computer networks 332 (COS 332) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Compiler construction 341 (COS 341) - Credits: 18.00

### Elective modules

Physical chemistry 382 (CMY 382) - Credits: 18.00
Analytical chemistry 383 (CMY 383) - Credits: 18.00
Organic chemistry 384 (CMY 384) - Credits: 18.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Database systems 326 (COS 326) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00
Information science: Information organisation 310 (INL 310) - Credits: 30.00
Information science: Information and knowledge management 320 (INL 320) - Credits: 30.00
Information science: Digital repositories 340 (INL 340) - Credits: 30.00
Information science: Socio-political aspects of information in global context 360 (INL 360) - Credits: 30.00
Information science 370 (INL 370) - Credits: 15.00

Information science: Competitive intelligence 380 (INL 380) - Credits: 30.00
Electronics, electromagnetism and quantum mechanics 356 (PHY 356) - Credits: 36.00
Statistical mechanics, solid state physics and modelling 364 (PHY 364) - Credits: 36.00
Stochastic processes 312 (WST 312) - Credits: 18.00
Time-series analysis 321 (WST 321) - Credits: 18.00
Actuarial statistics 322 (WST 322) - Credits: 18.00
Financial engineering 354 (WTW 354) - Credits: 18.00
Algebra 381 (WTW 381) - Credits: 18.00
Numerical analysis 383 (WTW 383) - Credits: 18.00
Geometry 389 (WTW 389) - Credits: 18.00

## BSc Construction Management (12132025)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Mr AHG van Heerden hennie.vanheerden@up.ac.za +27 (0)124204150 |

### Programme information

Construction management is the field of study meant for the person who wishes to become part of the process of infrastructure development, especially the construction of buildings. The construction manager is a professional business person who acts as manager for undertakings in the building, construction and property industry as well as related support services.

Career opportunities cover a wide spectrum and construction managers find employment as main and subcontractors in the building and construction industry, as project managers or investment experts with financial institutions and property developers, as property experts who offer broker services and compile packages, as managers of building and property portfolios for investors, as suppliers of material and equipment to the building and construction industry, as consultants for financial services in the construction and related sectors, or as private entrepreneurs working in these fields.

The examinations of the BScHons degree in Construction Management are recognised by the minister as prescribed examinations in terms of the stipulations as described in the Project and Construction Management Professions Act (Act No 48/2000), as well as by the Chartered Institute of Building.

The degree is awarded if all the prescribed modules have been passed.

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- BSc (Construction Management) is a selection programme.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Science | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 5 | 3 | C | C | or Accounting 4 | or Accounting 3 | or Accounting D | or Accounting D | 30 |

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study

a. A newly registered first-year student who failed all the prescribed modules for the programme at the end of the first semester shall not be readmitted to the School for the Built Environment in the second semester.
b. A student who complies with all the requirements of the first year of study, or has at least obtained 110 credits, is promoted to the second year of study.
c. A student who has not obtained at least 70% of the credits of the first year of study after the November examinations must reapply for admission should he/she intend to continue with his/her studies. Written application must be submitted to the student administration of the School for the Built Environment no later than 12 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean and conditions of readmission as determined by the admissions committee shall apply should first-year students be readmitted.
d. Students who have not passed all the prescribed modules of the first year of study, as well as students who are readmitted in terms of (c) must register for the outstanding modules of the first year.
e. A student who is repeating his/her first year, may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enrol for modules of the second year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and that no timetable clashes occur. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.

### Promotion to the third year of study

a. A student who complies with all the requirements of the second year of study, or has at least obtained 230 credits, is promoted to the third year of study.
b. The Dean may, on the recommendation of the Head of Department, allow a student, who qualifies for promotion to a subsequent year of study, but who has not passed all the modules of that year, to carry over those modules to the next or a later year.
c. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.
d. A student who complies with all the requirements for the degree with the exception of one year module or two semester modules, in which a final mark of at least 40% has been obtained, may be admitted to a special examination in the module(s) concerned, at the start of the ensuing semester.
e. On the recommendation of the Head of Department, the Dean may in exceptional circumstances deviate from the abovementioned stipulations, provided that no timetable clashes occur.

## Pass with distinction

The degree is conferred with distinction on a student:

i. if no module of the second and third study year was repeated and a weighted average of at least 75% was obtained in one year in all the modules (excluding JCP 201), of the final study year;
ii. the degree programme was completed within the prescribed three study years, and the final study year modules were passed on first registration without any supplementary or special examinations.

## Curriculum: Year 1

Minimum credits: 141

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Construction Economics 122 (ALL 122) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Building organisation 121 (BGG 121) - Credits: 3.00
Building drawings 111 (BOU 111) - Credits: 6.00
Building drawings 121 (BOU 121) - Credits: 6.00
Building science 110 (BWT 110) - Credits: 9.00
Building science 120 (BWT 120) - Credits: 9.00
Economics 110 (EKN 110) - Credits: 10.00
Economics 120 (EKN 120) - Credits: 10.00
Building services 112 (GBD 112) - Credits: 6.00
Building services 122 (GBD 122) - Credits: 6.00
Quantities 101 (HVH 101) - Credits: 24.00
History of the environment 122 (OMG 122) - Credits: 6.00
Introduction to structures 110 (SKE 110) - Credits: 9.00
Structures 120 (SKE 120) - Credits: 9.00
Mathematics 134 (WTW 134) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 133

### Core modules

Labour law 311 (ABR 311) - Credits: 20.00
Building science 210 (BWT 210) - Credits: 9.00
Building science 220 (BWT 220) - Credits: 9.00
Financial management 110 (FBS 110) - Credits: 10.00
Building services 211 (GBD 211) - Credits: 6.00
Building services 221 (GBD 221) - Credits: 6.00
Construction quantities 201 (KSH 201) - Credits: 24.00
Reinforced concrete structures 210 (SKE 210) - Credits: 9.00
Civil engineering services 220 (SKE 220) - Credits: 9.00
Statistics 110 (STK 110) - Credits: 13.00

Statistics 161 (STK 161) - Credits: 6.00
Site surveying 213 (TRN 213) - Credits: 12.00

### Curriculum: Final year

Minimum credits: 150

#### Core modules

Business law 310 (BER 310) - Credits: 16.00
Housing 320 (BHU 320) - Credits: 6.00
Building science 310 (BWT 310) - Credits: 9.00
Building science 320 (BWT 320) - Credits: 9.00
Introduction to property law 320 (EOW 320) - Credits: 6.00
Financial management 210 (FBS 210) - Credits: 16.00
Financial management 320 (FBS 320) - Credits: 20.00
Building services 311 (GBD 311) - Credits: 6.00
Community-based project 201 (JCP 201) - Credits: 8.00
Construction management 310 (KBS 310) - Credits: 9.00
Construction management 320 (KBS 320) - Credits: 9.00
Construction quantities 300 (KSH 300) - Credits: 24.00
Research methodology 320 (NNM 320) - Credits: 6.00
Sustainable construction 320 (VKN 320) - Credits: 6.00

## BSc Information and Knowledge Systems (12133213)

| | |
|---|---|
| **Minimum duration of study** | 3 years |

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Should a candidate obtain an APS of 26 to 29, consideration for admission will be based on the results of the NBT, provided the quotas regarding student numbers have not been reached.

<table>
<tr><th colspan="9">Minimum requirements</th></tr>
<tr><th colspan="9">Achievement level</th></tr>
<tr><th colspan="4">Afrikaans or English</th><th colspan="4">Mathematics</th><th rowspan="2">APS</th></tr>
<tr><td>NSC/IEB</td><td>HIGCSE</td><td>AS-Level</td><td>A-Level</td><td>NSC/IEB</td><td>HIGCSE</td><td>AS-Level</td><td>A-Level</td></tr>
</table>

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | 3 | D | D | 5 | 3 | C | C | 30 (26-29 admission based on the NBT) |

## Promotion to next study year

### General

a. A student must pass all the modules of the first year of study, before he or she is permitted to register for any module of the third year of study. Module prerequisites remain applicable. Exceptions to this rule will be considered by the relevant Head of Department and the Dean.
b. A student must pass all the modules of the second year of study, before he or she is permitted to register for any module of the fourth year of study (in the case of a four-year degree). Module prerequisites remain applicable. Exceptions to this rule will be considered by the relevant Head of Department and the Dean.
c. A new first-year student, who has failed in all the prescribed modules of the programme at the end of the first semester, will not be permitted to proceed to the second semester in the School of Information Technology.
d. A student who has not passed at least 70% of the credits of the current year of study after the November examinations will not be re-admitted to the School of Information Technology.
e. Students who fail a module for a second time, forfeit the privilege of registering for any modules of an advanced year of study.
f. Students whose academic progress is not acceptable can be suspended from further studies.

### Procedure: Exclusion from and re-admission to further studies in the School of Information Technology

a. A student who is excluded from further studies in terms of the stipulations of the abovementioned regulations will be notified in writing by the Dean or admissions committee of the School of Information Technology at the end of the relevant semester.
b. A student who has been excluded from further studies may apply in writing to the admissions committee of the School of Information Technology on level 6 in the Engineering building I for re-admission.
c. Written applications for re-admission to the second semester must be submitted at least 7 days before lectures resume for the second semester.
d. Written applications for re-admission to the new academic year must be submitted before 12 January.
e. Late applications will be accepted only in exceptional circumstances after approval by the Dean.
f. Should a student not be re-admitted to further studies by the admissions committee of the School of Information Technology, he/she will be informed in writing.
g. A student who is not re-admitted by the admissions committee of the School of Information Technology has the right to appeal to the Appeals Committee: Admissions in the Administration building, room 3-13.
h. Any decision taken by the Appeals Committee: Admissions is final.
i. Should the student be re-admitted by the Admissions Committee, strict conditions will be set which the student must comply with in order to proceed with his/her studies.
j. A student, who is repeating his or her year, may be permitted by the Dean, on recommendation of the relevant head(s) of department, to register for modules of the following year of study in addition to the outstanding modules he or she has failed, providing that he or she complies with the prerequisites of these modules and no timetable clashes occur. In no semester may the total credits for which a student registers, exceed the normal number of credits per semester by more than 16 credits, except with special permission from the relevant Head of Department.

## Pass with distinction

A degree (undergraduate) in the School of IT is conferred with distinction on a student who did not repeat any module of his/her final year, obtained a weighted average of at least 75% in all the prescribed modules for the final year, provided that a subminimum of 65% is obtained in each of these modules and provided that the degree is completed in the prescribed minimum period of time. Ad hoc cases will be considered by the Dean, in consultation with the head of the relevant department.

## Curriculum: Year 1

Minimum credits: 140

Students are required to choose their electives from what is referred to as an elective group. Once an elective group has been chosen, the modules listed per year level need to be completed in order to comply with the requirements of the degree programme. These elective groups, along with their respective first year modules are:

- Data Science (WTW 146, WTW 148, WTW 152, STK 110 and STK 120)
- Genetics (BME 120, BOT 161, GTS 161, MBY 161, MLB 111 and WTW 146)
- Geographical Information Systems (GGY 156, ENV 101, GGY 166, GMC 110, STK 110 and WTW 146)
- IT and Enterprises (BEM 120, OBS 114, OBS 124 and STK 110)
- IT and Law (KRG 110, KRG 120, KRM 110 and KRM 120)
- IT and Music (MGS 110, MGS 120, MPE 170, MCS 200, WTW 146 and WTW 148)
- Software Development (INF 154, INF 164 and INF 171)

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Information Technology 121 (ALL 121) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Introduction to computer science 151 (COS 151) - Credits: 8.00
Discrete structures 115 (WTW 115) - Credits: 8.00
Mathematics 134 (WTW 134) - Credits: 16.00

### Elective modules

Marketing Management 120 (BEM 120) - Credits: 10.00
Biometry 120 (BME 120) - Credits: 16.00
Plant biology 161 (BOT 161) - Credits: 8.00
Introduction to environmental sciences 101 (ENV 101) - Credits: 8.00
Financial accounting 122 (FRK 122) - Credits: 12.00
Aspects of human geography 156 (GGY 156) - Credits: 8.00
Southern African geomorphology 166 (GGY 166) - Credits: 8.00
Cartography 110 (GMC 110) - Credits: 10.00
Introductory genetics 161 (GTS 161) - Credits: 8.00

Informatics 154 (INF 154) - Credits: 10.00
Informatics 164 (INF 164) - Credits: 10.00
Informatics 171 (INF 171) - Credits: 20.00
Commercial law 110 (KRG 110) - Credits: 10.00
Commercial law 120 (KRG 120) - Credits: 10.00
Criminology 110 (KRM 110) - Credits: 12.00
Criminology 120 (KRM 120) - Credits: 12.00
Introduction to microbiology 161 (MBY 161) - Credits: 8.00
Music technology 200 (MCS 200) - Credits: 12.00
Musicology 110 (MGS 110) - Credits: 10.00
Musicology 120 (MGS 120) - Credits: 10.00
Molecular and cell biology 111 (MLB 111) - Credits: 16.00
Music education 170 (MPE 170) - Credits: 10.00
Business management 114 (OBS 114) - Credits: 10.00
Business management 124 (OBS 124) - Credits: 10.00
Statistics 110 (STK 110) - Credits: 13.00
Statistics 120 (STK 120) - Credits: 13.00
Mathematical statistics 111 (WST 111) - Credits: 16.00
Mathematical statistics 121 (WST 121) - Credits: 16.00
Numerical analysis 123 (WTW 123) - Credits: 8.00
Linear algebra 146 (WTW 146) - Credits: 8.00
Calculus 148 (WTW 148) - Credits: 8.00
Mathematical modelling 152 (WTW 152) - Credits: 8.00

## Curriculum: Year 2

Minimum credits: 170

Students must continue with the elective groups they chose in first year.  The modules associated with each of the elective groups are the following:

- Data Science (STK 210 and STK 220)
- Genetics (GTS 251, GTS 261, MBY 251 and MBY 261)
- Geographical Information Systems (GGY 283, GIS 220 and GMS 220)
- IT and Enterprises (BEM 212, FIL 251, OBS 210 and OBS 220)
- IT and Law (KRG 200, KRM 210 and KRM 220)
- IT and Music (MPE 270 and MCS 302)
- Software Development (INF 272, IMY 210 and IMY 220)

### Fundamental modules

Community-based project 202 (JCP 202) - Credits: 8.00

### Core modules

Theoretical computer science 210 (COS 210) - Credits: 8.00
Data structures and algorithms 212 (COS 212) - Credits: 16.00
Software modelling 214 (COS 214) - Credits: 16.00
Netcentric computer systems 216 (COS 216) - Credits: 16.00
Introduction to database systems 221 (COS 221) - Credits: 16.00
Concurrent systems 226 (COS 226) - Credits: 16.00

Computer organisation and architecture 284 (COS 284) - Credits: 16.00
Discrete structures 285 (WTW 285) - Credits: 12.00

### Elective modules

Consumer behaviour 212 (BEM 212) - Credits: 16.00
Introductory geographic information systems 283 (GGY 283) - Credits: 14.00
Geographic data analysis 220 (GIS 220) - Credits: 14.00
Remote sensing 220 (GMA 220) - Credits: 14.00
Molecular genetics 251 (GTS 251) - Credits: 12.00
Genetic diversity and evolution 261 (GTS 261) - Credits: 12.00
Multimedia 210 (IMY 210) - Credits: 16.00
Multimedia 220 (IMY 220) - Credits: 16.00
Informatics 272 (INF 272) - Credits: 14.00
Commercial law 200 (KRG 200) - Credits: 24.00
Criminology 210 (KRM 210) - Credits: 20.00
Criminology 220 (KRM 220) - Credits: 20.00
Bacteriology 251 (MBY 251) - Credits: 12.00
Mycology 261 (MBY 261) - Credits: 12.00
Music technology 302 (MCS 302) - Credits: 18.00
Music education 270 (MPE 270) - Credits: 12.00
Business management 210 (OBS 210) - Credits: 16.00
Business management 220 (OBS 220) - Credits: 16.00
Statistics 210 (STK 210) - Credits: 20.00
Statistics 220 (STK 220) - Credits: 20.00

## Curriculum: Final year

Minimum credits: 144

As with the 2$^{nd}$ year elective modules, the 3$^{rd}$ year elective modules follow on from the elective group chosen in first year.  The modules for 3$^{rd}$ year, given per elective group are the following:

- Data Science (COS 314, COS 326 and STK353)
- Genetics (COS314 and (COS 326 and COS 344) or (GTS 354 and GTS 367) or (GTS354 and BTC 361))
- Geographical Information Systems (COS 326, COS 344, GIS 310 and GIS 320)
- IT and Enterprises ((OBS 359 and OBS 369) or (OBS310 and OBS 320))
- IT and Law (KRM 310, KRM 320 and KUB 420)
- IT and Music (Another 3$^{rd}$ year COS module (either COS 314, COS 326, COS 344 or COS 341) and MCS 402)
- Software Development (COS 326 and INF 354)

### Core modules

Software engineering 301 (COS 301) - Credits: 27.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Computer networks 332 (COS 332) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Multimedia 310 (IMY 310) - Credits: 30.00

### Elective modules

Plant genetics and crop biotechnology 361 (BTC 361) - Credits: 18.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Database systems 326 (COS 326) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00
Geographic information systems 310 (GIS 310) - Credits: 22.00
Spatial analysis 320 (GIS 320) - Credits: 22.00
Genome evolution and phylogenetics 354 (GTS 354) - Credits: 18.00
Population and evolutionary genetics 367 (GTS 367) - Credits: 18.00
Informatics 354 (INF 354) - Credits: 15.00
Information and communications technology law 420 (KUB 420) - Credits: 10.00
Capita selecta: Music 402 (MCS 402) - Credits: 40.00
Business management 310 (OBS 310) - Credits: 20.00
Business management 320 (OBS 320) - Credits: 20.00
International business management 359 (OBS 359) - Credits: 20.00
International business management 369 (OBS 369) - Credits: 20.00

## BSc Interior Architecture (12132020)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

### Programme information

Interior architecture is the art and science of the design of designated spaces. It focuses on the needs of the user and the harmony between architectural spaces and the detailed design of spaces and life-style products. Graduates will have the ability to design interiors and products. Attention is given to the design process, building and material technology, building climate, ergonomics, history and visual communication within the context of society, economics, politics and technology. It is very important that students have the ability to visualise spaces, think three-dimensionally and solve problems creatively.

Students are advised to work in the offices of an architect or an interior architect during the university recesses to gain practical experience.

It is recommended that those graduates wishing to become professional Interior architects must hereafter apply to register for the BIntHons degree (one year full-time) and the MInt(Prof) degree (one year full-time). Those candidates wishing to become interior and product designers must hereafter register for the one year full-time honours degree programme in Interior Architecture [BIntHons].

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student

has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- BSc (Interior Architecture) will only be considered as first study choice. Selection programme: Selection includes an interview.

| Minimum requirements | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Achievement level | | | | | | | | | | | | |
| Afrikaans or English | | | | Mathematics | | | | Physical Sciences | | | | APS |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 4 | 3 | D | D | 4 | 3 | D | D | 27 |

## Additional requirements

Students wishing to transfer to other programmes in the Department of Architecture must obtain written consent from the admissions committee.

## Other programme-specific information

**Concurrent presentation**

In the third year of study Design, Construction, Design communication, Environmental studies, Earth studies and Material studies must initially be examined in the same year.

**Awarding of degree**

The degree is awarded to those students who have obtained all the prescribed credits for the programme modules.

## Promotion to next study year

A student is promoted to a subsequent year of study after acquiring all the prerequisite module credits of the preceding year of study. A student is deemed to be in the year of study for which he or she is registered in Design.

If the student is not registered for Design the highest passed year of Design determines the year of study.

**Please Note**: Students not promoted to the next year of study must obtain the approval of the programme coordinator and the Head of Department to register for modules in the subsequent year of study. Students must re-apply for admission to the Department of Architecture in instances where:

i. a student is not promoted to the second year of study;
ii. a student after repeating any year of study, is not promoted to the following year of study.

## Pass with distinction

The degree is conferred with distinction on a student who, at first registration, simultaneously passes both Design 303 and Construction 320 with distinction (75%) with the proviso that the degree is completed within the minimum prescribed time and all other final-year modules are passed on first registration without any supplementary/special examinations.

## Curriculum: Year 1

Minimum credits: 116

#### Fundamental modules
Academic orientation 112 (UPO 112) - Credits: 0.00

#### Core modules
Earth studies 110 (AAL 110) - Credits: 10.00
Academic information management 102 (AIM 102) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Elective module 110 (ARC 110) - Credits: 6.00
Construction 111 (KON 111) - Credits: 8.00
Construction 121 (KON 121) - Credits: 8.00
Design communication 120 (OKU 120) - Credits: 6.00
Environmental theory 110 (OML 110) - Credits: 6.00
Environmental studies 120 (OML 120) - Credits: 6.00
Design 100 (ONT 100) - Credits: 60.00

### Curriculum: Year 2
Minimum credits: 134

#### Core modules
Earth studies 210 (AAL 210) - Credits: 8.00
Earth studies 223 (AAL 223) - Credits: 4.00
Earth studies 224 (AAL 224) - Credits: 4.00
Community-based project 201 (JCP 201) - Credits: 8.00
Construction 210 (KON 210) - Credits: 8.00
Construction 220 (KON 220) - Credits: 8.00
Material studies 223 (MST 223) - Credits: 8.00
Environmental theory 210 (OML 210) - Credits: 6.00
Environmental studies 220 (OML 220) - Credits: 6.00
Design 203 (ONT 203) - Credits: 60.00
Textiles: Utilities, fibres and yarns 212 (TKS 212) - Credits: 14.00

### Curriculum: Final year
Minimum credits: 152

#### Core modules
Earth studies 320 (AAL 320) - Credits: 6.00
Business law 310 (BER 310) - Credits: 16.00
Construction 310 (KON 310) - Credits: 8.00
Construction 320 (KON 320) - Credits: 8.00
Material studies 313 (MST 313) - Credits: 8.00
Material studies 323 (MST 323) - Credits: 8.00
Design communication 313 (OKU 313) - Credits: 6.00
History of the environment 310 (OMG 310) - Credits: 6.00
History of the environment 320 (OMG 320) - Credits: 6.00
Environmental studies 310 (OML 310) - Credits: 6.00
Environmental studies 320 (OML 320) - Credits: 6.00
Design 303 (ONT 303) - Credits: 60.00

Practice management 320 (PJS 320) - Credits: 8.00

## BSc Landscape Architecture (12132019)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Mr GA Young grahamyounglandarch@gmail.com +27 (0)824621491 |

### Programme information

Landscape architecture is the science and art of the design of outside areas for the use and enjoyment of people. Parks, game reserves, recreational areas and marinas are only a few of the environments which the landscape architect designs. They create urban oases in the form of plazas and pedestrian routes, and design environments around shopping centres and residential developments. The landscape architect can join a private firm, start an own business, or accept employment in central, provincial or local government in departments that handle water usage and research, forestry, environmental matters, sport, recreational and fishing areas, and nature conservation.

Students are advised to work in the offices of an architect or a landscape architect to gain practical experience during the university recesses.

BScLArch is a three-year degree and is regarded as an exit level that enables the graduate to register as a candidate landscape architectural technologist who is a professional person registered by the South African Council of the Landscape Architectural Profession in terms of the Act on the Landscape Architectural Profession (Act 45 of 2000). Such practitioners provide assistance in the practices of the disciplines of landscape architecture and urban design where their responsibilities would be the documentation of projects, project administration and site management. Candidates wishing to become professional landscape architects must hereafter apply to register for the BLHons degree (one year full-time), and thereafter the ML(Prof) degree (one year full-time).

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Selection programme: Selection includes an interview.

| **Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Sciences** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 3 | C | C | 4 | 3 | D | D | or Geography or Life Sciences 4 | or Geography or Life Sciences 3 | or Geography or Life Sciences D | or Geography or Life Sciences D | 27 |

## Additional requirements

**Please Note:** Students wishing to transfer to other programmes in the Department of Architecture must obtain written consent from the admissions committee.

## Other programme-specific information

### Concurrent presentation

In the third year of study Design, Construction, Environmental studies, Plant science and Earth studies must be examined in the same year.

### Awarding of degree

The degree is awarded to those students who have obtained all the prescribed credits for the programme modules.

## Promotion to next study year

A student is promoted to a subsequent year of study after acquiring all the prerequisite module credits of the preceding year of study.
A student is deemed to be in the year of study for which he or she is registered in Design.
If the student is not registered for Design the highest passed year of Design determines the year of study.

**Please Note**: Students not promoted to the next year of study must obtain the approval of the programme co-ordinator and the head of department to register for modules in the subsequent year of study. Students must re-apply for admission to the Department of Architecture in instances where:

i. a student is not promoted to the second year of study;
ii. a student after repeating any year of study, is not promoted to the following year of study.

## Pass with distinction

The BScLArch degree is conferred with distinction on a student who, at first registration, simultaneously passes Design 302 and Construction 320 with distinction (75%) with the proviso that the degree is completed within the minimum prescribed time and all other final-year modules are passed on first registration without any supplementary/special examinations.

## Curriculum: Year 1

Minimum credits: 116

### Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Academic information management 102 (AIM 102) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy 110 (ALL 110) - Credits: 6.00

Elective module 110 (ARC 110) - Credits: 6.00
Construction 111 (KON 111) - Credits: 8.00
Construction 121 (KON 121) - Credits: 8.00
Design communication 120 (OKU 120) - Credits: 6.00
Environmental theory 110 (OML 110) - Credits: 6.00
Environmental studies 120 (OML 120) - Credits: 6.00
Design 100 (ONT 100) - Credits: 60.00

### Curriculum: Year 2

Minimum credits: 144

#### Core modules

Earth studies 210 (AAL 210) - Credits: 8.00
Geomorphology of the built environment 265 (GGY 265) - Credits: 12.00
Introductory soil science 250 (GKD 250) - Credits: 12.00
Community-based project 201 (JCP 201) - Credits: 8.00
Construction 210 (KON 210) - Credits: 8.00
Construction 220 (KON 220) - Credits: 8.00
Landscape architecture 212 (LAN 212) - Credits: 8.00
Landscape architecture 222 (LAN 222) - Credits: 8.00
Environmental theory 210 (OML 210) - Credits: 6.00
Environmental studies 220 (OML 220) - Credits: 6.00
Design 202 (ONT 202) - Credits: 60.00

### Curriculum: Final year

Minimum credits: 152

#### Core modules

Earth studies 320 (AAL 320) - Credits: 6.00
Business law 310 (BER 310) - Credits: 16.00
Construction 310 (KON 310) - Credits: 8.00
Construction 320 (KON 320) - Credits: 8.00
Design communication 313 (OKU 313) - Credits: 6.00
History of the environment 310 (OMG 310) - Credits: 6.00
History of the environment 320 (OMG 320) - Credits: 6.00
Environmental studies 310 (OML 310) - Credits: 6.00
Environmental studies 320 (OML 320) - Credits: 6.00
Design 302 (ONT 302) - Credits: 60.00
Practice management 320 (PJS 320) - Credits: 8.00
Plant science 312 (PWT 312) - Credits: 8.00
Plant science 322 (PWT 322) - Credits: 8.00

## BSc Quantity Surveying (12132023)

| | |
|---|---|
| **Minimum duration of study** | 3 years |
| **Contact** | Dr DJ Hoffman danie.hoffman@up.ac.za +27 (0)124202551 |

## Programme information

Quantity surveying is the science that delivers specialised financial and contractual services and advice to clients in the building and construction industry, as well as in related industries. The quantity surveyor is an independent and professional consultant who works with architects, consulting engineers, and the building contractor, in order to protect the interests of the client, while at the same time also looking after the interests of the contractor and subcontractors.

The student could enter the building or construction industry as a candidate quantity surveyor after he/she has completed the three-year degree. Such qualification, however, would not allow the person to register as a professional quantity surveyor without acquiring additional qualifications. After completing the honours programme the opportunities become far wider, and application can be made for registration as a professional quantity surveyor with the South African Council for the Quantity Surveying Profession, after further assessment and furnishing of evidence, in compliance with the prescribed competencies. Employment opportunities in the building and construction sector, government departments, in the property sector, banks and manufacturing industry exist for such registered quantity surveyors. Most, however, work in the private sector where they become employees/ partners/ directors of quantity surveying practices, or open their own practices.

The examinations for the BScHons degree in Quantity Surveying are approved by the Minister as prescribed examinations in terms of the stipulations of the Quantity Surveying Profession Act (Act No. 49/2000), as well as by the Royal Institution of Chartered Surveyors.

## Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- BSc (Quantity Surveying) is a selection programme.

| **Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Science** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 5 | 3 | C | C | or Accounting 4 | or Accounting 3 | or Accounting ?D | or Accounting ?D | 30 |

## Other programme-specific information

**Please Note:** Students with Maths 4, should take STK 113 and STK 123 (instead of STK 110) during their first year of study and STK 120 during their second year of study.

The degree is awarded if all the prescribed modules have been passed.

## Promotion to next study year

### Promotion to the second semester of the first year and to the second year of study

a. A newly registered first-year student who failed all the prescribed modules for the programme at the end of the first semester shall not be readmitted to the School for the Built Environment in the second semester.
b. A student who complies with all the requirements of the first year of study, or has at least obtained 110 credits, is promoted to the second year of study.
c. A student who has not obtained at least 70% of the credits of the first year of study after the November examinations must reapply for admission should he/she intend to continue with his/her studies. Written application must be submitted to the student administration of the School for the Built Environment no later than 12 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean and conditions of readmission as determined by the admissions committee shall apply should first-year students be readmitted.
d. Students who have not passed all the prescribed modules of the first year of study, as well as students who are readmitted in terms of (c) must register for the outstanding modules of the first year.
e. A student who is repeating his/her first year, may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enrol for modules of the second year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and that no timetable clashes occur. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.

### Promotion to the third year of study

a. A student who complies with all the requirements of the second year of study, or has at least obtained 230 credits, is promoted to the third year of study.
b. The Dean may, on the recommendation of the Head of Department, allow a student, who qualifies for promotion to a subsequent year of study, but who has not passed all the modules of that year, to carry over those modules to the next or a later year.
c. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.
d. A student who complies with all the requirements for the degree with the exception of one year module or two semester modules, in which a final mark of at least 40% has been obtained, may be admitted to a special examination in the module(s) concerned, at the start of the ensuing semester.
e. On the recommendation of the Head of Department, the Dean may in exceptional circumstances deviate from the abovementioned stipulations, provided that no timetable clashes occur.

## Pass with distinction

The degree is conferred with distinction on a student:

i. if no module of the second and third study year was repeated and a weighted average of at least 75% was obtained in one year in all the modules (excluding JCP 201), of the final study year;
ii. the degree programme was completed within the prescribed three study years, and the final study year modules were passed on first registration without any supplementary or special examinations.

## Curriculum: Year 1

Minimum credits: 141

**Fundamental modules**

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Construction Economics 122 (ALL 122) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

**Core modules**

Building organisation 121 (BGG 121) - Credits: 3.00
Building drawings 111 (BOU 111) - Credits: 6.00
Building drawings 121 (BOU 121) - Credits: 6.00
Building science 110 (BWT 110) - Credits: 9.00
Building science 120 (BWT 120) - Credits: 9.00
Economics 110 (EKN 110) - Credits: 10.00
Economics 120 (EKN 120) - Credits: 10.00
Building services 112 (GBD 112) - Credits: 6.00
Building services 122 (GBD 122) - Credits: 6.00
Quantities 101 (HVH 101) - Credits: 24.00
History of the environment 122 (OMG 122) - Credits: 6.00
Introduction to structures 110 (SKE 110) - Credits: 9.00
Structures 120 (SKE 120) - Credits: 9.00
Mathematics 134 (WTW 134) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 113

**Core modules**

Building science 210 (BWT 210) - Credits: 9.00
Building science 220 (BWT 220) - Credits: 9.00
Financial management 110 (FBS 110) - Credits: 10.00
Building services 211 (GBD 211) - Credits: 6.00
Building services 221 (GBD 221) - Credits: 6.00
Quantities 200 (HVH 200) - Credits: 24.00
Reinforced concrete structures 210 (SKE 210) - Credits: 9.00
Civil engineering services 220 (SKE 220) - Credits: 9.00
Statistics 110 (STK 110) - Credits: 13.00
Statistics 161 (STK 161) - Credits: 6.00
Site surveying 213 (TRN 213) - Credits: 12.00

## Curriculum: Final year

Minimum credits: 150

**Core modules**

Business law 310 (BER 310) - Credits: 16.00
Housing 320 (BHU 320) - Credits: 6.00
Quantity surveying practice 300 (BRK 300) - Credits: 18.00
Building science 310 (BWT 310) - Credits: 9.00
Building science 320 (BWT 320) - Credits: 9.00

Introduction to property law 320 (EOW 320) - Credits: 6.00
Financial management 210 (FBS 210) - Credits: 16.00
Financial management 320 (FBS 320) - Credits: 20.00
Building services 311 (GBD 311) - Credits: 6.00
Quantities 300 (HVH 300) - Credits: 24.00
Community-based project 201 (JCP 201) - Credits: 8.00
Research methodology 320 (NNM 320) - Credits: 6.00
Sustainable construction 320 (VKN 320) - Credits: 6.00

## BSc Real Estate (12132024)

| **Minimum duration of study** | 3 years |
|---|---|
| **Contact** | Miss V Wilkens vita.wilkens@up.ac.za +27 (0)124203599 |

### Programme information

Real estate is the study of fixed property and related aspects such as property economics, development, management, valuation, financing, investment and marketing.

Apart from a future in areas such as property investment, property finance and facilities and property management, further studies to obtain an honours degree in real estate can lead to registration as a professional property valuer. Career opportunities encompass the whole spectrum of the property sector, whether as entrepreneurs in the private sector or as employees in the private, government or semi-governmental sectors.

The degree is awarded if all the prescribed modules have been passed.

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required.
- BSc (Real Estate) is a selection programme.

| **Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans of Engels** | | | | **Mathematics** | | | | **Physical Science** | | | | **TPT** |
| NSS/IEB | HIGCSE | AS-Level | A-Level | NSS/IEB | HIGCSE | AS-Level | A-Level | NSS/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 5 | 3 | C | C | or Accounting 4 | or Accounting 3 | or Accounting D | or Accounting D | 30 |

### Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study**

a. A newly registered first-year student who failed all the prescribed modules for the programme at the end of the first semester shall not be readmitted to the School for the Built Environment in the second semester.

b. A student who complies with all the requirements of the first year of study, or has at least obtained 110 credits, is promoted to the second year of study.
c. A student who has not obtained at least 70% of the credits of the first year of study after the November examinations must reapply for admission should he/she intend to continue with his/her studies. Written application must be submitted to the student administration of the School for the Built Environment no later than 12 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean and conditions of readmission as determined by the admissions committee shall apply should first-year students be readmitted.
d. Students who have not passed all the prescribed modules of the first year of study, as well as students who are readmitted in terms of (c) must register for the outstanding modules of the first year.
e. A student who is repeating his/her first year, may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enrol for modules of the second year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and that no timetable clashes occur. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.

**Promotion to the third year of study**

a. A student who complies with all the requirements of the second year of study, or has at least obtained 230 credits, is promoted to the third year of study.
b. The Dean may, on the recommendation of the Head of Department, allow a student, who qualifies for promotion to a subsequent year of study, but who has not passed all the modules of that year, to carry over those modules to the next or a later year.
c. The number of credits per semester for which a student registers may not exceed the prescribed number of credits per semester by more than 16 credits.
d. A student who complies with all the requirements for the degree with the exception of one year module or two semester modules, in which a final mark of at least 40% has been obtained, may be admitted to a special examination in the module(s) concerned, at the start of the ensuing semester.
e. On the recommendation of the Head of Department, the Dean may in exceptional circumstances deviate from the abovementioned stipulations, provided that no timetable clashes occur.

## Pass with distinction

The degree is conferred with distinction on a student:

i. if no module of the second and third study year was repeated and a weighted average of at least 75% was obtained in one year in all the modules (excluding JCP 201), of the final study year;
ii. the degree programme was completed within the prescribed three study years, and the final study year modules were passed on first registration without any supplementary or special examinations.

## Curriculum: Year 1

Minimum credits: 143

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Construction Economics 122 (ALL 122) - Credits: 6.00

Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Building organisation 121 (BGG 121) - Credits: 3.00
Building drawings 111 (BOU 111) - Credits: 6.00
Building drawings 121 (BOU 121) - Credits: 6.00
Building science 110 (BWT 110) - Credits: 9.00
Building science 120 (BWT 120) - Credits: 9.00
Economics 110 (EKN 110) - Credits: 10.00
Economics 120 (EKN 120) - Credits: 10.00
Real estate 110 (EWS 110) - Credits: 6.00
Real estate 120 (EWS 120) - Credits: 6.00
Building services 112 (GBD 112) - Credits: 6.00
Building services 122 (GBD 122) - Credits: 6.00
Quantities 101 (HVH 101) - Credits: 24.00
History of the environment 122 (OMG 122) - Credits: 6.00
Mathematics 134 (WTW 134) - Credits: 16.00

## Curriculum: Year 2

Minimum credits: 98

### Core modules

Building science 210 (BWT 210) - Credits: 9.00
Building science 220 (BWT 220) - Credits: 9.00
Property valuation 200 (EDW 200) - Credits: 12.00
Real estate 210 (EWS 210) - Credits: 12.00
Real estate 220 (EWS 220) - Credits: 6.00
Financial management 110 (FBS 110) - Credits: 10.00
Building services 211 (GBD 211) - Credits: 6.00
Building services 221 (GBD 221) - Credits: 6.00
Civil engineering services 220 (SKE 220) - Credits: 9.00
Statistics 110 (STK 110) - Credits: 13.00
Statistics 161 (STK 161) - Credits: 6.00

## Curriculum: Final year

Minimum credits: 138

### Core modules

Business law 310 (BER 310) - Credits: 16.00
Housing 320 (BHU 320) - Credits: 6.00
Building science 310 (BWT 310) - Credits: 9.00
Building science 320 (BWT 320) - Credits: 9.00
Property valuation 300 (EDW 300) - Credits: 12.00
Introduction to property law 320 (EOW 320) - Credits: 6.00
Real estate 310 (EWS 310) - Credits: 9.00
Real estate 320 (EWS 320) - Credits: 9.00
Financial management 210 (FBS 210) - Credits: 16.00
Financial management 320 (FBS 320) - Credits: 20.00

Building services 311 (GBD 311) - Credits: 6.00
Community-based project 201 (JCP 201) - Credits: 8.00
Research methodology 320 (NNM 320) - Credits: 6.00
Sustainable construction 320 (VKN 320) - Credits: 6.00

## BTRP (12132026)

| | |
|---|---|
| **Minimum duration of study** | 4 years |

### Programme information

Town and regional planning is primarily concerned with the planning, design, implementation and management of public interventions in the development and use of land from site to supranational level so as to widen choice, promote equity and ensure sustainable development. The guiding motive of the profession is the generation of viable alternatives to present settlement types. At the current juncture in South Africa's history, town and regional planning is a key profession in the rectification of the spatial and other imbalances in both urban and rural areas, as well as the improvement of inefficient and under-performing living environments.

The ideal town and regional planner is a creative person who is able to put forward innovative solutions to complex problems, a mediator who is able to reconcile diverse points of view, a strategic thinker and a good manager. Given the enormous backlogs in the fields of housing and social services and the misery in which many South Africans find themselves, planners also need a strongly developed sense of social and environmental justice and be committed to human development. While the majority of town and regional planners act as private consultants to the public and the private sector, they are also employed by all three spheres of government, research agencies such as the CSIR and the HSRC, non-governmental organisations, community-based organisations, major financial institutions and property development groups.

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- BTRP – Bachelor of Town and Regional Planning is a selection programme.

| **Minimum requirements** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 4 | 3 | D | D | 27 |

## Promotion to next study year

i. **Promotion to the second semester of the first year and to the second year of study**

a. A new first-year student who fails all the prescribed modules for the programme at the end of the first semester shall not be readmitted to the School for the Built Environment in the second semester.
b. A student is promoted to the second year provided the student (1) has obtained at least 100 credits; and (2) is not repeating more than one first-year Town and Regional planning module per semester; and (3) has obtained a final mark of at least 40 – 49% in the respective town and regional planning module(s) being repeated.
c. A student who is not promoted to the second year of study in terms of (b) may not register for second-year Town and Regional planning modules.
d. Students who have not obtained at least 100 credits of the first year of study after the November examinations must apply for re-admission should they intend to proceed with their studies. Written application must be submitted to the student administration for the School for the Built Environment no later than 12 January. Late applications will only be accepted under exceptional circumstances and with approval by the Dean. If first year students are readmitted, conditions of readmission will be set by the admissions committee.
e. Students who have not passed all the prescribed modules of the first year of study, as well as students who are readmitted in terms of (d) must register for the outstanding modules of the first year.

ii. **Promotion to the third year of study**

a. A student is promoted to the third year provided the student (1) has obtained at least 200 credits; (2) is not repeating any first or second-year Town and regional planning module.
b. A student who is not promoted to the third year of study in terms of (a) may not register for third-year Town and regional planning modules.

iii. **Promotion to the fourth year of study**

a. A student is promoted to the fourth year provided the student (1) has obtained at least 300 credits; and (2) is not repeating any third-year Town and regional planning module.
b. A student who is not promoted to the fourth year of study in terms of (a) may not register for fourth-year Town and Regional planning modules.
c. A student who complies with all the requirements for the degree with the exception of one year module or two semester modules, in which a final mark of at least 40% has been obtained, may be admitted to a special examination in the module(s) concerned at the start of the ensuing semester.
d. The degree is awarded if all the prescribed modules have been passed.

## Pass with distinction

The degree is conferred with distinction on a student who, at first registration passes all modules of the final year with a weighted average of 75%. The degree must have been completed within the minimum prescribed time. Exceptional cases will be considered by the Dean.

## Curriculum: Year 1

Minimum credits: 162

### Fundamental modules

Academic information management 101 (AIM 101) - Credits: 6.00
Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Academic literacy for Town and Regional Planning 123 (ALL 123) - Credits: 6.00
Academic orientation 112 (UPO 112) - Credits: 0.00

### Core modules

Economics 110 (EKN 110) - Credits: 10.00
Economics 120 (EKN 120) - Credits: 10.00
Sociology 110 (SOC 110) - Credits: 12.00
Sociology 120 (SOC 120) - Credits: 12.00
Statistics 110 (STK 110) - Credits: 13.00
Statistics 120 (STK 120) - Credits: 13.00
Site analysis and assessment 110 (TPA 110) - Credits: 16.00
Settlement analysis and assessment 120 (TPA 120) - Credits: 16.00
Planning and settlement histories before the Industrial Revolution 110 (TPH 110) - Credits: 12.00
Planning and settlement histories since the Industrial Revolution 120 (TPH 120) - Credits: 12.00
Principles of settlement design 120 (TPS 120) - Credits: 12.00
Introduction to planning 110 (TRP 110) - Credits: 12.00

## Curriculum: Year 2

Minimum credits: 132

### Core modules

Community-based project 201 (JCP 201) - Credits: 8.00
Plan and policy analysis and assessment 210 (TPA 210) - Credits: 12.00
Introduction to development planning 210 (TPD 210) - Credits: 12.00
Municipal development planning 220 (TPD 220) - Credits: 12.00
Settlement design concepts 210 (TPS 210) - Credits: 16.00
Settlement establishment planning and housing delivery 220 (TPS 220) - Credits: 16.00
Theory and practice of land-use management 211 (TPU 211) - Credits: 12.00

### Elective modules

Economics 214 (EKN 214) - Credits: 16.00
Economics 234 (EKN 234) - Credits: 16.00
Sociology 210 (SOC 210) - Credits: 20.00
Sociology 220 (SOC 220) - Credits: 20.00

## Curriculum: Year 3

Minimum credits: 120

### Core modules

Regional development planning 310 (TPD 310) - Credits: 12.00
Rural development planning 320 (TPD 320) - Credits: 12.00
Spatial concepts 310 (TPS 310) - Credits: 16.00

Transport planning 321 (TPS 321) - Credits: 8.00
Institutional and legal structures for planning 310 (TPW 310) - Credits: 12.00
Planning prospects 320 (TRP 320) - Credits: 12.00

### Elective modules

Economics 310 (EKN 310) - Credits: 20.00
Economics 320 (EKN 320) - Credits: 20.00
Sociology 310 (SOC 310) - Credits: 30.00
Sociology 320 (SOC 320) - Credits: 30.00

## Curriculum: Final year

Minimum credits: 96

### Core modules

Research methodology 410 (TPE 410) - Credits: 12.00
Research report 420 (TPE 420) - Credits: 30.00
Planning interventions: Precinct scale 451 (TPI 451) - Credits: 12.00
Planning interventions: Peri-urban and rural scale 452 (TPI 452) - Credits: 12.00
Planning interventions: Metropolitan scale 453 (TPI 453) - Credits: 12.00
Planning interventions: Supranational, national and provincial scale 454 (TPI 454) - Credits: 12.00
Professional practice 412 (TRP 412) - Credits: 6.00

# Honours

## BArchHons (12242005)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 1 year | | |
| **Contact** | Prof C Combrinck | carin.combrinck@up.ac.za | +27 (0)124206536 |
| | Dr N Botes | nico.botes@up.ac.za | +27 (0)124204600 |

### Admission requirements

A candidate for the degree programme Bachelor of Architecture Honours:
(1) must be a graduate with a BScArch degree or an equivalent university degree;
or
(2) must have an appropriate recognised tertiary qualification.
Such a candidate may be required, at the discretion of the Head of Department to take:
(i) an academic literacy test;
(ii) a computer skills test;
or
(3) must have a qualification deemed adequate by the Head of Department in consultation with the Dean and obtain (where necessary) the approval of the Senate, and comply with any other prescribed requirements.

Candidates mentioned in (2) and (3) above may, at the discretion of the Head of Department, be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.

Candidates mentioned in (1), (2) and (3) above,
(i) should preferably have had practical experience and/or have done and recorded an extended study excursion;
(ii) are interviewed for selection;
(iii) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;
(iv) are selected on merit.
Please Note: A limited number of candidates are admitted to this programme.

### Additional requirements

Also refer to G Regulations G.16 to G.29 and G.54.

### Other programme-specific information

The degree is awarded to those students who have obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

### Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework a minimum examination mark of 50% is required.

### Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75%.

### Curriculum: Final year

Minimum credits: 130

#### Core modules

Continuing practice development 710 (CPD 710) - Credits: 6.00
Continuing practice development 720 (CPD 720) - Credits: 6.00
Continuing practice development 730 (CPD 730) - Credits: 6.00
Continuing practice development 740 (CPD 740) - Credits: 6.00
Research field project 710 (RFP 710) - Credits: 16.00
Research field project 711 (RFP 711) - Credits: 16.00
Research field project 721 (RFP 721) - Credits: 16.00
Research field project 731 (RFP 731) - Credits: 16.00
Research field studies 710 (RFS 710) - Credits: 32.00

## BEngHons Bioengineering (12240203)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

Students may take modules to the value of 32 credits from other fields of specialisation or from other departments, with approval of the Coordinator: Postgraduate studies.

It is a requirement that a student must complete all three the bioengineering honours modules, as well as Introduction to research 732 (EIN 732), to enroll for a master’s or a PhD in Bioengineering.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

EIN 732 is a compulsory module. With permission from the department it may be substituted with:

EPT 732 OR

EPT 733

EIN 732 is 'n verpligte module. Met toestemming van die departement mag dit vervang word met:

EPT 732 OF

EPT 733

#### Core modules

Biosignals and systems 732 (EBB 732) - Credits: 32.00
Bioelectricity and electronics 732 (EBE 732) - Credits: 32.00
Bioelectromagnetism and modelling 732 (EBI 732) - Credits: 32.00
Introduction to research 732 (EIN 732) - Credits: 32.00

## BEngHons Chemical Engineering (12240022)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

## Other programme-specific information

A limited number of appropriate modules from other departments and from other divisions of Chemical Engineering are allowed.

Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

## Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

### Core modules

Bioprocessing 732 (CBP 732) - Credits: 32.00
Fluoro-materials science research and technology 732 (CFT 732) - Credits: 32.00
Process integration 732 (CIP 732) - Credits: 32.00
Chemical engineering 702 (CIR 702) - Credits: 32.00
Environmental nanomaterials 732 (CKO 732) - Credits: 32.00
Carbon materials science research and technology 732 (CMS 732) - Credits: 32.00
Product design 732 (CPO 732) - Credits: 32.00
Polymer processing 732 (CPP 732) - Credits: 32.00
Polymer materials science and research 732 (CPW 732) - Credits: 32.00
Bio-reaction engineering 732 (CRH 732) - Credits: 32.00
Research orientation 700 (CRO 700) - Credits: 32.00
Separation technology 732 (CSK 732) - Credits: 32.00

Process control system research and development 732 (CSP 732) - Credits: 32.00
Additive technology 732 (CYM 732) - Credits: 32.00
Biological water treatment 780 (WBW 780) - Credits: 32.00

## BEngHons Computer Engineering (12240214)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

Students may take modules to the value of 32 credits from other fields of specialisation or from other departments, with approval of the Coordinator: Postgraduate Studies.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

EIN 732 is a compulsory module. With permission from the department it may be substituted with:

EPT 732 OR

EPT 733

EIN 732 is 'n verpligte module. Met toestemming van die departement mag dit vervang word met:

EPT 732 OF

EPT 733

**Core modules**

Intelligent systems 732 (EAI 732) - Credits: 32.00
Advanced topics in intelligent systems 733 (EAI 733) - Credits: 32.00
Introduction to research 732 (EIN 732) - Credits: 32.00
Wireless sensor networks 732 (EKS 732) - Credits: 32.00
Electronic defence - electronic countermeasures 780 (ELB 780) - Credits: 32.00
Electronic defence - electronic support 781 (ELB 781) - Credits: 32.00
Research project: Theory 732 (EPT 732) - Credits: 32.00
Research project: Design and laboratory 733 (EPT 733) - Credits: 32.00
Computer networks 780 (ERN 780) - Credits: 32.00

## BEngHons Control Engineering (12240232)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final

mark of 50% is required.

v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction
A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year
Minimum credits: 128

### Core modules
Multivariable control system design 700 (CBO 700) - Credits: 32.00
Multivariable control system theory 700 (CBT 700) - Credits: 32.00
Model-based control laboratory 732 (CML 732) - Credits: 32.00
Process control system research and development 732 (CSP 732) - Credits: 32.00

# BEngHons Electrical Engineering (12240032)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information
The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

## Admission requirements
Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

## Other programme-specific information
Students may take modules to the value of 32 credits from other fields of specialisation or from other departments, with approval of the Coordinator: Postgraduate Studies.

## Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final

mark of 50% is required.

v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

EIN 732 is a compulsory module. With permission from the department it may be substituted with:

EPT 732 OR

EPT 733

EIN 732 is 'n verpligte module. Met toestemming van die departement mag dit vervang word met:

EPT 732 OF

EPT 733

### Core modules

Power electronics 780 (EED 780) - Credits: 32.00
Energy management 732 (EES 732) - Credits: 32.00
Power distribution engineering 732 (EEV 732) - Credits: 32.00
Renewable energy 732 (EGH 732) - Credits: 32.00
Introduction to research 732 (EIN 732) - Credits: 32.00
Energy optimisation 732 (ENO 732) - Credits: 32.00
Research project: Theory 732 (EPT 732) - Credits: 32.00
Research project: Design and laboratory 733 (EPT 733) - Credits: 32.00

# BEngHons Electronic Engineering (12240092)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

## Other programme-specific information

Students may take modules to the value of 32 credits from other fields of specialisation or from other departments, with approval of the Coordinator: Postgraduate Studies.

## Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

EIN 732 is a compulsory module. With permission from the department it may be substituted with:

EPT 732 OR

EPT 733

EIN 732 is 'n verpligte module. Met toestemming van die departement mag dit vervang word met:

EPT 732 OF

EPT 733

### Core modules

Intelligent systems 732 (EAI 732) - Credits: 32.00
Advanced topics in intelligent systems 733 (EAI 733) - Credits: 32.00
Optimal control 780 (EBO 780) - Credits: 32.00
Renewable energy 732 (EGH 732) - Credits: 32.00
Introduction to research 732 (EIN 732) - Credits: 32.00
Electronic defence - electronic countermeasures 780 (ELB 780) - Credits: 32.00
Electronic defence - electronic support 781 (ELB 781) - Credits: 32.00
Antenna theory 780 (EMA 780) - Credits: 32.00
Multivariable control systems 732 (EMB 732) - Credits: 32.00
Microwave theory 780 (EMM 780) - Credits: 32.00
Research project: Theory 732 (EPT 732) - Credits: 32.00
Research project: Design and laboratory 733 (EPT 733) - Credits: 32.00
Digital communications 732 (ETD 732) - Credits: 32.00

Telecommunication systems engineering 732 (ETT 732) - Credits: 32.00

## BEngHons Engineering and Technology Management (12240252)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BEngHons (Engineering and Technology Management) degree is conferred by the following academic department: Engineering and Technology Management.

The stipulations of Faculty Regulations for honours degrees apply mutatis mutandis.

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must be consulted.

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

The admission requirement for the BEng (Hon) degree is a BEng or equivalent qualification. A selection procedure takes place prior to admission to the honours degree. Selection takes place as stipulated in the respective departmental rules. (click here)

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

**Core modules**
Research project 780 (IGB 780) - Credits: 32.00
Engineering technology economics 780 (IKN 780) - Credits: 16.00
Technology and innovation management 780 (INV 780) - Credits: 16.00
Project management 780 (IPK 780) - Credits: 16.00
Systems thinking and engineering 780 (ISE 780) - Credits: 16.00

**Elective modules**
Asset management 780 (IBB 780) - Credits: 16.00
Technological entrepreneurship 780 (IEE 780) - Credits: 16.00
Maintenance management 780 (IMC 780) - Credits: 16.00
Operations management 781 (IVV 781) - Credits: 16.00

## BEngHons Environmental Engineering (12240222)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Air quality control 780 (CAM 780) - Credits: 32.00
Principles of environmental engineering 780 (CEM 780) - Credits: 32.00
Industrial waste engineering 780 (WAI 780) - Credits: 32.00
Water quality management and research 780 (WQB 780) - Credits: 32.00

## BEngHons Geotechnical Engineering (12240215)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year
Minimum credits: 128

SSC 780 compulsory module / verpligte module

**Core modules**
Analytical soil mechanics 787 (SGS 787) - Credits: 24.00
Theoretical soil mechanics 788 (SGS 788) - Credits: 24.00
Specialised geotechnical testing 789 (SGS 789) - Credits: 24.00
Civil research 780 (SSC 780) - Credits: 32.00

**Elective modules**
Applied statistical methods and optimisation 798 (SHC 798) - Credits: 24.00
Numerical methods and finite element applications for Civil Engineers 790 (SIK 790) - Credits: 24.00

## BEngHons Industrial Engineering (12240012)

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| **Minimum duration of study** | 1 year |

### Programme information
The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements
Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information
An appropriate bouquet of 8 modules must be selected in consultation with the Head of Department to comply with the requirements for one of the following domains of specialisation:

- Resource Optimisation (RO)
- Supply Chain Engineering (SCE)
- Business Process Management (BPM)

Industrial Engineers are not allowed more than 2 appropriate modules from other departments.

Non-Industrial Engineers are not allowed more than 1 appropriate module from other departments.

A maximum of 3 approved modules may be selected from other departments

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.

iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

BCS 780 is a compulsory module.

#### Core modules

Enterprise engineering and research methods 781 (BBA 781) - Credits: 32.00
Industrial and systems engineering research 780 (BCS 780) - Credits: 32.00
Quality management 780 (BGH 780) - Credits: 16.00
Supply chain processes 781 (BLK 781) - Credits: 16.00
Manufacturing planning systems 782 (BPZ 782) - Credits: 32.00
Reliability engineering 780 (BTH 780) - Credits: 16.00
Simulation modelling 780 (BUY 780) - Credits: 32.00
Supply chain design 780 (BVK 780) - Credits: 16.00

## BEngHons Mechanical Engineering (12240052)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

Also consult the General Regulations G.16 to G.29.

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

All students must complete the module MSS 732 Research study 732 listed below.

A limited number of appropriate modules from other departments are allowed. Not all modules liste are presented each year. Please consult the departmental post- grad brochure.

## Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

MSS 732 compulsory module / verpligte module

### Core modules

Aircraft propulsion 780 (MAY 780) - Credits: 16.00
Control Systems 780 (MBB 780) - Credits: 16.00
Non-destructive testing 780 (MCT 780) - Credits: 16.00
Advanced finite element methods 781 (MEE 781) - Credits: 16.00
Mechatronics 780 (MEG 780) - Credits: 16.00
Vibration-based condition monitoring 781 (MEV 781) - Credits: 16.00
Advanced heat and mass transfer 780 (MHM 780) - Credits: 16.00
Condition-based maintenance 780 (MIC 780) - Credits: 16.00
Maintenance practice 780 (MIP 780) - Credits: 16.00
Maintenance logistics 782 (MIP 782) - Credits: 16.00
Reliability engineering 781 (MIR 781) - Credits: 16.00
Aerodynamics 780 (MLD 780) - Credits: 16.00
Missile aerodynamics and design 781 (MLD 781) - Credits: 16.00
Experimental methods 782 (MLD 782) - Credits: 16.00
Unmanned aircraft systems technology 783 (MLD 783) - Credits: 16.00
Avionics 784 (MLD 784) - Credits: 16.00
Air conditioning and refrigeration 780 (MLR 780) - Credits: 16.00
Flight mechanics 780 (MLV 780) - Credits: 16.00

Optimum design 780 (MOO 780) - Credits: 16.00
Fracture mechanics 780 (MSF 780) - Credits: 16.00
Numerical thermoflow 780 (MSM 780) - Credits: 16.00
Numerical thermoflow 781 (MSM 781) - Credits: 16.00
Research study 732 (MSS 732) - Credits: 32.00
Fatigue 780 (MSV 780) - Credits: 16.00
Fluid mechanics 780 (MSX 780) - Credits: 16.00
Advanced fluid mechanics 781 (MSX 781) - Credits: 16.00
Advanced thermodynamics and energy systems 781 (MTX 781) - Credits: 16.00
Reactor coolant flow and heat transfer 782 (MUA 782) - Credits: 16.00
Reactor engineering science 783 (MUA 783) - Credits: 16.00
Reactor physics 784 (MUA 784) - Credits: 16.00
Reactor materials engineering 785 (MUA 785) - Credits: 16.00
Reactor materials engineering 786 (MUA 786) - Credits: 16.00
Fossil fuel power stations 781 (MUU 781) - Credits: 16.00
Vehicle dynamics 780 (MVI 780) - Credits: 16.00
Numerical methods 780 (MWN 780) - Credits: 16.00

## BEngHons Metallurgical Engineering (12240063)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

A limited number of appropriate modules from other departments are allowed.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.

v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

NLO 700 compulsory module / verpligte module

#### Core modules

Electrometallurgy 700 (NEL 700) - Credits: 30.00
Fabrication engineering 700 (NFE 700) - Credits: 30.00
Physical metallurgy 700 (NFM 700) - Credits: 30.00
Heat treatment 700 (NHB 700) - Credits: 30.00
Hydrometallurgy 700 (NHM 700) - Credits: 30.00
Corrosion 700 (NKR 700) - Credits: 30.00
Research project 700 (NLO 700) - Credits: 30.00
Mechanical metallurgy 700 (NMM 700) - Credits: 30.00
Minerals processing 700 (NMP 700) - Credits: 30.00
Applied theory of sampling for minerals processing 701 (NMP 701) - Credits: 30.00
Pyrometallurgy 700 (NPM 700) - Credits: 30.00
Froth flotation 700 (NSF 700) - Credits: 30.00
Welding metallurgy 700 (NSW 700) - Credits: 30.00
Refractory materials 700 (NVM 700) - Credits: 30.00
Mathematical modelling of metallurgical processes and materials 780 (NWM 780) - Credits: 30.00
Welding processes 700 (NWP 700) - Credits: 30.00
Design of welded structures 701 (NWP 701) - Credits: 30.00

## BEngHons Microelectronic Engineering (12240192)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

Students may take modules to the value of 32 credits from other fields of specialisation or from other departments, with approval of the Coordinator: Postgraduate Studies.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

EIN 732 is a compulsory module. With permission from the department it may be substituted with:

EPT 732 OR

EPT 733

EIN 732 is 'n verpligte module. Met toestemming van die departement mag dit vervang word met:

EPT 732 OF

EPT 733

#### Core modules

Analogue electronic design 732 (EME 732) - Credits: 32.00
Communication electronics 732 (EMK 732) - Credits: 32.00

#### Elective modules

Introduction to research 732 (EIN 732) - Credits: 32.00
Research project: Theory 732 (EPT 732) - Credits: 32.00
Research project: Design and laboratory 733 (EPT 733) - Credits: 32.00

## BEngHons Mining Engineering (12240072)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

## Other programme-specific information

A limited number of appropriate modules from other departments are allowed, i.e. 64 credits.

## Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

PSS 700 compulsory module / verpligte module

### Core modules

Financial mine valuation 780 (PFZ 780) - Credits: 16.00
Slope stability 781 (PHS 781) - Credits: 16.00
Airflow and fans 711 (PKB 711) - Credits: 16.00
Advanced design: Mining 780 (PMZ 780) - Credits: 16.00
Open-pit mining 783 (POY 783) - Credits: 16.00
Advanced explosive engineering 785 (PRX 785) - Credits: 16.00
Research project 700 (PSS 700) - Credits: 32.00

Strata control: Hard-rock mining 786 (PSZ 786) - Credits: 16.00
Strata control: Collieries 788 (PSZ 788) - Credits: 16.00

## BEngHons Structural Engineering (12240122)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Numerical methods and finite element applications for Civil Engineers 790 (SIK 790) - Credits: 24.00
Civil research 780 (SSC 780) - Credits: 32.00

#### Elective modules

Structural mechanics 777 (SIN 777) - Credits: 24.00

Pre-stressed concrete design 791 (SIN 791) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00

## BEngHons Transportation Engineering (12240112)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

SSC 780 compulsory module / verpligte module

#### Core modules

Applied statistical methods and optimisation 798 (SHC 798) - Credits: 24.00

Civil research 780 (SSC 780) - Credits: 32.00

**Elective modules**

Pavement design 793 (SGC 793) - Credits: 24.00
Road rehabilitation technology 797 (SGC 797) - Credits: 24.00
Numerical methods and finite element applications for Civil Engineers 790 (SIK 790) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00
Transportation studies 790 (SVC 790) - Credits: 24.00
Traffic engineering 792 (SVC 792) - Credits: 24.00

## BEngHons Water Resources Engineering (12240162)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

SSC 780 compulsory module / verpligte module

**Core modules**
Civil research 780 (SSC 780) - Credits: 32.00

**Elective modules**
Flood hydrology 792 (SHC 792) - Credits: 24.00
Pipe flow 795 (SHC 795) - Credits: 24.00
Applied statistical methods and optimisation 798 (SHC 798) - Credits: 24.00
Numerical methods and finite element applications for Civil Engineers 790 (SIK 790) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00

## BEngHons Water Utilisation Engineering (12240103)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

A limited number of appropriate modules from other departments and from other divisions of Chemical Engineering are allowed.

Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Principles of environmental engineering 780 (CEM 780) - Credits: 32.00
Process integration 732 (CIP 732) - Credits: 32.00
Industrial waste engineering 780 (WAI 780) - Credits: 32.00
Biological water treatment 780 (WBW 780) - Credits: 32.00
Chemical water treatment 780 (WCW 780) - Credits: 32.00
Water quality management and research 780 (WQB 780) - Credits: 32.00

## BEngHons Welding Engineering (12240064)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Curriculum: Final year

Minimum credits: 150

#### Core modules

Fabrication engineering 700 (NFE 700) - Credits: 30.00
Research project 700 (NLO 700) - Credits: 30.00
Welding metallurgy 700 (NSW 700) - Credits: 30.00
Welding processes 700 (NWP 700) - Credits: 30.00
Design of welded structures 701 (NWP 701) - Credits: 30.00

## BIArchHons (12242007)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

## Admission requirements

A candidate for the degree programme Bachelor of Interior Architecture Honours:

(1) must be a graduate for the degree with a BScInt degree or an equivalent university degree;

**or**

(2) must have an appropriate recognised tertiary qualification. Such a candidate may be required, at the discretion of the HOD to take:

(i) an academic literacy test;

(ii) a computer skills test;

**or**

(3) must have a qualification deemed adequate by the HOD in consultation with the Dean and obtain (where necessary) the approval of Senate and comply with any other prescribed requirements.

Candidates mentioned in (2) and (3) above may, at the discretion of the HOD, be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.

Candidates mentioned in (1), (2) and (3) above:

(i) should preferably have had practical experience and/or have done and recorded an extended study exursion;

(ii) are intereviewed for selection;

(iii) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;

(iv) are selected on merit

**Please note:** The number of candidate admitted to this programme is restricted.

**Main curriculum:**

Unless the HOD, after consultattion with the Dean, decides otherwise, for those students wishing hereafter to continue with the MInt(Prof) degree, the following curriculum applies:

| **BIntHons** | **1ste Quarter** | **2nd Quarter** | **3rd Quarter** | **4th Quarter** |
|---|---|---|---|---|
| Practice component | **CPD 710** (6 credits) Systems and materials | **CPD 720** (6 credits) The idea of building | **CPD 740** (6 credits) Built environment modelling **POU 720** (2 credits) | **CPD 730** (6 credits) Profession practice |

| | | |
|---|---|---|
| Theory component | **RFS 710** (6 credits) **RFS 720** (6 credits) & **RFS 730** (6 credits)<br>*May run separately or concurrently over quarters 1-2* | **RFS 740** (6 credits) |
| Project component | **RFP 713/723/733** (20 credits each)<br>*Examined at the end of the quarter 3* | **RFP 730** (20 credits) |

## Other programme-specific information

Refer to G Regulations G.16 to G.29 and G.54.

The degree is awarded to those students who have obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework, a minimum examination mark of 50% is required.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75%.

## Curriculum: Final year

Minimum credits: 120

### Core modules

Continuing practice development 710 (CPD 710) - Credits: 6.00
Continuing practice development 720 (CPD 720) - Credits: 6.00
Continuing practice development 730 (CPD 730) - Credits: 6.00
Continuing practice development 740 (CPD 740) - Credits: 6.00
Research field project 713 (RFP 713) - Credits: 16.00
Research field project 723 (RFP 723) - Credits: 16.00
Research field project 730 (RFP 730) - Credits: 16.00
Research field project 733 (RFP 733) - Credits: 16.00
Research field studies 730 (RFS 730) - Credits: 32.00

# BISHons Information Science (12240006)

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|---|---|
| **Minimum duration of study** | 1 year |

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YUNIBESITHI YA PRETORIA

| | |
|---|---|
| **Contact** | Prof I Fourie ina.fourie@up.ac.za +27 (0)124205216 |

## Admission requirements

- Any person who wishes to register at the University for the first time, or after an interruption of studies, should apply or reapply for admission. Application for admission to all programmes closes on 30 September.
- BIS in Information Science, Information and Knowledge Management, Library Science or an equivalent degree.
- A minimum average of 60% in the undergraduate studies.

## Additional requirements

Consult G Regulations G.16 to G.29.

## Other programme-specific information

Subject to the provisions of G Regulation G.18.3, a full-time student must complete his or her studies for an honours degree within two academic years (four semesters) and an after-hours student within three academic years (six semesters) after first registration for the degree. However, the Dean may, on the recommendation of the Head of Department concerned, extend the period of study in both cases by a maximum of two semesters.

**Please Note:**

The semester in which the module is offered may vary from year to year. Please see the departmental website.

## Curriculum: Final year

Minimum credits: 120

Select any three electives (45 credits) in collaboration with the package organiser.

### Fundamental modules

Research methodology 711 (INY 711) - Credits: 15.00
Research report 734 (INY 734) - Credits: 30.00

### Core modules

Information and knowledge management (I) 713 (INY 713) - Credits: 15.00
Organisation, retrieval and seeking of information 714 (INY 714) - Credits: 15.00

### Elective modules

Information ethics 715 (INY 715) - Credits: 15.00
Information and knowledge management (II) 716 (INY 716) - Credits: 15.00
Information retrieval 717 (INY 717) - Credits: 15.00
Information society 722 (INY 722) - Credits: 15.00
Competitive intelligence (I) 726 (INY 726) - Credits: 15.00
Competitive intelligence (II) 727 (INY 727) - Credits: 15.00
Information communication 730 (INY 730) - Credits: 15.00

# BISHons Multimedia (12240007)

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|---|---|
| **Minimum duration of study** | 1 year |

| | | |
|---|---|---|
| **Contact** | Mr JW de Beer | koos.debeer@up.ac.za +27 (0)124202833 |

### Admission requirements

- BIS in Multimedia.
- A minimum average of 60% in the undergraduate studies.

### Additional requirements

Also consult G Regulations G.16 to G.29.

### Other programme-specific information

Subject to the provisions of G Regulation G.18.3, a full-time student must complete his or her studies for an honours degree within two academic years (four semesters) and an after-hours student within three academic years (six semesters) after first registration for the degree. However, the Dean may, on the recommendation of the Head of Department concerned, extend the period of study in both cases by a maximum of two semesters.

A maximum of two modules may also be selected as electives from the other departments in the School of Information Technology.

### Curriculum: Final year

Minimum credits: 120

#### Core modules

Multimedia research project 761 (IMY 761) - Credits: 30.00
Hypermedia and mark-up languages 772 (IMY 772) - Credits: 15.00

#### Elective modules

Multimedia trends 771 (IMY 771) - Credits: 15.00
Multimedia technology 773 (IMY 773) - Credits: 15.00
Virtual environments 774 (IMY 774) - Credits: 15.00
Animation theory and practice 777 (IMY 777) - Credits: 15.00
Human-computer interaction 779 (IMY 779) - Credits: 15.00
Research methodology 711 (INY 711) - Credits: 15.00

## BISHons Publishing (12240008)

| | | |
|---|---|---|
| **Minimum duration of study** | 1 year | |
| **Contact** | Prof EH le Roux | beth.leroux@up.ac.za +27 (0)124202426 |

### Admission requirements

- BIS in Publishing or any related package or equivalent degree;
- A minimum average of 65% in the undergraduate studies.

## Additional requirements

Consult G Regulations G.16 to G.29.

## Other programme-specific information

Subject to the provisions of G Regulation G.18.3, a full-time student must complete his or her studies for an honours degree within two academic years (four semesters) and an after-hours student within three academic years (six semesters) after first registration for the degree. However, the Dean may, on the recommendation of the Head of Department concerned, extend the period of study in both cases by a maximum of two semesters.

## Curriculum: Final year

Minimum credits: 120

Select two of the following modules or any other relevant modules in collaboration with the package organiser.

### Fundamental modules

Research methodology 711 (INY 711) - Credits: 15.00

### Core modules

Publishing management: Management and finance 722 (PUB 722) - Credits: 15.00
Publishing management: Organisation and processes 723 (PUB 723) - Credits: 15.00
Research project 1: The South African publishing environment 724 (PUB 724) - Credits: 15.00
Research project 2: The international publishing environment 725 (PUB 725) - Credits: 15.00
Editorial practice: Advanced copy-editing and editorial project management 728 (PUB 728) - Credits: 15.00

### Elective modules

Advanced e-publishing 712 (PUB 712) - Credits: 15.00
Editorial practice: List building and acquisition of rights 729 (PUB 729) - Credits: 15.00
Book history 732 (PUB 732) - Credits: 15.00

# BLArchHons (12242008)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof PT Vosloo tsa-s02365103@tuks.co.za +27 (0)124204128 |

## Programme information

Also refer to G Regulations G.16 to G.29 and G.54.

## Admission requirements

A candidate for the degree programme Bachelor of Landscape Architecture Honours:

(1) must be a graduate with a BScLArch degree or an equivalent university degree;
or
(2) must have an appropriate recognised tertiary qualification. Such a candidate may be required at the discretion of the Head of Department to take:

(i) an academic literacy test;
(ii) a computer skills test;
or
(3) must have a qualification deemed adequate by the Head of Department in consultation with the Dean and obtain (where necessary) the approval of Senate and comply with any other prescribed requirements.
Candidates mentioned in (2) and (3) above may at the discretion of the Head of Department be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.
Candidates mentioned in (1) (2) and (3) above
(i) should preferably have had practical experience and/or have done and recorded an extended study excursion;
(ii) are interviewed for selection;
(iii) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;
(iv) are selected on merit.

**Note**: A limited number of candidates are admitted to this programme.

## Other programme-specific information

**Awarding of degree**

The degree is awarded to those students who have obtained the prescribed credits. Students admitted with conditions must comply with all of these before all 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework a minimum examination mark of 50% is required.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75%.

## Curriculum: Final year

Minimum credits: 120

### Core modules

Continuing practice development 710 (CPD 710) - Credits: 6.00
Continuing practice development 720 (CPD 720) - Credits: 6.00
Continuing practice development 730 (CPD 730) - Credits: 6.00
Continuing practice development 740 (CPD 740) - Credits: 6.00
Research field project 712 (RFP 712) - Credits: 16.00
Research field project 720 (RFP 720) - Credits: 16.00

Research field project 722 (RFP 722) - Credits: 16.00
Research field project 732 (RFP 732) - Credits: 16.00
Research field studies 720 (RFS 720) - Credits: 32.00

## BScHons Applied Science Architecture (12242001)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof C Combrinck carin.combrinck@up.ac.za +27 (0)124206536 |

### Programme information

This degree is for those students intending hereafter to pursue a master's degree by research and coursework in applied science in the fields of architecture, landscape architecture or interior architecture or generally in the built environment.

Refer to G Regulations G.16 to G.29 and G.54.

### Admission requirements

A candidate for the degree programme Bachelor of Science Honours in Applied Science:
(1) must be a graduate with a BSc degree or an equivalent university degree;
or
(2) must have an appropriate recognised tertiary qualification.
Such a candidate may be required, at the discretion of the head of Head of Department to take:
(i) an academic literacy test;
(ii) a computer skills test;
or
(3) must have a qualification deemed adequate by the Head of Department in consultation with the Dean and obtain (where necessary) the approval of Senate, and comply with any other prescribed requirements.
Candidates mentioned in (2) and (3) above may, at the discretion of the Head of Department, be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.
Candidates mentioned in (1), (2) and (3) above
(i) should preferably have had practical experience and/or have done and recorded an extended study excursion;
(ii) are interviewed for selection;
(iii) must present a portfolio and/or journal which demonstrates the requisite level of proficiency and competency and is a record of their experience within the field they intend to do research;
(iv) are selected on merit.
**Please note:** A limited number of candidates are admitted to this programme.

### Other programme-specific information

Students who follow modules presented by other schools or faculties must first obtain permission for such registration(s) from those schools or faculties and must familiarise themselves with the admission requirements of the specific module(s), and the examination rules and regulations pertaining to such a module(s).

(Please Note: it is the students' responsibility to have their projects approved by the specific research field coordinator)

Course work modules at honours level (700) presented by other departments, schools or faculities (maximum 30 credits) . Students may register for other honours (700) level modules presented in the Department of Architecture with the approval of the Head of Department.

**Awarding of degree**

The degree is awarded to those students who have obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework a minimum examination mark of 50% is required.

## Research information

The G Regulation G.39.12 applies.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75%.

## Curriculum: Final year

Minimum credits: 120

In addition to the prescribed 90 credits, a student must do a 700-level module(s) for 30 credit from other departments,schools or faculties. Students may also register for 700-level modules presented by the Department of Architecture, with the permission of the Head of Department.

### Core modules

Project component (Capita selecta) 700 (RFP 700) - Credits: 60.00
Theory component (Capita selecta) 700 (RFS 700) - Credits: 30.00

# BScHons Applied Science Metallurgy: Welding Technology (12243036)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering

- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Curriculum: Final year

Minimum credits: 150

#### Core modules

Fabrication engineering 700 (NFE 700) - Credits: 30.00
Research project 700 (NLO 700) - Credits: 30.00
Welding metallurgy 700 (NSW 700) - Credits: 30.00
Welding processes 700 (NWP 700) - Credits: 30.00
Design of welded structures 701 (NWP 701) - Credits: 30.00

## BScHons Applied Science Chemical Technology (12243004)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification is required for admission.

### Other programme-specific information

A limited number of appropriate postgraduate modules from other departments are allowed. Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

Specialisation in Process Technology is possible by registering for specific modules. (Please note that a candidate selecting this option will not be allowed to register for any modules at 700-level before the modules of the first semester at 400-level had been completed successfully.) Please consult the department.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

## Curriculum: Final year

Minimum credits: 128

### Core modules

Bioprocessing 732 (CBP 732) - Credits: 32.00
Fluoro-materials science research and technology 732 (CFT 732) - Credits: 32.00
Process integration 732 (CIP 732) - Credits: 32.00
Chemical engineering 707 (CIR 707) - Credits: 32.00
Chemical Engineering 787 (CIR 787) - Credits: 16.00
Carbon materials science research and technology 732 (CMS 732) - Credits: 32.00
Particle technology 410 (CPA 410) - Credits: 16.00
Process control 410 (CPB 410) - Credits: 16.00
Product design 732 (CPO 732) - Credits: 32.00
Polymer processing 732 (CPP 732) - Credits: 32.00
Polymer materials science and research 732 (CPW 732) - Credits: 32.00
Reactor design 410 (CRO 410) - Credits: 16.00
Separation technology 732 (CSK 732) - Credits: 32.00
Specialisation 420 (CSS 420) - Credits: 16.00
Additive technology 732 (CYM 732) - Credits: 32.00

# BScHons Applied Science Environmental Technology (12243008)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

## Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

## Other programme-specific information

A limited number of appropriate postgraduate modules from other departments are allowed. Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

## Curriculum: Final year

Minimum credits: 128

### Core modules

Air quality control 787 (CAM 787) - Credits: 32.00
Principles of environmental engineering 787 (CEM 787) - Credits: 32.00
Industrial waste engineering 787 (WAI 787) - Credits: 32.00
Water quality management and research 787 (WQB 787) - Credits: 32.00

# BScHons Applied Science Geotechnics (12243005)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

## Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

## Other programme-specific information

The remainder of the credits to be chosen from the modules prescribed for the BEngHons (Geotechnical Engineering) programme, as approved by the head of department, and after completion of the appropriate modules as listed.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

## Curriculum: Final year

Minimum credits: 128

#### Core modules

Analytical soil mechanics 787 (SGS 787) - Credits: 24.00
Theoretical soil mechanics 788 (SGS 788) - Credits: 24.00
Specialised geotechnical testing 789 (SGS 789) - Credits: 24.00
Basic statistical methods 797 (SHC 797) - Credits: 24.00
Civil research 780 (SSC 780) - Credits: 32.00

## BScHons Applied Science Industrial Systems (12243002)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Other programme-specific information

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Industrial analysis 780 (BAN 780) - Credits: 16.00
Enterprise engineering and research methods 781 (BBA 781) - Credits: 32.00
Industrial and systems engineering research 780 (BCS 780) - Credits: 32.00
Quality management 780 (BGH 780) - Credits: 16.00
Supply chain processes 781 (BLK 781) - Credits: 16.00
Manufacturing planning systems 782 (BPZ 782) - Credits: 32.00
Reliability engineering 780 (BTH 780) - Credits: 16.00
Simulation modelling 780 (BUY 780) - Credits: 32.00
Supply chain design 780 (BVK 780) - Credits: 16.00

## BScHons Applied Science Mechanics (12243006)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Maintenance practice 780 (MIP 780) - Credits: 16.00
Reliability engineering 781 (MIR 781) - Credits: 16.00
Aerodynamics 780 (MLD 780) - Credits: 16.00
Flight mechanics 780 (MLV 780) - Credits: 16.00
Numerical thermoflow 780 (MSM 780) - Credits: 16.00
Fatigue 780 (MSV 780) - Credits: 16.00
Fluid mechanics 780 (MSX 780) - Credits: 16.00

#### Elective modules

Aircraft propulsion 780 (MAY 780) - Credits: 16.00
Control Systems 780 (MBB 780) - Credits: 16.00
Non-destructive testing 780 (MCT 780) - Credits: 16.00
Advanced finite element methods 781 (MEE 781) - Credits: 16.00
Mechatronics 780 (MEG 780) - Credits: 16.00
Vibration-based condition monitoring 781 (MEV 781) - Credits: 16.00
Advanced heat and mass transfer 780 (MHM 780) - Credits: 16.00
Condition-based maintenance 780 (MIC 780) - Credits: 16.00
Maintenance logistics 782 (MIP 782) - Credits: 16.00
Missile aerodynamics and design 781 (MLD 781) - Credits: 16.00
Experimental methods 782 (MLD 782) - Credits: 16.00
Unmanned aircraft systems technology 783 (MLD 783) - Credits: 16.00

Avionics 784 (MLD 784) - Credits: 16.00
Air conditioning and refrigeration 780 (MLR 780) - Credits: 16.00
Optimum design 780 (MOO 780) - Credits: 16.00
Fracture mechanics 780 (MSF 780) - Credits: 16.00
Numerical thermoflow 781 (MSM 781) - Credits: 16.00
Research study 732 (MSS 732) - Credits: 32.00
Advanced fluid mechanics 781 (MSX 781) - Credits: 16.00
Experimental structural dynamics 783 (MSY 783) - Credits: 16.00
Advanced thermodynamics and energy systems 781 (MTX 781) - Credits: 16.00
Fossil fuel power stations 781 (MUU 781) - Credits: 16.00
Vehicle dynamics 780 (MVI 780) - Credits: 16.00
Numerical methods 780 (MWN 780) - Credits: 16.00

## BScHons Applied Science Metallurgy (12243007)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Other programme-specific information

A limited number of appropriate modules from other departments and from other divisions of Chemical Engineering are allowed. Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

### Curriculum: Final year

Minimum credits: 120

NLO 700 is a compulsory research module (30 credits).
Select one of the other three core modules listed (30 credits) and
two modules from the list of electives (60 credits).

**Core modules**

Basic physical metallurgy 701 (NFM 701) - Credits: 30.00
Basic extractive metallurgy 701 (NHM 701) - Credits: 30.00
Research project 700 (NLO 700) - Credits: 30.00
Basic pyrometallurgy 701 (NPM 701) - Credits: 30.00

**Elective modules**

Electrometallurgy 700 (NEL 700) - Credits: 30.00
Fabrication engineering 700 (NFE 700) - Credits: 30.00
Physical metallurgy 700 (NFM 700) - Credits: 30.00
Heat treatment 700 (NHB 700) - Credits: 30.00
Hydrometallurgy 700 (NHM 700) - Credits: 30.00
Corrosion 700 (NKR 700) - Credits: 30.00
Mechanical metallurgy 700 (NMM 700) - Credits: 30.00
Minerals processing 700 (NMP 700) - Credits: 30.00
Applied theory of sampling for minerals processing 701 (NMP 701) - Credits: 30.00
Pyrometallurgy 700 (NPM 700) - Credits: 30.00
Froth flotation 700 (NSF 700) - Credits: 30.00
Welding metallurgy 700 (NSW 700) - Credits: 30.00
Refractory materials 700 (NVM 700) - Credits: 30.00
Mathematical modelling of metallurgical processes and materials 780 (NWM 780) - Credits: 30.00
Welding processes 700 (NWP 700) - Credits: 30.00
Design of welded structures 701 (NWP 701) - Credits: 30.00

## BScHons Applied Science Mining (12243035)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Curriculum: Final year

Minimum credits: 128

All modules compulsory / Alle modules verpligtend

#### Core modules

Basic mine ventilation engineering 701 (PKB 701) - Credits: 16.00
Underground mining methods 701 (PMY 701) - Credits: 32.00
Surface-mining 703 (PMY 703) - Credits: 16.00
Explosives engineering 701 (PRX 701) - Credits: 16.00
Research project 700 (PSS 700) - Credits: 32.00
Basic rock mechanics 703 (PSZ 703) - Credits: 16.00

## BScHons Applied Science Structure (12243034)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification is required for admission.

### Other programme-specific information

The remainder of the credits to be chosen from the modules prescribed for the BEngHons (Structural Engineering) programme, as approved by the head of department, and after completion of the appropriate modules as listed.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

### Curriculum: Final year

Minimum credits: 128

#### Core modules
Basic structural analysis 790 (SIC 790) - Credits: 24.00
Basic structural design 793 (SIC 793) - Credits: 24.00
Civil research 780 (SSC 780) - Credits: 32.00

#### Elective modules
Structural mechanics 777 (SIN 777) - Credits: 24.00
Pre-stressed concrete design 791 (SIN 791) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00

## BScHons Applied Science Transportation Planning (12243009)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information
The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements
An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Other programme-specific information
The remainder of the credits to be chosen from the modules for the BEngHons (Transportation Engineering) programme, as approved by the head of department, and after completion of the appropriate modules as listed.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

### Curriculum: Final year
Minimum credits: 128

#### Core modules
Basic pavements and transportation 787 (SGM 787) - Credits: 24.00
Basic statistical methods 797 (SHC 797) - Credits: 24.00

Civil research 780 (SSC 780) - Credits: 32.00

**Elective modules**
Pavement design 793 (SGC 793) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00
Transportation studies 790 (SVC 790) - Credits: 24.00
Traffic engineering 792 (SVC 792) - Credits: 24.00

## BScHons Applied Science Water Resources (12243033)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification is required for admission.

### Other programme-specific information

The remainder of the modules must be chosen from the modules prescribed for the BEngHons (Water Resource Engineering) programme, as approved by the head of department, and after completion of the appropriate modules as listed.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

### Curriculum: Final year

Minimum credits: 128

**Core modules**
Basic statistical methods 797 (SHC 797) - Credits: 24.00
Basic hydraulics 788 (SHW 788) - Credits: 24.00
Civil research 780 (SSC 780) - Credits: 32.00

#### Elective modules
Flood hydrology 792 (SHC 792) - Credits: 24.00
Pipe flow 795 (SHC 795) - Credits: 24.00
Infrastructure management 790 (SSI 790) - Credits: 24.00

## BScHons Applied Science Water Utilisation (12243014)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information
The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements
An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Other programme-specific information
A limited number of appropriate postgraduate modules from other departments are allowed. Not all modules listed are presented each year. Please consult the departmental postgraduate brochure.

### Curriculum: Final year
Minimum credits: 128

#### Core modules
Industrial waste engineering 787 (WAI 787) - Credits: 32.00
Biological water treatment 787 (WBW 787) - Credits: 32.00
Chemical water treatment 787 (WCW 787) - Credits: 32.00
Water quality management and research 787 (WQB 787) - Credits: 32.00

## BScHons Applied Sciences Mechanics: Physical Asset Management (12243037)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information
This multidisciplinary programme exposes students to both the management as well as the technical aspects of

Physical Asset Management from a theoretical perspective. Students will, however, have to choose whether they would prefer to conduct the research component of the programme in either the technical domain (register with the Department of Mechanical and Aeronautical Engineering) or in the management domain (register with the Graduate School of Technology Management).

## Other programme-specific information

The curriculum comprises four core modules, two elective modules and a compulsory research project.

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean.

## Examinations and pass requirements

Also consult the Faculty Rules in this regard.
All the examination admission requirements, applicable to the relevant module, must have been met.

## Pass with distinction

The degree is conferred with distinction if students obtain a weighted average of at least 75% in all the required modules for the programme. The degree is not awarded with distinction if any one module is failed (excluding modules which were discontinued timeously).

## Curriculum: Final year

Minimum credits: 128

### Core modules

Maintenance practice 780 (MIP 780) - Credits: 16.00
Reliability engineering 781 (MIR 781) - Credits: 16.00
Aerodynamics 780 (MLD 780) - Credits: 16.00
Flight mechanics 780 (MLV 780) - Credits: 16.00
Numerical thermoflow 780 (MSM 780) - Credits: 16.00
Fatigue 780 (MSV 780) - Credits: 16.00
Fluid mechanics 780 (MSX 780) - Credits: 16.00

### Elective modules

Aircraft propulsion 780 (MAY 780) - Credits: 16.00
Control Systems 780 (MBB 780) - Credits: 16.00
Non-destructive testing 780 (MCT 780) - Credits: 16.00
Advanced finite element methods 781 (MEE 781) - Credits: 16.00
Mechatronics 780 (MEG 780) - Credits: 16.00
Vibration-based condition monitoring 781 (MEV 781) - Credits: 16.00
Advanced heat and mass transfer 780 (MHM 780) - Credits: 16.00
Condition-based maintenance 780 (MIC 780) - Credits: 16.00
Maintenance logistics 782 (MIP 782) - Credits: 16.00
Missile aerodynamics and design 781 (MLD 781) - Credits: 16.00
Experimental methods 782 (MLD 782) - Credits: 16.00
Unmanned aircraft systems technology 783 (MLD 783) - Credits: 16.00
Avionics 784 (MLD 784) - Credits: 16.00
Air conditioning and refrigeration 780 (MLR 780) - Credits: 16.00

Optimum design 780 (MOO 780) - Credits: 16.00
Fracture mechanics 780 (MSF 780) - Credits: 16.00
Numerical thermoflow 781 (MSM 781) - Credits: 16.00
Research study 732 (MSS 732) - Credits: 32.00
Advanced fluid mechanics 781 (MSX 781) - Credits: 16.00
Experimental structural dynamics 783 (MSY 783) - Credits: 16.00
Advanced thermodynamics and energy systems 781 (MTX 781) - Credits: 16.00
Fossil fuel power stations 781 (MUU 781) - Credits: 16.00
Vehicle dynamics 780 (MVI 780) - Credits: 16.00
Numerical methods 780 (MWN 780) - Credits: 16.00

## BScHons Computer Science (12244001)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

This degree programme is offered in English only. The degree is conferred on a student who successfully completes at least 120 credits of coursework in Computer Science at honours level. Consult G Regulations G.16 to G.29

### Admission requirements

A BSc degree, majoring in Computer Science from a South African university (or equivalent) with an average of 60% over all third-year computer science modules, is required for admission to this degree programme. Students from outside South Africa need to obtain a certificate from the South Afican Qualifications Authority (SAQA) before admission will be considered. The Head of Department may prescribe additional conditions for admission.

### Other programme-specific information

The Dean, on the recommendation of the Head of Department, may approve a stipulated limited extension of the prescribed period of study.

Details regarding postgraduate modules are available at www.cs.up.ac.za.

Note that some of the elective modules might not be presented each year. Consult the departmental website for the list of modules presented in the current year.

One elective module can be selected from outside the Department of Computer Science, subject to the approval of the programme manager, and provided that there are no lecture and exam clashes with Computer Science modules.

### Examinations and pass requirements

In calculating marks, G Regulation G.12.2 is applicable. However, a student is required to obtain at least 50% in an examination in a module where no semester or year mark is required. In those cases where a year mark or semester mark is available, a subminimum of 40% must be obtained in the examination.
The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module in an academic year. A module may only be repeated once. No supplementary

examinations are granted at postgraduate level.

## Pass with distinction

The BScHons degree is awarded with distinction to a candidate who obtains a weighted average of at least 75% in all the prescribed modules and who did not fail any module.

## Curriculum: Final year

Minimum credits: 120

### Core modules

Research report 700 (COS 700) - Credits: 30.00

### Elective modules

Artificial intelligence (I) 710 (COS 710) - Credits: 15.00
Artificial Intelligence (II) 711 (COS 711) - Credits: 15.00
Computer and information security (I) 720 (COS 720) - Credits: 15.00
Computer and information security (II) 721 (COS 721) - Credits: 15.00
Software engineering (I) 730 (COS 730) - Credits: 15.00
Software engineering (II) 731 (COS 731) - Credits: 15.00
Formal aspects of computing (I) 740 (COS 740) - Credits: 15.00
Formal aspects of computing (II) 741 (COS 741) - Credits: 15.00
Educational software development 750 (COS 750) - Credits: 15.00
Data mining 781 (COS 781) - Credits: 15.00
Generic programming 782 (COS 782) - Credits: 15.00
Digital forensics and investigations 783 (COS 783) - Credits: 15.00
Computer networks 784 (COS 784) - Credits: 15.00
Computer graphics 785 (COS 785) - Credits: 15.00
Parallel and distributed computing 786 (COS 786) - Credits: 15.00
Spatial databases 787 (COS 787) - Credits: 15.00
Information hiding 788 (COS 788) - Credits: 15.00
Special topics (I) 790 (COS 790) - Credits: 15.00
Special topics (II) 791 (COS 791) - Credits: 15.00

# BScHons Construction Management (12242018)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Mr AHG van Heerden hennie.vanheerden@up.ac.za +27 (0)124204150 |

## Programme information

A student is required to attend lectures diligently, but in addition the student must complete a compulsory minimum of 240 hours of temporary employment with a suitable employer in the construction industry/built environment (registered quantity surveyor, contractor, developer, property owner, etc). As proof of the practical experience the student must submit an approved log book signed by the employer.

Also refer to G Regulations G.16 to G.29 and G.54.

## Admission requirements

The admission requirements must be read in conjuction with the General Regulations.

A person shall not be admitted as a candidate for the degree unless he or she:

(a) is a graduate of the BSc in Construction Management degree of this University; or
(b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the head of department as equivalent to the BSc in Construction Management degree of this University; or
(c) has in any other manner attained a level of competence which in the opinion of the head of department is adequate for the purpose of admission

## Additional requirements

Selection is based on an applicant's academic record and experience. Applicants may be required to attend an interview and/or write an entrance examination.

## Examinations and pass requirements

A minimum semester/year mark of 40% is required in order to be admitted to the examination in a specific module. In addition, all other examination admission requirements, applicable to the relevant module, must have been met.

**Supplementary examinations**

No supplementary examinations are granted at postgraduate level.

**Special examinations**

No special examinations are granted at postgraduate level.

The degree is awarded when all prescribed modules have been passed.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75% (excluding POU 700).

## Curriculum: Final year

Minimum credits: 152

### Core modules

Feasibility studies 710 (EUS 710) - Credits: 9.00
Feasibility studies 720 (EUS 720) - Credits: 9.00
Financial management 700 (FMT 700) - Credits: 18.00
Construction management 710 (KBS 710) - Credits: 9.00
Construction management 720 (KBS 720) - Credits: 9.00
Research report 785 (KBS 785) - Credits: 30.00
Construction entrepreneurship 740 (KEN 740) - Credits: 9.00
Construction contract law 730 (KKR 730) - Credits: 12.00
Construction contract law 740 (KKR 740) - Credits: 12.00
Construction project management 730 (KPB 730) - Credits: 9.00
Construction quantities 700 (KSH 700) - Credits: 24.00

Practical development feasibility 700 (POU 700) - Credits: 2.00

## BScHons Engineering and Technology Management (12241073)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The BScHons (Engineering and Technology Management) degree is conferred by the following academic department: Engineering and Technology Management.

The stipulations of Faculty Regulations for honours degrees apply mutatis mutandis.

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must be consulted.

### Admission requirements

The admission requirement for the BSc (Hon) degree is a BSc, BTech or equivalent qualification. A selection procedure takes place prior to admission to the honours degree. Selection takes place as stipulated in the respective departmental rules. (click here)

### Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

### Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

### Curriculum: Final year

Minimum credits: 128

#### Core modules

Engineering technology economics 780 (IKN 780) - Credits: 16.00

Technology and innovation management 780 (INV 780) - Credits: 16.00
Project management 780 (IPK 780) - Credits: 16.00
Research project 780 (ISC 780) - Credits: 32.00
Systems thinking and engineering 780 (ISE 780) - Credits: 16.00

#### Elective modules

Asset management 780 (IBB 780) - Credits: 16.00
Technological entrepreneurship 780 (IEE 780) - Credits: 16.00
Maintenance management 780 (IMC 780) - Credits: 16.00
Operations management 781 (IVV 781) - Credits: 16.00

## BScHons Quantity Surveying (12242017)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Dr DJ Hoffman danie.hoffman@up.ac.za +27 (0)124202551 |

### Programme information

A student is required to attend lectures diligently, but in addition the student must complete a compulsory minimum of 240 hours of temporary employment with a suitable employer in the construction industry/built environment (registered quantity surveyor, contractor, developer, property owner, etc). As proof of the practical experience the student must submit an approved log book signed by the employer.

Also refer to G Regulations G.16 to G.29 and G.54.

### Admission requirements

A person shall not be admitted as a candidate for the degree unless he or she:

(a) is a graduate of the BSc in Quantity Surveying degree of this University; or
(b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the head of department as equivalent to the BSc in Quantity Surveying degree of this University; or
(c) has in any other manner attained a level of competence which in the opinion of the head of department is adequate for the purpose of admission.

### Additional requirements

Selection is based on an applicant's academic record and experience. Applicants may be required to attend an interview and/or write an entrance examination.

### Examinations and pass requirements

A minimum semester/year mark of 40% is required in order to be admitted to the examination in a specific module. In addition, all other examination admission requirements, applicable to the relevant module, must have been met.

**Supplementary examinations**

No supplementary examinations are granted at postgraduate level.

**Special examinations**

No special examinations are granted at postgraduate level.

The degree is awarded when all prescribed modules have been passed.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75% (excluding POU 700).

## Curriculum: Final year

Minimum credits: 158

### Core modules

Building cost estimation 700 (BKR 700) - Credits: 24.00
Quantity surveying practice 700 (BRK 700) - Credits: 12.00
Research report 785 (BRK 785) - Credits: 30.00
Management practice 700 (BTP 700) - Credits: 6.00
Feasibility studies 710 (EUS 710) - Credits: 9.00
Feasibility studies 720 (EUS 720) - Credits: 9.00
Quantities 700 (HVH 700) - Credits: 24.00
Construction management 710 (KBS 710) - Credits: 9.00
Construction contract law 730 (KKR 730) - Credits: 12.00
Construction contract law 740 (KKR 740) - Credits: 12.00
Construction project management 730 (KPB 730) - Credits: 9.00
Practical development feasibility 700 (POU 700) - Credits: 2.00

# BScHons Real Estate Retail Property (12242020)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Miss V Wilkens vita.wilkens@up.ac.za +27 (0)124203599 |

## Programme information

A student is required to attend lectures diligently, but in addition the student must complete a compulsory minimum of 240 hours of temporary employment with a suitable employer in the construction industry/built environment (registered quantity surveyor, contractor, developer, property owner, etc). As proof of the practical experience the student must submit an approved log book signed by the employer.

Also refer to G Regulations G.16 to G.29 and G.54.

## Admission requirements

he admission requirements must be read together with the stipulations of the General Regulations.

A person shall not be admitted as a candidate for the degree unless he or she:

(a) is a graduate of the BSc in Real Estate degree of this University; or
(b) is the holder of any three-year bachelor's degree of this or any other university recognised for the purpose by the head of department as equivalent to the BSc in Real Estate degree of this University; or
(c) has in any other manner attained a level of competence which in the opinion of the head of department is adequate for the purpose of admission.

## Additional requirements

Selection is based on an applicant's academic record and experience.  Applicants may be required to attend an interview and/or write an entrance examination.

## Examinations and pass requirements

A minimum semester/year mark of 40% is required in order to be admitted to the examination in a specific module. In addition, all other examination admission requirements, applicable to the relevant module, must have been met.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75% (excluding POU 700).

## Curriculum: Final year

Minimum credits: 131

### Core modules

Building cost estimation 700 (BKR 700) - Credits: 24.00
Management practice 700 (BTP 700) - Credits: 6.00
Property marketing 710 (EBM 710) - Credits: 6.00
Market and location studies 720 (EBM 720) - Credits: 6.00
Facilities management 710 (EBS 710) - Credits: 6.00
Property valuation 700 (EDW 700) - Credits: 12.00
Research report 785 (EMW 785) - Credits: 30.00
Property development 711 (EOW 711) - Credits: 9.00
Law of lease contracts 720 (HKR 720) - Credits: 6.00
Construction management 710 (KBS 710) - Credits: 9.00
Property investment 720 (PMN 720) - Credits: 6.00
Practical development feasibility 700 (POU 700) - Credits: 2.00

# BScHons Real Estate (12242019)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Miss V Wilkens vita.wilkens@up.ac.za +27 (0)124203599 |

## Programme information

A student is required to attend lectures diligently, but in addition the student must complete a compulsory minimum of 240 hours of temporary employment with a suitable employer in the construction industry/built environment (registered quantity surveyor, contractor, developer, property owner, etc). As proof of the practical experience the student must submit an approved log book signed by the employer.

Also refer to G Regulations G.16 to G.29 and G.54.

## Admission requirements

The admission requirements must be read together with the stipulations of the General Regulations.

A person shall not be admitted as a candidate for the degree unless he or she:

(a) is a graduate of the BSc in Real Estate degree of this University; or
(b) is the holder of any three-year bachelor's degree of this or any other university recognised for the purpose by the head of department as equivalent to the BSc in Real Estate degree of this University; or
(c) has in any other manner attained a level of competence which in the opinion of the head of department is adequate for the purpose of admission.

## Additional requirements

Selection is based on an applicant's academic record and experience.  Applicants may be required to attend an interview and/or write an entrance examination.

## Examinations and pass requirements

A minimum semester/year mark of 40% is required in order to be admitted to the examination in a specific module. In addition, all other examination admission requirements, applicable to the relevant module, must have been met.

**Supplementary examinations**
No supplementary examinations are granted at postgraduate level.

**Special examinations**
No special examinations are granted at postgraduate level.

The degree is awarded when all prescribed modules have been passed.

## Pass with distinction

The degree is conferred with distinction if students registered for the degree for the first time, complete the degree within the minimum prescribed time and pass all modules with a weighted average of 75% (excluding POU 700).

## Curriculum: Final year

Minimum credits: 131

### Core modules

Building cost estimation 700 (BKR 700) - Credits: 24.00
Management practice 700 (BTP 700) - Credits: 6.00
Property marketing 710 (EBM 710) - Credits: 6.00
Market and location studies 720 (EBM 720) - Credits: 6.00
Facilities management 710 (EBS 710) - Credits: 6.00
Property valuation 700 (EDW 700) - Credits: 12.00
Research report 785 (EMW 785) - Credits: 30.00
Property development 711 (EOW 711) - Credits: 9.00
Feasibility studies 720 (EUS 720) - Credits: 9.00
Law of lease contracts 720 (HKR 720) - Credits: 6.00
Construction management 710 (KBS 710) - Credits: 9.00
Property investment 720 (PMN 720) - Credits: 6.00
Practical development feasibility 700 (POU 700) - Credits: 2.00

# Master's

## MArch (12252025)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

### Programme information

By virtue of a dissertation and examination.

Refer to G Regulations G.30 to G.40 and G. 50 to G.54.

### Admission requirements

Candidates who wish to research a topic within the discipline of architecture and who are in possession of

(i) a BArch or equivalent degree of four years or more;

or

(ii) an honours degree in Architecture BArchHons or equivalent;

or

(iii) a three-year degree with Design as major component and who successfully complete supplementary modules with the weighting equivalent of an honours degree as prescribed by the Head of Department;

or

(iv) who are deemed adequate by the Head of Department in consultation with the Dean and obtained (where necessary) the approval of Senate and complying with whatever additional requirements may be prescribed are admitted for the degree Master of Architecture (by research).

### Examinations and pass requirements

After a minimum of one year of registration, the student is to submit a dissertation for examination and have an oral examination of the dissertation in the related field of study.

**Awarding of the degree**

The Master of Architecture degree is conferred on students obtaining a minimum of 50% for both the dissertation and oral examination.

### Research information

The G Regulation G.39.12 applies.

### Pass with distinction

The Master of Architecture degree is conferred with distinction on students obtaining a minimum of 75% for both the dissertation and the oral examination.

### Curriculum: Final year

#### Core modules

Dissertation: Architecture 890 (ARG 890) - Credits: 180.00

## MArch (Professional) (12252026)

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| **Minimum duration of study** | 1 year | | |
| **Contact** | Dr N Botes | nico.botes@up.ac.za | +27 (0)124204600 |
| | Prof AAJ Barker | arthur.barker@up.ac.za | +27 (0)124204542 |

### Programme information

The Master of Architecture (Professional) is a taught master's degree for the purposes of registration as a candidate professional architect with the South African Council for the Architectural Profession in terms of Act 44 of 2000 and is done by coursework, projects and a design investigation mini-dissertation and design project and discourse.

### Admission requirements

A candidate for the degree programme Master of Architecture (Professional):

1) must be a graduate with a BArchHons degree or an equivalent university degree;

or

2) must have an appropriate recognised tertiary qualification at honours degree level;

or

3) must have a qualification deemed adequate by the Head of Department in consultation with the Dean and obtain (where necessary) the approval of Senate and comply with any other prescribed requirements.

Candidates mentioned in (2) and (3) above may at the discretion of the Head of Department be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.

Candidates mentioned in (1) (2) and (3) above

(i) should preferably have had practical experience and/or have done and recorded an extended study excursion;

(ii) are interviewed for selection;

(iii) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;

(iv) are selected on merit.

**Please Note**: A limited number of candidates are admitted to this programme.

Also refer to G Regulations

### Additional requirements

Also refer to G Regulations G.30 to G.40 and G. 50 to G.54.

### Other programme-specific information

**Design topic**

The topic of the final design project (DIT 801 & DPD 801) must be approved by the Head of Department.

**Awarding of degree**

The degree is awarded to those students who have obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework a minimum examination mark of 50% is required.

## Research information

General Regulation G.39.12 applies.

## Pass with distinction

The degree is conferred with distinction on those students registering for the first time and obtaining a distinction (75%) simultaneously for both the Design investigation mini-dissertation (DIT 801) and the Design project and discourse (DPD 801) with the proviso that the degree is completed within the minimum prescribed time and all other final-year modules are passed on first registration.

## Curriculum: Final year

### Core modules

Continuing practice development 810 (CPD 810) - Credits: 15.00
Design investigation 801 (DIT 801) - Credits: 75.00
Mini-dissertation: Design project and discourse 801 (DPD 801) - Credits: 90.00

# MEng Bioengineering (12250203)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification with an average of 65% is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Bioengineering 890 (EIB 890) - Credits: 180.00

# MEng Chemical Engineering (12250022)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

### Curriculum: Final year

#### Core modules

Dissertation 800 (CVD 800) - Credits: 180.00

## MEng Computer Engineering (12250214)

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| **Minimum duration of study** | 1 year |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

### Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification with an average of 65% is required for admission to the MEng programmes.

### Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

### Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Computer engineering 890 (ERI 890) - Credits: 180.00

# MEng Control Engineering (12250232)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation 800 (CVD 800) - Credits: 180.00

# MEng Electrical Engineering (12250032)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental

postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification with an average of 65% is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Electrical engineering 890 (EIR 890) - Credits: 180.00

# MEng Electronic Engineering (12250094)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification with an average of 65% is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated

to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

### Curriculum: Final year

#### Core modules

Dissertation: Electronic engineering 890 (EIN 890) - Credits: 180.00

## MEng Engineering Management (Coursework) (12250173)

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| **Minimum duration of study** | 2 years |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MEng degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

### Admission requirements

The admission requirement for the MEng is a BEng or equivalent qualification. A selection procedure takes place prior to admission to the Master’s degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

### Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Year 1

### Core modules

Maintenance management 801 (IIB 801) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Project management 803 (IPK 803) - Credits: 10.00
Production and operations management 801 (IPP 801) - Credits: 10.00
Systems engineering and management 801 (ISE 801) - Credits: 10.00
Technology management 801 (ITB 801) - Credits: 10.00
People management 883 (PEM 883) - Credits: 10.00

## Curriculum: Final year

### Core modules

Financial management 830 (FBS 830) - Credits: 10.00
Mini-dissertation 898 (IGB 898) - Credits: 60.00
Strategic management 801 (ISM 801) - Credits: 10.00

### Elective modules

Engineering asset management 801 (IAM 801) - Credits: 10.00
Marketing management 801 (IIM 801) - Credits: 10.00
Information management 884 (ILB 884) - Credits: 10.00
Legal aspects of project management 803 (ILC 803) - Credits: 10.00
New ventures and entrepreneurship 801 (IOE 801) - Credits: 10.00
Project quality management 801 (IQM 801) - Credits: 10.00
Decision analysis and risk management 801 (IRI 801) - Credits: 10.00

# MEng Environmental Engineering (12250222)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these

modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation 800 (CVD 800) - Credits: 180.00

# MEng Geotechnical Engineering (12250215)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

### Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

### Curriculum: Final year

#### Core modules

Dissertation 890 (SGI 890) - Credits: 180.00

## MEng Industrial Engineering (12250012)

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| **Minimum duration of study** | 1 year |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

### Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

### Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

### Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

### Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

### Curriculum: Final year

#### Core modules

Dissertation: Industrial engineering 890 (BIR 890) - Credits: 180.00

## MEng Mechanical Engineering (12250052)

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| **Minimum duration of study** | 1 year |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the

head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Mechanical engineering 890 (MIR 890) - Credits: 180.00

## MEng Metallurgical Engineering (12250062)

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| **Minimum duration of study** | 1 year |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

### Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

### Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

### Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

### Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with

distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation 890 (NIN 890) - Credits: 180.00

# MEng Microelectronic Engineering (12250192)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification with an average of 65% is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Micro-electronic engineering 890 (EEY 890) - Credits: 180.00

# MEng Mining Engineering (12250072)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Mining engineering 890 (PYI 890) - Credits: 180.00

# MEng Project Management (Coursework) (12250263)

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| **Minimum duration of study** | 2 years |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MEng degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.

- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

?The admission requirement for the MEng is a BEng or equivalent qualification. A selection procedure takes place prior to admission to the Master's degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

## Other programme-specific information

Details regarding the curricula as well as syllabi of the respective domains are available from the Department.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Year 1

### Core modules

Project human resource management 801 (IHR 801) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Project financial and cost management 802 (IPF 802) - Credits: 10.00
Project procurement management 801 (IPJ 801) - Credits: 10.00
Introduction to project management 801 (IPM 801) - Credits: 10.00
Project risk management 801 (IRM 801) - Credits: 10.00
Project systems engineering 802 (ISE 802) - Credits: 10.00

## Curriculum: Final year

### Core modules

Mini-dissertation 898 (IGB 898) - Credits: 60.00
Project management practice 801 (IMP 801) - Credits: 10.00
Strategic project management 804 (ISM 804) - Credits: 10.00

### Elective modules

Marketing management 801 (IIM 801) - Credits: 10.00
Information management 884 (ILB 884) - Credits: 10.00
Legal aspects of project management 803 (ILC 803) - Credits: 10.00
New ventures and entrepreneurship 801 (IOE 801) - Credits: 10.00
Project quality management 801 (IQM 801) - Credits: 10.00
Construction management 803 (KBS 803) - Credits: 10.00
Construction management 804 (KBS 804) - Credits: 10.00
Construction management 805 (KBS 805) - Credits: 10.00

# MEng Software Engineering (12250204)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation 890 (EPR 890) - Credits: 180.00

# MEng Structural Engineering (12250122)

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| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the

degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Structural engineering 890 (SIN 890) - Credits: 180.00

# MEng Technology and Innovation Management (12250253)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of a dissertation (including an examination on the dissertation).
- A minimum of 180 credits is required to obtain the MEng degree.

## Admission requirements

A BEngHons degree or equivalent qualification is required for admission to the MEng programmes. Postgraduate selection takes place as stipulated in the respective departmental rules. (www.up.ac.za/gstm)

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).

## Curriculum: Final year

**Core modules**

Dissertation: Technology and innovation management 890 (ITB 890) - Credits: 180.00

# MEng Technology and Innovation Management (Coursework) (12250254)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MEng degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

?The admission requirement for the MEng is a BEng or equivalent qualification. A selection procedure takes place prior to admission to the Master’s degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Year 1

### Core modules

Decision analysis 880 (IBD 880) - Credits: 10.00
Technological intrapreneurship 880 (IEE 880) - Credits: 10.00
Technology commercialisation 881 (IKG 881) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Organisation and innovation 880 (INV 880) - Credits: 10.00
Project management 804 (IPK 804) - Credits: 10.00
Science, technology and innovation policy 880 (ISP 880) - Credits: 10.00
Technology management 802 (ITB 802) - Credits: 10.00

## Curriculum: Final year

### Core modules

Financial management 831 (FBS 831) - Credits: 16.00
Mini-dissertation 898 (IGB 898) - Credits: 60.00
New product development 880 (INP 880) - Credits: 10.00
Strategic technology and innovation management 880 (IST 880) - Credits: 10.00
People management 884 (PEM 884) - Credits: 16.00

# MEng Transportation Engineering (12250112)

| | |
|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the

head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation 890 (SVI 890) - Credits: 180.00

# MEng Water Resources Engineering (12250162)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).

ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Final year

### Core modules

Dissertation: Water resource engineering 890 (WBK 890) - Credits: 180.00

# MEng Water Utilisation Engineering (12250102)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).
- A minimum of 128 credits is required to obtain the MEng degree. Either a mini-dissertation (64 credits) and coursework (64 credits) (for all coursework master's degrees) or a dissertation (128 credits) (for all research master's degrees) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEngHons degree or equivalent qualification is required for admission to the MEng programmes.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.

The Dean may, on recommendation of the relevant head of department, exempt a student from the examination on the dissertation.

Guidelines for the preparation and examination of mini-dissertations are available from all departments. The average mark awarded by all the examiners is the final mark, with the pass mark being at least 50%.

## Research information

A student must by means of a dissertation or mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof issued by a recognised academic journal that an article was submitted, to the Head: Student Administration. The draft article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

### Pass with distinction

i. A student who submits a dissertation passes with distinction if an average mark of at least 75% is obtained for the dissertation (and the examination on the dissertation).
ii. A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 128 credits obtained for the degree [first 256 credits in the case of the MEng (Engineering Management), MEng (Project Management), MSc (Engineering Management) or the MSc (Project Management)], provided that 64 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

### Curriculum: Final year

#### Core modules

Dissertation 800 (CVD 800) - Credits: 180.00

## MIntArch (12252027)

| | |
|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

### Programme information

By virtue of dissertation and examination.

Refer to G Regulations G.30 to G.40 and G.50 to G.54.

### Admission requirements

Candidates who wish to research a topic within the discipline of interior architecture and who

(i) are in possession of a BInt or equivalent degree of four years or more;

or

(ii) are in possession of an honours degree in Interior architecture BIntHons or equivalent;

or

(iii) are in possession of a three-year degree with Design as major component and who successfully complete supplementary modules with weighting equivalent of an honours degree as prescribed by the Head of Department;

or

(iv) are deemed adequate by the Head of Department in consultation with the Dean and obtained (where necessary) the approval of Senate and complying with whatever additional requirements may be prescribed are admitted for the degree Master of Interior Architecture (by research).

## Examinations and pass requirements

After a minimum of one year of registration the student submits a dissertation for examination and has an oral examination of the dissertation in the related field of study.

The Master of Interior Architecture degree is conferred on students obtaining a minimum of 50% for both the dissertation and oral examination.

## Research information

The G Regulation G.39.12 applies.

## Pass with distinction

The Master of Interior Architecture degree is conferred with distinction on students obtaining a minimum of 75% in both the dissertation and the oral examination.

## Curriculum: Final year

### Core modules

Dissertation: Interior architecture 890 (INT 890) - Credits: 180.00

# MIntArch (Professional) (12252028)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

## Programme information

The Master of Interior Architecture (Professional) is done by coursework, a design investigation mini-dissertation and design project and discourse.

Refer to G Regulations G.30 to G.40 and G.50 to G.54.

## Admission requirements

Candidates for the degree programme Master of Interior Architecture (Professional):

(i) must be a graduate with a BIntHons degree or an equivalent university degree;

or

(ii) must have an appropriate recognised tertiary qualification at honours degree level;

or

(iii) must have a qualification deemed adequate by the head of department in consultation with the Dean and obtain (where necessary) the approval of Senate and comply with any other prescribed requirements.

Candidates mentioned in (ii) and (iii) above may at the discretion of the Head of Department be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.

Candidates mentioned in (i) (ii) and (iii) above:

(a) should preferably have had practical experience and/or have done and recorded an extended study excursion;

(b) are interviewed for selection;

(c) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;

(d) are selected on merit.

**Note:** A limited number of candidates are admitted to this programme.

## Other programme-specific information

**Design topic**

The topic of the final design project (DIT 803 & DPD 803) must be approved by the Head of Department.

**Awarding of degree**

The degree is awarded to those students having obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination, a minimum coursework mark of 50% is required.

If the module is not evaluated by coursework, a minimum examination mark of 50% is required.

## Research information

G Regulation G.39.12 applies with regard to the required publication.

## Pass with distinction

The degree is conferred with distinction on those students registering for the first time and obtaining a distinction (75%) simultaneously for both the Design investigation mini-dissertation (DIT 803) and the Design project and discourse (DPD 803) with the proviso that the degree is completed within the minimum prescribed time and all other final-year modules are passed on first registration.

## Curriculum: Final year

### Core modules

Continuing practice development 810 (CPD 810) - Credits: 15.00
Design investigation 803 (DIT 803) - Credits: 75.00
Mini-dissertation: Design project and discourse 803 (DPD 803) - Credits: 90.00

# MIS Information Science (12254010)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof I Fourie ina.fourie@up.ac.za +27 (0)124205216 |

## Admission requirements

BIS and BISHons specialising in any of the specific packages for:

- Library Science
- Information Science
- Multimedia
- Publishing
- **or** any equivalent honours degree.

Consult G Regulations G.30 to G.40 and G.54.

## Additional requirements

Consult G Regulations G.30 to G.40 and G.54.

## Other programme-specific information

The Dean may, in exceptional cases, and on the recommendation of the Head of Department concerned, approve a fixed limited extension of the period of study.

## Curriculum: Final year

### Core modules

Dissertation: Information science 890 (INL 890) - Credits: 180.00

# MIS Library Science (12254009)

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|---|---|
| **Minimum duration of study** | 1 year |

## Admission requirements

BIS and BISHons specialising in any of the specific packages for:

- Library Science
- Information Science
- Multimedia
- Publishing
- **or** any equivalent honours degree.

## Additional requirements

Consult G Regulations G.30 to G.40 and G.54.

## Other programme-specific information

The Dean may, in exceptional cases, and on the recommendation of the Head of Department concerned, approve a fixed limited extension of the period of study.

## Curriculum: Final year

### Core modules

Dissertation: Library science 890 (BIB 890) - Credits: 180.00

# MIS Multimedia (12254011)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof TJD Bothma theo.bothma@up.ac.za +27 (0)124202961 |

## Admission requirements

BIS and BISHons specialising in any of the specific packages for:

- Library Science
- Information Science
- Multimedia
- Publishing
- **or** any equivalent honours degree.

## Additional requirements

Consult G Regulations G.30 to G.40 and G.54.

## Other programme-specific information

The Dean may, in exceptional cases, and on the recommendation of the Head of Department concerned, approve a fixed limited extension of the period of study.

## Curriculum: Final year

### Core modules

Dissertation: Multimedia 890 (IMY 890) - Credits: 180.00

# MIS Publishing (12254012)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof EH le Roux beth.leroux@up.ac.za +27 (0)124202426 |

## Admission requirements

BIS and BISHons specialising in any of the specific packages for:

- Library Science
- Information Science
- Multimedia
- Publishing
- **or** any equivalent honours degree.

Consult G Regulations G.30 to G.40 and G.54.

### Additional requirements

Consult G Regulations G.30 to G.40 and G.54.

### Other programme-specific information

The Dean may, in exceptional cases, and on the recommendation of the Head of Department concerned, approve a fixed limited extension of the period of study.

### Curriculum: Final year

#### Core modules

Dissertation: Publishing 890 (PUB 890) - Credits: 180.00

## MIT (12254014)

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|---|---|
| **Minimum duration of study** | 2 years |

### Programme information

This degree programme is presented in English only.

Also consult G Regulations G.30 to G.54

The curriculum is determined in consultation with the programme organiser.

A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

### Admission requirements

i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission to Stream A and Stream B; and an honours degree is an admission requirement for Stream C.
ii. A pass mark in Mathematics at grade 12 level or another qualification in Mathematics, Statistics or Mathematical Statistics, which the Chairperson of the School of Information Technology considers to be sufficient. This requirement is not applicable to Stream C.
iii. Sufficient appropriate practical experience in the technology field in the opinion of the Chairperson of the School of Information Technology. This requirement is not applicable to Stream C.
iv. The Chairperson of the School of Information Technology may impose additional requirements for admission. In particular, this will apply to candidates with insufficient academic background in Information Technology. This requirement is not applicable to Stream C.
v. Selection of candidates will take place.
vi. The result of the selection is final and no correspondence will be entered into.

**See additional requirements for Stream C: Big Data Science below.**

vii. A minimum pass rate of 65% for the previous degree, AND
viii. Successfully completed higher education modules, or other modules with similar content, as part of the previous degree in:

- Statistics,
- Calculus I,

- Linear Algebra I,
- Programming,
- Database systems, and
- Research Methods; AND

ix. Success in the selection process based on:

- Previous education,
- passing an English test, and
- passing a proficiency test in Databases, Programming, Mathematics and Statistics.

## Examinations and pass requirements

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

**Discontinuation of studies**

The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

**Deregistration of modules**

Deregistration of modules for Stream C is only allowed before the early deadline.

**Conferment of the degree**

The Master's degree in Information Technology Stream A and Stream B is conferred on a student who successfully completes the following:

- Mini-dissertation – 90 credits
- Core modules – 90 credits
- Total – 180 credits

The Master's degree in Information Technology Stream C is conferred on a student who successfully completes the following:

- Mini-dissertation – 90 credits
- Core modules – 55 credits
- Research methods – 5 credits
- Projects – 20 credits
- Elective modules – 10 credits
- Total – 180 credits

## Pass with distinction

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

## Curriculum: Year 1

### Core modules

Introduction to big data science 800 (MIT 800) - Credits: 5.00
Introduction to machine and statistical learning 801 (MIT 801) - Credits: 15.00
Introduction to data platforms and sources 802 (MIT 802) - Credits: 5.00

Introduction to Information Ethics for Big Data Science 803 (MIT 803) - Credits: 5.00
Introduction to mathematical optimization for big data science 804 (MIT 804) - Credits: 5.00
Big data 805 (MIT 805) - Credits: 10.00
Big data management 806 (MIT 806) - Credits: 10.00
Research methods for big data science 809 (MIT 809) - Credits: 5.00
Information and knowledge management 835 (MIT 835) - Credits: 8.00
Organisational behaviour and management 841 (MIT 841) - Credits: 8.00
Computer science in perspective 842 (MIT 842) - Credits: 5.00
Information in perspective 843 (MIT 843) - Credits: 5.00
Life-cycle and maturity models for IT 850 (MIT 850) - Credits: 8.00
Digital economy 851 (MIT 851) - Credits: 8.00
ICT project management 852 (MIT 852) - Credits: 8.00
Corporate IT systems 853 (MIT 853) - Credits: 8.00
ICT infrastructure management 860 (MIT 860) - Credits: 8.00
IT research 862 (MIT 862) - Credits: 8.00
Web trends in the library 865 (MIT 865) - Credits: 8.00
Digital repositories 866 (MIT 866) - Credits: 8.00
The knowledge society and international librarianship 867 (MIT 867) - Credits: 8.00
Facilitating information retrieval and information use 868 (MIT 868) - Credits: 8.00
IT systems in libraries 869 (MIT 869) - Credits: 8.00
Knowledge management 872 (MIT 872) - Credits: 8.00
Network technologies 873 (MIT 873) - Credits: 6.00
Organisational behaviour and leadership 875 (MIT 875) - Credits: 6.00
Strategic ICT management 876 (MIT 876) - Credits: 5.00
IT Research 879 (MIT 879) - Credits: 8.00

**Elective modules**

Big data science elective 801 (COS 801) - Credits: 5.00
Big data science elective 802 (COS 802) - Credits: 5.00
Big data science elective 801 (ERZ 801) - Credits: 5.00
Big data science elective 802 (ERZ 802) - Credits: 5.00
Big data science elective 801 (INF 801) - Credits: 5.00
Big data science elective 802 (INF 802) - Credits: 5.00
Big data science elective 820 (INL 820) - Credits: 5.00
Statistics elective 801 (STK 801) - Credits: 5.00
Statistics elective 802 (STK 802) - Credits: 5.00
Big data science elective 801 (WTW 801) - Credits: 5.00
Big data science elective 802 (WTW 802) - Credits: 5.00

## Curriculum: Final year

**Core modules**

Mini dissertation in big data science 807 (MIT 807) - Credits: 90.00
Big data science project 808 (MIT 808) - Credits: 20.00
Mini-dissertation 840 (MIT 840) - Credits: 90.00
Strategic ICT management 844 (MIT 844) - Credits: 8.00
IT financial management 864 (MIT 864) - Credits: 8.00
Computer science in perspective 874 (MIT 874) - Credits: 6.00

ICT project management 877 (MIT 877) - Credits: 5.00
IT financial management 878 (MIT 878) - Credits: 6.00
Mini-dissertation 880 (MIT 880) - Credits: 90.00
Mini-dissertation 881 (MIT 881) - Credits: 90.00
Mini-dissertation 882 (MIT 882) - Credits: 90.00

## MIT Big Data Science (12254017)

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|---|---|
| **Minimum duration of study** | 2 years |

### Programme information

This degree programme is presented in English only.
Also consult G Regulations G.30 to G.54
The curriculum is determined in consultation with the programme organiser.
A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

### Admission requirements

i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission.
ii. Selection of candidates will take place.
iii. The result of the selection is final and no correspondence will be entered into.
iv. A minimum pass mark of 65% for the previous degree AND
v. Successful completion of higher education modules, or other modules with similar content, as part of the previous degree in:

- Statistics,
- Calculus I,
- Linear Algebra I,
- Programming,
- Database systems, and
- Research methods; AND

i. Success in the selection process based on:

- previous education;
- passing an English test; and
- passing a proficiency test in Databases, Programming, Mathematics and Statistics.

### Other programme-specific information

**Discontinuation of studies**
The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

**Deregistration of modules**
Deregistration of modules is only allowed before the early deadline.

## Examinations and pass requirements

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

## Pass with distinction

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

## Curriculum: Year 1

### Core modules

Introduction to big data science 800 (MIT 800) - Credits: 5.00
Introduction to machine and statistical learning 801 (MIT 801) - Credits: 15.00
Introduction to data platforms and sources 802 (MIT 802) - Credits: 5.00
Introduction to Information Ethics for Big Data Science 803 (MIT 803) - Credits: 5.00
Introduction to mathematical optimization for big data science 804 (MIT 804) - Credits: 5.00
Big data 805 (MIT 805) - Credits: 10.00
Big data management 806 (MIT 806) - Credits: 10.00
Research methods for big data science 809 (MIT 809) - Credits: 5.00

### Elective modules

Big data science elective 801 (COS 801) - Credits: 5.00
Big data science elective 802 (COS 802) - Credits: 5.00
Big data science elective 801 (ERZ 801) - Credits: 5.00
Big data science elective 802 (ERZ 802) - Credits: 5.00
Big data science elective 801 (INF 801) - Credits: 5.00
Big data science elective 802 (INF 802) - Credits: 5.00
Big data science elective 820 (INL 820) - Credits: 5.00
Statistics elective 801 (STK 801) - Credits: 5.00
Statistics elective 802 (STK 802) - Credits: 5.00
Big data science elective 801 (WTW 801) - Credits: 5.00
Big data science elective 802 (WTW 802) - Credits: 5.00

## Curriculum: Final year

### Core modules

Mini dissertation in big data science 807 (MIT 807) - Credits: 90.00
Big data science project 808 (MIT 808) - Credits: 20.00

# MIT ICT Information Science (12254016)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

This degree programme is presented in English only.
Also consult G Regulations G.30 to G.54

The curriculum is determined in consultation with the programme organiser.
A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

## Admission requirements

i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission.
ii. A pass mark in Mathematics at grade 12 level or another qualification in Mathematics, Statistics or Mathematical Statistics, which the Chairperson of the School of Information Technology considers to be sufficient.
iii. Sufficient appropriate practical experience in the technology field in the opinion of the Chairperson of the School of Information Technology.
iv. The Chairperson of the School of Information Technology may impose additional requirements for admission. In particular, this will apply to candidates with insufficient academic background in Information Technology.
v. Selection of candidates will take place.
vi. The result of the selection is final and no correspondence will be entered into.

## Other programme-specific information

**Discontinuation of studies**
The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

**Deregistration of modules**
Deregistration of modules is only allowed before the early deadline.

## Examinations and pass requirements

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

## Pass with distinction

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

## Curriculum: Year 1

### Core modules

Web trends in the library 865 (MIT 865) - Credits: 8.00
Digital repositories 866 (MIT 866) - Credits: 8.00
The knowledge society and international librarianship 867 (MIT 867) - Credits: 8.00
Facilitating information retrieval and information use 868 (MIT 868) - Credits: 8.00
IT systems in libraries 869 (MIT 869) - Credits: 8.00
Knowledge management 872 (MIT 872) - Credits: 8.00
Network technologies 873 (MIT 873) - Credits: 6.00
Organisational behaviour and leadership 875 (MIT 875) - Credits: 6.00
Strategic ICT management 876 (MIT 876) - Credits: 5.00

IT Research 879 (MIT 879) - Credits: 8.00

## Curriculum: Final year

### Core modules

Computer science in perspective 874 (MIT 874) - Credits: 6.00
ICT project management 877 (MIT 877) - Credits: 5.00
IT financial management 878 (MIT 878) - Credits: 6.00
Mini-dissertation 880 (MIT 880) - Credits: 90.00

# MIT ICT Management (12254015)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

This degree programme is presented in English only.
Also consult G Regulations G.30 to G.54
The curriculum is determined in consultation with the programme organiser.
A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

## Admission requirements

i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission.
ii. A pass mark in Mathematics at grade 12 level or another qualification in Mathematics, Statistics or Mathematical Statistics, which the Chairperson of the School of Information Technology considers to be sufficient.
iii. Sufficient appropriate practical experience in the technology field in the opinion of the Chairperson of the School of Information Technology.
iv. The Chairperson of the School of Information Technology may impose additional requirements for admission. In particular, this will apply to candidates with insufficient academic background in Information Technology.
v. Selection of candidates will take place.
vi. The result of the selection is final and no correspondence will be entered into.

## Other programme-specific information

**Discontinuation of studies**
The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

**Deregistration of modules**
Deregistration of modules is only allowed before the early deadline.

## Examinations and pass requirements

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

### Pass with distinction

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

### Curriculum: Year 1

#### Core modules

Information and knowledge management 835 (MIT 835) - Credits: 8.00
Organisational behaviour and management 841 (MIT 841) - Credits: 8.00
Computer science in perspective 842 (MIT 842) - Credits: 5.00
Information in perspective 843 (MIT 843) - Credits: 5.00
Life-cycle and maturity models for IT 850 (MIT 850) - Credits: 8.00
Digital economy 851 (MIT 851) - Credits: 8.00
ICT project management 852 (MIT 852) - Credits: 8.00
Corporate IT systems 853 (MIT 853) - Credits: 8.00
ICT infrastructure management 860 (MIT 860) - Credits: 8.00
IT research 862 (MIT 862) - Credits: 8.00

### Curriculum: Final year

#### Core modules

Mini-dissertation 840 (MIT 840) - Credits: 90.00
Strategic ICT management 844 (MIT 844) - Credits: 8.00
IT financial management 864 (MIT 864) - Credits: 8.00

## MIT Information Systems (12254013)

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|---|---|
| **Minimum duration of study** | 1 year |

### Admission requirements

Subject to the stipulations of G Regulations G.1.3 and G.54, an appropriate honours degree is a requirement for admission.

The Dean has the right of authorisation regarding matters not provided for in the G Regulations or the Faculty-specific regulations.

A candidate may be refused admission to a master's degree by the Chairperson of the School of Information Technology if he or she does not comply with the standard of competence in the subject as determined by the department – with the proviso that a candidate, who does not comply with the required level of competence, may be admitted, provided that he or she completes additional study assignments and/or examinations.

The Chairperson of the School of Information Technology may set additional admission requirements.

Specific departments have specific requirements for admission which will be published in the Postgraduate Brochure of the Faculty.

The number of students will be determined in line with the growth strategy of the University of Pretoria as approved by the Executive.

The Dean reserves the right to place meritorious candidates to improve the diversity profile of students.

## Other programme-specific information

The Dean may, on the recommendation of the Postgraduate Committee, cancel the registration of a student during any academic year if his/her academic progress is not satisfactory.
The degree programme must be completed within four years after the first registration for the degree, provided that the Dean may, in exceptional cases, and on the recommendation of the Head of Department concerned, approve a fixed limited extension of the period of study.

## Research information

A dissertation must be submitted on a field of study as approved by the Department.

## Curriculum: Final year

### Core modules

Dissertation: Information systems 890 (ISY 890) - Credits: 180.00

# MLArch (12252029)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Prof PT Vosloo tsa-s02365103@tuks.co.za +27 (0)124204128 |

## Programme information

By virtue of dissertation and examination.

Also refer to G Regulations G.30 to G.40 and G.50 to G.54.

## Admission requirements

Candidates wishing to research a topic within the discipline of landscape architecture and who

(i) are in possession of a BL or equivalent degree of four years;

or

(ii) are in possession of an Honours degree in Landscape Architecture BLHons or equivalent;

or

(iii) are in possession of a three-year degree with Design as major component and successfully complete supplementary modules with the weighting equivalent of an honours degree as prescribed by the Head of Department;

or

(iv) are deemed adequate by the Head of Department in consultation with the Dean and obtained (where necessary) the approval of Senate and complying with whatever additional requirements may be prescribed are admitted to the degree Master of Landscape Architecture by research.

## Examinations and pass requirements

After a minimum of one year of registration the student submits a dissertation for examination and takes an oral examination of the dissertation in the related field of study.

The Master of Landscape Architecture degree is conferred on a student who has obtained a minimum of 50% for both the dissertation and oral examination.

## Research information

G Regulation G.39.12 applies.

## Pass with distinction

The Master of Landscape Architecture degree is conferred with distinction on a student obtaining a minimum of 75% in both the dissertation and the oral examination.

## Curriculum: Final year

### Core modules

Dissertation: Landscape architecture 890 (LAN 890) - Credits: 180.00

# MLArch (Professional) (12252030)

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|---|---|
| **Minimum duration of study** | 1 year |
| **Contact** | Mr JN Prinsloo johan-nel.prinsloo@up.ac.za +27 (0)124204313 |

## Programme information

The Master of Landscape Architecture (Professional) is a taught master's degree for the purpose of registration as a candidate professional landscape architect with the South African Council for the Landscape Architectural Profession in terms of Act 45 of 2000 and is done by coursework, projects and a design investigation mini-dissertation and design project and discourse.

Also refer to the G Regulations G.30 to G.40 and G.50 to G.54.

## Admission requirements

Candidates for the degree programme Master of Landscape Architecture (Professional):

(i) must be a graduate with a BLHons degree or an equivalent university degree;

**or**

(ii) must have an appropriate recognised tertiary qualification at honours degree level;

**or**

(iii) must have a qualification deemed adequate by the Head of Department in consultation with the Dean and obtain (where necessary) the approval of Senate and comply with any other prescribed requirements.

Candidates mentioned in (ii) and (iii) above may at the discretion of the Head of Department be required to be evaluated in prerequisite fields of knowledge and/or register for additional modules for non-degree purposes.

Candidates mentioned in (i) (ii) and (iii):

(a) should preferably have had practical experience and/or have done and recorded an extended study excursion;

(b) are interviewed for selection;

(c) must present a portfolio and/or design journal which demonstrates the requisite level of proficiency and competency and is considered a record of their experience within the discipline;

(d) are selected on merit.

**Please note**: A limited number of candidates are admitted to this programme.

## Additional requirements

## Other programme-specific information

**Design topic**

The topic of the final design project (DIT 802 & DPD 802) must be approved by the Head of Department.

**Awarding of degree**

The degree is awarded to those students who have obtained the prescribed credits. Those students admitted with conditions must comply with all of these before all the 700 series module credits and the degree are awarded.

## Examinations and pass requirements

The minimum pass mark is 50%. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass. If a module is not evaluated by examination a minimum coursework mark of 50% is required. If the module is not evaluated by coursework a minimum examination mark of 50% is required.

## Research information

G Regulation G.39.12. applies.

## Pass with distinction

The degree is conferred with distinction on those students registering for the first time and obtaining a distinction (75%) simultaneously for both the Design investigation mini-dissertation (DIT 802) and the Design project and discourse (DPD 802) with the proviso that the degree is completed within the minimum prescribed time and all other final-year modules are passed on first registration.

## Curriculum: Final year

### Core modules

Continuing practice development 810 (CPD 810) - Credits: 15.00
Design investigation 802 (DIT 802) - Credits: 75.00
Mini-dissertation: Design project and discourse 802 (DPD 802) - Credits: 90.00

# MSc Applied Science Architecture (Coursework) (12252009)

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|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof C Combrinck carin.combrinck@up.ac.za +27 (0)124206536 |

## Programme information

By virtue of a curriculum with coursework and a mini-dissertation.

Also refer to G Regulations G.1.2, G.30 to G.40 and G.50 to G.54.

## Admission requirements

Candidates who wish to research a topic within the disciplines of architecture landscape architecture or interior architecture and in particular related to one of the research fields of the department and who are in possession of

- a BScHons or equivalent degree of four years or more or
- an honours degree in architecture landscape architecture or interior architecture or equivalent or
- who are deemed adequate by the Head of Department in consultation with the Dean and obtained (where necessary) the approval of Senate and complying with whatever additional requirements may be prescribed are admitted to the degree Master of Science (Applied Science).
- Candidates are selected on academic merit for admission to studies for the degree.

## Other programme-specific information

The curriculum is compiled in consultation with the Head of Department.

It is the responsibility of students to ascertain that the lectures in the appropriate research field are on offer in the specific year of study. The attendance of lectures is compulsory.

The topic of the mini-dissertation must be approved by the Head of Department.

## Examinations and pass requirements

A minimum of 50% is required in the examination of the coursework, with a minimum final mark of 50% to pass.

A minimum of 50% is required to pass the mini-dissertation.

## Research information

G Regulation G.39.12 applies.

## Pass with distinction

The degree is conferred with distinction on a student who obtains a weighted average of 75%, having obtained at least 75% in the mini-dissertation and a weighted average of at least 70% in the remaining coursework constituting the required credits for RFS module of the degree.

## Curriculum: Year 1

One additional module at 800 level at other schools, faculties or departments for 35 credits.

### Core modules

Mini-dissertation 895 (ARG 895) - Credits: 110.00
Research field studies 890 (RFS 890) - Credits: 35.00

## Curriculum: Final year

One additional module at 800 level at other schools, faculties or departments for 35 credits.

### Core modules

Mini-dissertation 895 (ARG 895) - Credits: 110.00
Research field studies 890 (RFS 890) - Credits: 35.00

## MSc Applied Science Chemical Technology (12253062)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

#### Core modules

Dissertation 807 (CVD 807) - Credits: 180.00

## MSc Applied Science Control (12253061)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of the General Regulations, G.54, an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

#### Core modules

Dissertation 807 (CVD 807) - Credits: 180.00

# MSc Applied Science Electrical, Electronic and Computer Engineering (12253073)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

## Admission requirements

Subject to the stipulations of the General Regulations, G.54, an appropriate BScHons or equivalent degree is required for admission.

## Curriculum: Final year

### Core modules

Dissertation 891 (EER 891) - Credits: 180.00

# MSc Applied Science Environmental Technology (12253067)

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|---|---|
| **Minimum duration of study** | 1 year |

## Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

## Admission requirements

Subject to the stipulations of Regulation G.54an appropriate BScHons or equivalent degree is required for admission.

## Curriculum: Final year

### Core modules

Dissertation 807 (CVD 807) - Credits: 180.00

## MSc Applied Science Geotechnics (12253063)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

**Core modules**

Dissertation 890 (SST 890) - Credits: 180.00

## MSc Applied Science Industrial Systems (12253060)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

**Core modules**

Dissertation 891 (BIR 891) - Credits: 180.00

## MSc Applied Science Mechanics (12253064)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Curriculum: Year 1

#### Core modules

Dissertation 891 (MIR 891) - Credits: 180.00

### Curriculum: Final year

#### Core modules

Dissertation 891 (MIR 891) - Credits: 180.00

## MSc Applied Science Metallurgy (12253065)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Curriculum: Final year

#### Core modules

Dissertation 891 (NIN 891) - Credits: 180.00

## MSc Applied Science Mining (12253072)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Curriculum: Final year

#### Core modules

Dissertation 891 (PYI 891) - Credits: 180.00

## MSc Applied Science Structures (12253071)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

#### Core modules

Dissertation 890 (SST 890) - Credits: 180.00

## MSc Applied Science Transportation Planning (12253068)

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| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

**Core modules**
Dissertation 890 (SST 890) - Credits: 180.00

## MSc Applied Science Water Resources (12253070)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

### Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

### Curriculum: Final year

**Core modules**
Dissertation 890 (SST 890) - Credits: 180.00

## MSc Applied Science Water Utilisation (12253069)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

The MSc (Applied Science) degree is conferred by the same departments as the BScHons (Applied Science) degree.

A minimum of 128 credits is required to obtain the MSc degree. Either a mini-dissertation (64 credits) and coursework (64 credits) or a dissertation (128 credits) is included in the programme.

Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation or a dissertation (including an examination on the dissertation).

## Admission requirements

Subject to the stipulations of Regulation G.54 an appropriate BScHons or equivalent degree is required for admission.

## Curriculum: Final year

### Core modules

Dissertation 807 (CVD 807) - Credits: 180.00

# MSc Computer Science (12253074)

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| **Minimum duration of study** | 1 year |

## Programme information

The MSc degree is conferred on grounds of a dissertation and such additional postgraduate coursework as may be prescribed. A student is required to demonstrate, by means of a dissertation, the ability to plan, institute and execute a scientific investigation.
A student works under the guidance of a supervisor and is expected to identify and complete a research project. The research results are to be fully reported in an MSc dissertation.

Also consult G Regulations.

## Admission requirements

An appropriate BScHons or equivalent degree is required for admission. In addition to be considered for admission an average of 65% should have been obtained for the modules passed for the honours degree. The Dean, on the recommendation of the supervisor and the Head of Department, may approve additional requirements and conditions.

## Promotion to next study year

If the supervisor affirms that a candidate has progressed satisfactorily, registration may be renewed for the second year (full-time) or for the second to fourth year (part-time). Re-registration thereafter will only take place if a written motivation from the candidate, supported by the Head of Department is submitted to the student administration offices.

## Research information

Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a dissertation, must submit proof of submission of an article by an accredited journal to the Head: Student administration.

The draft or submitted article, as the case may be, should be based on the research that the student has conducted for the dissertation/thesis and be approved by the supervisor if the supervisor is not a co-author.

The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation. Also consult the G Regulations.

### Pass with distinction

The MSc degree is conferred with distinction on candidates who obtain a final average mark of at least 75%.

### Curriculum: Final year

#### Core modules

Dissertation: Computer science 890 (RKW 890) - Credits: 180.00

## MSc Construction Management (12252032)

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|---|---|---|---|
| **Minimum duration of study** | 1 year | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

### Programme information

The degree is conferred on the basis of a dissertation and examination on the field of study of the dissertation and/or divisions of the field of study as required by the Head of Department.

Also refer to G Regulations G.30 to G.40 and G.50 to G.54.

### Admission requirements

Subject to the stipulations of the General Regulations, a BScHons degree or equivalent qualification and practical experience which is deemed adequate by the Head of Department is required for admission.

### Additional requirements

Supplementary undergraduate modules may be prescribed during the first year of study.

### Examinations and pass requirements

The minimum pass mark is 50% for both the dissertation and the examination.

### Pass with distinction

The degree is conferred with distinction when a student obtains at least 75% in the examination and the dissertation.

### Curriculum: Final year

#### Core modules

Dissertation: Construction management 891 (KBS 891) - Credits: 180.00

## MSc Engineering Management (Coursework) (12251077)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MSc degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

The admission requirement for the MSc is a MSC (Hon) or equivalent qualification. A selection procedure takes place prior to admission to the Masters degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Year 1

### Core modules

Maintenance management 801 (IIB 801) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Project management 803 (IPK 803) - Credits: 10.00
Production and operations management 801 (IPP 801) - Credits: 10.00
Systems engineering and management 801 (ISE 801) - Credits: 10.00
Technology management 801 (ITB 801) - Credits: 10.00
People management 883 (PEM 883) - Credits: 10.00

## Curriculum: Final year

### Core modules

Financial management 830 (FBS 830) - Credits: 10.00
Mini-dissertation 898 (ISC 898) - Credits: 60.00
Strategic management 801 (ISM 801) - Credits: 10.00

### Elective modules

Engineering asset management 801 (IAM 801) - Credits: 10.00
Marketing management 801 (IIM 801) - Credits: 10.00
Information management 884 (ILB 884) - Credits: 10.00
Legal aspects of project management 803 (ILC 803) - Credits: 10.00
New ventures and entrepreneurship 801 (IOE 801) - Credits: 10.00
Project quality management 801 (IQM 801) - Credits: 10.00
Decision analysis and risk management 801 (IRI 801) - Credits: 10.00

# MSc Project Management (Coursework) (12251078)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MSc degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is

offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

The admission requirement for the MSc is a MSC (Hon) or equivalent qualification. A selection procedure takes place prior to admission to the Masters degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

## Other programme-specific information

Details regarding the curricula as well as syllabi of the respective domains are available from the Department.

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MSc degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental

postgraduate brochures should also be consulted.

## Curriculum: Year 1

### Core modules

Project human resource management 801 (IHR 801) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Project financial and cost management 802 (IPF 802) - Credits: 10.00
Project procurement management 801 (IPJ 801) - Credits: 10.00
Introduction to project management 801 (IPM 801) - Credits: 10.00
Project risk management 801 (IRM 801) - Credits: 10.00
Project systems engineering 802 (ISE 802) - Credits: 10.00

## Curriculum: Final year

### Core modules

Project management practice 801 (IMP 801) - Credits: 10.00
Mini-dissertation 898 (ISC 898) - Credits: 60.00
Strategic project management 804 (ISM 804) - Credits: 10.00

### Elective modules

Marketing management 801 (IIM 801) - Credits: 10.00
Information management 884 (ILB 884) - Credits: 10.00
Legal aspects of project management 803 (ILC 803) - Credits: 10.00
New ventures and entrepreneurship 801 (IOE 801) - Credits: 10.00
Project quality management 801 (IQM 801) - Credits: 10.00
Construction management 803 (KBS 803) - Credits: 10.00
Construction management 804 (KBS 804) - Credits: 10.00
Construction management 805 (KBS 805) - Credits: 10.00

# MSc Quantity Surveying (12252031)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 1 year | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

## Programme information

The degree is conferred on the basis of a dissertation and examination on the field of study of the dissertation and/or divisions of the field of study as required by the Head of Department.

Also refer to G Regulations G.30 to G.40 and G.50 to G.54.

## Admission requirements

Subject to the stipulations of the General Regulations, a BScHons degree or equivalent qualification and practical experience which is deemed adequate by the Head of Department is required for admission.

Supplementary undergraduate modules may be prescribed during the first year of study.

### Additional requirements
Supplementary undergraduate modules may be prescribed during the first year of study.

### Examinations and pass requirements
The minimum pass mark is 50% for both the dissertation and the examination.

### Pass with distinction
The degree is conferred with distinction when a student obtains at least 75% in the examination and the dissertation.

### Curriculum: Final year

#### Core modules
Dissertation: Quantity surveying 890 (BRK 890) - Credits: 180.00

## MSc Real Estate Retail property (Coursework) (12252037)

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| **Minimum duration of study** | 2 years |

### Programme information
The degree can be obtained by successfully completing a curriculum with coursework and a mini-dissertation. The modules are presented in block weeks. The attendance of block weeks is compulsory. All examinations are conducted at the Department of Construction Economics, South Campus, University of Pretoria.
The curriculum is compiled in consultation with the Head of Department. In order to be considered for the MSc Real Estate degree by coursework to be awarded, a candidate should have obtained a minimum of 120 credits for modules and in addition, have submitted and passed an applicable mini-dissertation (60 credits), i.e. a total of 180 credits.

### Admission requirements
A candidate for the degree Master of Science Real Estate by means of coursework and a mini-dissertation must have an appropriate recognised tertiary qualification at honours degree level and show sufficient past experience, or additional education in the discipline of real estate to the satisfaction of the Head of Department (refer also to G Regulation G.54).

*Note that the MSc(Real Estate) by coursework is not available for a BScHons (Real Estate) graduate.*

### Other programme-specific information
The Head of Department may, at own discretion, allow for any other module that is deemed appropriate for an individual student’s circumstances, to be taken elsewhere as elective in lieu of the abovementioned elective modules.

### Examinations and pass requirements
A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass.
Examination requirements are set out in the departmental study manuals.
The topic of the mini-dissertation must be approved by the Head of Department and a minimum of 50% is required to pass.
The degree is conferred with distinction on a student who obtains a weighted average of at least 75% in half of

the required modules, at least 75% in the mini-dissertation and a weighted average of at least 65% in the remaining modules, constituting the required credits for the MSc Real Estate degree.

## Curriculum: Year 1

### Core modules

Shopping centre management 802 (EBS 802) - Credits: 20.00
Property valuation 801 (EDW 801) - Credits: 20.00
Property development 801 (EOW 801) - Credits: 20.00
Shopping centre development 823 (EOW 823) - Credits: 10.00
Research methodology 820 (NNM 820) - Credits: 10.00

## Curriculum: Final year

### Core modules

Property valuation 802 (EDW 802) - Credits: 20.00
Mini-dissertation: Real estate 892 (EMW 892) - Credits: 60.00
Facilities management 822 (FAM 822) - Credits: 10.00
Property Investment 820 (PMN 820) - Credits: 10.00

# MSc Real Estate (12252033)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 1 year | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

## Programme information

The degree is conferred on the basis of a dissertation and examination on the field of study of the dissertation and/or divisions of the field of study as required by the Head of Department.

Also refer to G Regulations G.30 to G.40 and G.50 to G.54.

## Admission requirements

A candidate for the degree Master of Science Real Estate by means of coursework and a mini-dissertation must:

- be a graduate with a BScHons Real Estate degree or an equivalent university degree;
- or
- have an appropriate recognised tertiary qualification at honours degree level and show sufficient past experience, or additional education in the discipline of real estate to the satisfaction of the Head of Department (refer also to G Regulation G.54).

## Examinations and pass requirements

The minimum pass mark is 50% for both the dissertation and the examination.

### Pass with distinction

The degree is conferred with distinction when a student obtains at least 75% in the examination and the dissertation.

### Curriculum: Final year

#### Core modules

Dissertation: Real estate 890 (EMW 890) - Credits: 180.00

## MSc Real Estate (Coursework) (12252034)

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|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Dr M Burger michelle.burger@up.ac.za +27 (0)124203111 |

### Programme information

The degree can be obtained by successfully completing a curriculum with coursework and a mini-dissertation.

The modules are presented in block weeks. The attendance of block weeks is compulsory. All examinations are conducted at the Department of Construction Economics, South Campus, University of Pretoria.

The curriculum is compiled in consultation with the Head of Department. In order to be considered for the MSc Real Estate degree by coursework to be awarded, a candidate should have obtained a minimum of 120 credits for modules and in addition, have submitted and passed an applicable mini-dissertation (60 credits), i.e. a total of 180 credits.

### Admission requirements

A candidate for the degree Master of Science Real Estate by means of coursework and a mini-dissertation must:

- be a graduate with a BScHons Real Estate degree or an equivalent university degree;

or

- have an appropriate recognised tertiary qualification at honours degree level and show sufficient past experience, or additional education in the discipline of real estate to the satisfaction of the Head of Department (refer also to G Regulation G.54).

### Other programme-specific information

The Head of Department may, at own discretion, allow for any other module that is deemed appropriate for an individual student’s circumstances, to be taken elsewhere as elective in lieu of the abovementioned elective modules.

### Examinations and pass requirements

a. A minimum of 40% is required in the examination, with a minimum final mark of 50% to pass.
b. Examination requirements are set out in the departmental study manuals.
c. The topic of the mini-dissertation must be approved by the Head of Department and a minimum of 50% is

required to pass.

d. The degree is conferred with distinction on a student who obtains a weighted average of at least 75% in half of the required modules, at least 75% in the mini-dissertation and a weighted average of at least 65% in the remaining modules, constituting the required credits for the MSc Real Estate degree.

### Curriculum: Year 1

#### Core modules

Property management 801 (EBS 801) - Credits: 20.00
Property valuation 801 (EDW 801) - Credits: 20.00
Property development 801 (EOW 801) - Credits: 20.00
Property development 822 (EOW 822) - Credits: 10.00
Research methodology 820 (NNM 820) - Credits: 10.00

### Curriculum: Final year

#### Core modules

Property valuation 802 (EDW 802) - Credits: 20.00
Mini-dissertation: Real estate 892 (EMW 892) - Credits: 60.00
Facilities management 822 (FAM 822) - Credits: 10.00
Property Investment 820 (PMN 820) - Credits: 10.00

## MSc Technology and Innovation Management (12251000)

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|---|---|
| **Minimum duration of study** | 1 year |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of a dissertation (including an examination on the dissertation).
- A minimum of 180 credits is required to obtain the MSc degree.

### Admission requirements

A BEngHons degree or equivalent qualification is required for admission to the MEng programmes. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

### Curriculum: Final year

#### Core modules

Dissertation: Technology and innovation management 895 (ITB 895) - Credits: 180.00

## MSc Technology and Innovation Management (Coursework) (12251079)

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|---|---|
| **Minimum duration of study** | 2 years |

### Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's

degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MSc degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of  students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

## Admission requirements

The admission requirement for the MSc is a MSC (Hon) or equivalent qualification. A selection procedure takes place prior to admission to the Masters degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

## Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

## Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation.

## Curriculum: Year 1

### Core modules

Decision analysis 880 (IBD 880) - Credits: 10.00
Technological intrapreneurship 880 (IEE 880) - Credits: 10.00
Technology commercialisation 881 (IKG 881) - Credits: 10.00
Literature study 801 (ILS 801) - Credits: 10.00
Research methodology 800 (INI 800) - Credits: 10.00
Organisation and innovation 880 (INV 880) - Credits: 10.00
Project management 804 (IPK 804) - Credits: 10.00
Science, technology and innovation policy 880 (ISP 880) - Credits: 10.00
Technology management 802 (ITB 802) - Credits: 10.00

## Curriculum: Final year

### Core modules

Financial management 831 (FBS 831) - Credits: 16.00
New product development 880 (INP 880) - Credits: 10.00
Mini-dissertation 898 (ISC 898) - Credits: 60.00
Strategic technology and innovation management 880 (IST 880) - Credits: 10.00
People management 884 (PEM 884) - Credits: 16.00

# MTRP (12252035)

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| **Minimum duration of study** | 1 year |

## Programme information

The Master’s degree [MT&RP] is conferred by virtue of a dissertation as well as related assignments as prescribed by the Head of Department including an academic article for publication and an examination in the field of the dissertation and/or sections thereof as required by the Head of Department/supervisor.

The successful completion of a relevant module in research methodology is a prerequisite for approval of the study proposal.

Refer to the G Regulations G.30 to G.44 and G.57 to G.62.

## Admission requirements

Subject to the stipulations of General Regulations G.30 G.37 en G.38 the BT&RP degree or an acceptable qualification as well as practical experience deemed adequate by the Head of Department are required for admission to the study for the MT&RP degree.

## Additional requirements

Supplementary undergraduate modules for the MT&RP degree may be prescribed for students who have not obtained a BT&RP degree.

## Examinations and pass requirements

The minimum pass mark is 50% in both the dissertation and examination.

### Pass with distinction

The degree is conferred with distinction on a student who obtains at least 75% in both the examination and dissertation.

### Curriculum: Final year

**Core modules**

Dissertation: Town and regional planning 890 (SSB 890) - Credits: 180.00

## MTRP (Coursework) (12252036)

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| **Minimum duration of study** | 2 years |

### Programme information

This master's degree is obtained by virtue of coursework and a mini-dissertation. The topic of the mini-dissertation must be approved by the Head of Department.

### Admission requirements

Subject to the stipulations of General Regulations G.30 G.37 and G.38 a relevant four-year degree or a relevant three-year degree plus honours degree or a relevant three-year degree plus a minimum of five years relevant experience, is required for admission to the MT&RP degree programme.

### Additional requirements

Supplementary undergraduate modules for the MT&RP degree may be prescribed for students who have not obtained a BT&RP degree.

### Examinations and pass requirements

A minimum semester/year mark of 40% is required in order to be admitted to the final examination in a specific module. In addition, all other examination admission requirements, applicable to the relevant module, must be met. A minimum pass mark of 40% is required in the examination, with a minimum final mark of 50% to pass.

### Pass with distinction

The degree is conferred with distinction on a student who obtains a weighted average of at least 75% in the examinations of all the prescribed core modules as well as the mini-dissertation.

### Curriculum: Year 1

**Core modules**

Integrated development planning 820 (TPD 820) - Credits: 20.00
Metropolitan and urban area-based interventions 811 (TPI 811) - Credits: 20.00
Regional interventions 821 (TPI 821) - Credits: 20.00
Sustainable settlement planning and design 810 (TPS 810) - Credits: 20.00
Introduction to urban design 820 (TPS 820) - Credits: 20.00

An overview of planning theory and practice 810 (TRP 810) - Credits: 20.00

## Curriculum: Final year

### Core modules

Research methodology 810 (TPE 810) - Credits: 20.00
Mini-dissertation 820 (TPE 820) - Credits: 60.00
Land use management and land development 810 (TPU 810) - Credits: 20.00
Institutional and legal structures for planning 810 (TPW 810) - Credits: 20.00

# Doctorate

## PhD Architecture (12262004)

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|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

### Programme information

A PhD student must submit a thesis which deals with a topic from the discipline of architecture and which provides proof of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge and/or practice of architecture.

A student must submit at least one draft article to a recognised journal for publication, before or concurrent with the submission of the thesis. The draft article must be based on the research undertaken for the thesis and must be acceptable to the supervisor.

Also refer to G Regulations G.42 to G.54.

### Admission requirements

Candidates who have obtained a master's degree in Architecture or the UP MSc (Applied Science) are admitted to doctoral studies.

Candidates in possession of a master’s degree by coursework may, at the discretion of the Head of Department, be required to pass supplementary modules prior to commencing of studies.

### Additional requirements

Candidates in possession of a master’s degree by coursework may, at the discretion of the Head of Department, be required to pass supplementary modules prior to commencing of studies.

### Examinations and pass requirements

The doctoral examination, either written or oral, **is compulsory**, and covers the content of the thesis as well as the field of study on which the thesis is based.

### Curriculum: Year 1

#### Core modules

Thesis: Architecture 990 (ARG 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Architecture 990 (ARG 990) - Credits: 360.00

## PhD Biosystems (12263203)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Biosystems 990 (EIC 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Biosystems 990 (EIC 990) - Credits: 360.00

# PhD Chemical Engineering (12263012)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on

submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

### Core modules

Thesis: Chemical engineering 990 (CIR 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Chemical engineering 990 (CIR 990) - Credits: 360.00

# PhD Chemical Technology (12263142)

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| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

**Core modules**
Thesis: Chemical technology 990 (CCT 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**
Thesis: Chemical technology 990 (CCT 990) - Credits: 360.00

# PhD Civil (12263222)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

**Core modules**
Thesis: Civil engineering 990 (SIR 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**
Thesis: Civil engineering 990 (SIR 990) - Credits: 360.00

## PhD Civil Engineering (12263072)

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|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

### Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

### Curriculum: Year 1

#### Core modules

Thesis: Civil engineering 990 (SIR 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Civil engineering 990 (SIR 990) - Credits: 360.00

## PhD Computer Engineering (12263104)

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|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Computer engineering 990 (ERI 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Computer engineering 990 (ERI 990) - Credits: 360.00

# PhD Computer Science (12266001)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

The department offers a research-based PhD degree. The student works under guidance of a supervisor and is expected to identify and complete a research project. The research results are to be fully reported in a PhD thesis. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD(Computer Science) degree is awarded on the basis of a thesis and an examination on the thesis.

Also consult G Regulations

## Admission requirements

Subject to the stipulations of G Regulations G.1.3, G.42 and G.54, admission to doctoral studies requires that the candidate should have obtained at least 75% for a master's degree in computer science.

## Examinations and pass requirements

The thesis and examination thereof should prove that the candidate has carried out advanced original research and/or creative work, which make a real and substantial contribution to the discipline of computer science.

## Research information

Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article by an accredited journal to the Head: Student Administration.

The draft or submitted article, as the case may be, should be based on the research that the student has conducted for the dissertation/thesis and be approved by the supervisor if the supervisor if the supervisor is not a co-author.

The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

## Curriculum: Year 1

### Core modules

Thesis: Computer science 990 (RKW 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Computer science 990 (RKW 990) - Credits: 360.00

# PhD Construction Management (12262018)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 2 years | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

## Programme information

A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.

## Admission requirements

Refer to G Regulations G.42 to G.54.

- No student will be admitted to the study for a doctor?s degree unless he or she holds an applicable master?s degree.
- A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.
- The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

## Examinations and pass requirements

The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

## Curriculum: Year 1

**Core modules**
Thesis: Quantity surveying 990 (BRK 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**
Thesis: Construction management 990 (KBS 990) - Credits: 360.00

# PhD Electric (12263152)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

**Core modules**
Thesis: Electrical 991 (EIR 991) - Credits: 360.00

## Curriculum: Final year

**Core modules**
Thesis: Electrical 991 (EIR 991) - Credits: 360.00

# PhD Electrical Engineering (12263022)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

### Core modules

Thesis: Electrical engineering 990 (EIR 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Electrical engineering 990 (EIR 990) - Credits: 360.00

# PhD Electronic Engineering (12263082)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded

on the basis of a thesis and an examination on the thesis.

c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Electronic engineering 990 (EIN 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Electronic engineering 990 (EIN 990) - Credits: 360.00

# PhD Electronics (12263162)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Electronics 991 (EIN 991) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Electronics 991 (EIN 991) - Credits: 360.00

# PhD Engineering Management (12261072)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Please contact the programme coordinator for details.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

### Core modules

Thesis: Engineering management 990 (IGB 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Engineering management 990 (IGB 990) - Credits: 360.00

# PhD Engineering Management (12263214)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Please contact the programme coordinator for details.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Engineering management 990 (IGB 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Engineering management 990 (IGB 990) - Credits: 360.00

# PhD Industrial Engineering (12263002)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to

the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

**Core modules**

Thesis: Industrial engineering 990 (BIR 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**

Thesis: Industrial engineering 990 (BIR 990) - Credits: 360.00

# PhD Industrial Systems (12263132)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

#### Core modules

Thesis: Industrial systems 990 (BIT 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Industrial systems 990 (BIT 990) - Credits: 360.00

## PhD Information Science (12264005)

| | |
|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof AL Dick archie.dick@up.ac.za +27 (0)124202294 |

### Admission requirements

- MIS (Library Science)
- MIS (Information Science)
- MIS (Multimedia)
- MIS (Publishing)
- MIS (Development Communication)
- or an equivalent master's degree

### Additional requirements

Consult G Regulations G.42 to G.54.

### Curriculum: Year 1

#### Core modules

Thesis: Information science 990 (INL 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Information science 990 (INL 990) - Credits: 360.00

## PhD Information Systems (12264011)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Programme information

Unless the Dean, on the recommendation of the chairperson of the school, decides otherwise, the PhD degree is conferred on the basis of a thesis and an examination on the thesis.

### Admission requirements

Subject to the stipulations of G Regulations G.42 and G.54, no candidate is admitted to doctoral studies unless he/she holds an appropriate master?s degree.

### Research information

Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article to an accredited journal, to the Head: Student Administration. The draft or submitted article, as the case may be, should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

The student must provide proof by means of his or her work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the relevant field of research.

## Curriculum: Year 1

### Core modules

Thesis: Information Systems 990 (ISY 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Information Systems 990 (ISY 990) - Credits: 360.00

# PhD Information Technology (12264010)

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|---|---|
| **Minimum duration of study** | 2 years |

## Programme information

Unless the Dean, on the recommendation of the chairperson of the school, decides otherwise, the PhD degree is conferred on the basis of a thesis and an examination on the thesis.

## Admission requirements

Subject to the stipulations of G Regulations G.42 and G.54, no candidate is admitted to doctoral studies unless he/she holds an appropriate master's degree.

## Research information

Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article to an accredited journal, to the Head: Student Administration. The draft or submitted article, as the case may be, should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

The student must provide proof by means of his or her work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the relevant field of research.

## Curriculum: Year 1

### Core modules

Thesis: Information technology 990 (SIT 990) - Credits: 360.00

Thesis: Information technology 991 (SIT 991) - Credits: 360.00
Thesis: Information technology 992 (SIT 992) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Information technology 990 (SIT 990) - Credits: 360.00
Thesis: Information technology 991 (SIT 991) - Credits: 360.00
Thesis: Information technology 992 (SIT 992) - Credits: 360.00

# PhD Interior Architecture (12262009)

| | |
|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

## Programme information

A PhD student must submit a thesis which deals with a topic from the discipline of interior architecture and which provides proof of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge and/or practice of interior architecture.

A student must submit at least one draft article to a recognised journal for publication, before or concurrent with the submission of the thesis. The draft article must be based on the research undertaken for the thesis and must be acceptable to the supervisor.

Also refer to G Regulations G.42 to G.54.

## Admission requirements

Candidates who have obtained a master's degree in Interior architecture or the UP MSc (Applied Science) are admitted to doctoral studies.

Candidates in possession of a master’s degree by coursework may, at the discretion of the head of department, be required to pass supplementary modules prior to commencing of studies.

## Additional requirements

Candidates in possession of a master’s degree by coursework may, at the discretion of the head of department, be required to pass supplementary modules prior to commencing of studies.

## Examinations and pass requirements

The doctoral examination, either written or oral, **is compulsory**, and covers the content of the thesis as well as the field of study on which the thesis is based.

## Curriculum: Year 1

### Core modules

Thesis: Interior architecture 990 (INT 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Interior architecture 990 (INT 990) - Credits: 360.00

## PhD Landscape Architecture (12262005)

| | |
|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof BP Jekot barbara.jekot@up.ac.za +27 (0)124204052 |

### Programme information

A PhD student must submit a thesis, which deals with a topic from the discipline of landscape architecture and which provides proof of advanced original research and/or creative work which makes a real and substantial contribution to the field of knowledge and/or practice of landscape architecture.

A student must submit at least one draft article to a recognised journal for publication, before or concurrent with the submission of the thesis. The draft article must be based on the research undertaken for the thesis and must be acceptable to the supervisor.

Refer to the G Regulations G.42 to G.54.

### Admission requirements

Candidates who have obtained a master?s degree in Landscape Architecture or the UP MSc (Applied Science) are admitted to doctoral studies.

Candidates in possession of a master's degree by coursework may, at the discretion of the head of department, be required to do supplementary coursework prior to commencing studies.

### Additional requirements

Candidates in possession of a master's degree by coursework may, at the discretion of the head of department, be required to do supplementary coursework prior to commencing studies.

### Examinations and pass requirements

The doctoral examination, either written or oral, **is compulsory**, and encompasses the content of the thesis as well as the field of study on which the thesis is based.

### Curriculum: Year 1

#### Core modules

Thesis: Landscape architecture 990 (LAN 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Landscape architecture 990 (LAN 990) - Credits: 360.00

## PhD Library Science (12264006)

| | |
|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof AL Dick archie.dick@up.ac.za +27 (0)124202294 |

## Admission requirements

- MIS (Library Science)
- MIS (Information Science)
- MIS (Multimedia)
- MIS (Publishing)
- MIS (Development Communication)
- or an equivalent master's degree

Consult G Regulations G.42 to G.54.

## Additional requirements

Consult G Regulations G.42 to G.54.

## Curriculum: Year 1

### Core modules

Thesis: Library science 990 (BIB 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Library science 990 (BIB 990) - Credits: 360.00

# PhD Mechanical Engineering (12263042)

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|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

### Curriculum: Year 1

**Core modules**

Thesis: Mechanical engineering 990 (MIR 990) - Credits: 360.00

### Curriculum: Final year

**Core modules**

Thesis: Mechanical engineering 990 (MIR 990) - Credits: 360.00

## PhD Mechanics (12263172)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

### Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

### Curriculum: Year 1

**Core modules**

Thesis: Mechanics 998 (MIR 998) - Credits: 360.00

### Curriculum: Final year

**Core modules**

Thesis: Mechanics 998 (MIR 998) - Credits: 360.00

## PhD Metallurgical Engineering (12263052)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

### Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

### Curriculum: Year 1

#### Core modules

Thesis: Metallurgical engineering 990 (MIN 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Metallurgical engineering 990 (MIN 990) - Credits: 360.00

## PhD Metallurgy (12263182)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Metallurgical engineering 990 (MIN 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Metallurgy 990 (MTG 990) - Credits: 360.00

# PhD Mining (12263192)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54 a master's degree is required for admission to studies for a PhD.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and

resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Mining 990 (MYL 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Mining 990 (MYL 990) - Credits: 360.00

# PhD Mining Engineering (12263062)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Subject to the stipulations of the General Regulations, G.42 and G.54, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

### Core modules

Thesis: Mining engineering 990 (MYI 990) - Credits: 360.00

### Curriculum: Final year

**Core modules**

Thesis: Mining engineering 990 (MYI 990) - Credits: 360.00

## PhD Project Management (12261092)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Please contact the programme coordinator for details.

### Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

### Curriculum: Year 1

**Core modules**

Thesis: Project management 990 (IPK 990) - Credits: 360.00

### Curriculum: Final year

**Core modules**

Thesis: Project management 990 (IPK 990) - Credits: 360.00

## PhD Project Management (12263216)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Please contact the programme coordinator for details.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

### Core modules

Thesis: Project management 990 (IPK 990) - Credits: 360.00

## Curriculum: Final year

### Core modules

Thesis: Project management 990 (IPK 990) - Credits: 360.00

# PhD Publishing (12264007)

| | |
|---|---|
| **Minimum duration of study** | 2 years |
| **Contact** | Prof EH le Roux beth.leroux@up.ac.za +27 (0)124202426 |

## Admission requirements

- MIS (Library Science)
- MIS (Information Science)
- MIS (Multimedia)
- MIS (Publishing)
- MIS (Development Communication)
- or an equivalent master's degree

## Additional requirements

Consult G Regulations G.42 to G.54.

## Curriculum: Year 1

### Core modules
Thesis: Publishing 990 (PUB 990) - Credits: 360.00

## Curriculum: Final year

### Core modules
Thesis: Publishing 990 (PUB 990) - Credits: 360.00

# PhD Quantity Surveying (12262017)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 2 years | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

## Programme information
A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.

## Admission requirements
Refer to G Regulations G.42 to G.54.

- No student will be admitted to the study for a doctor?s degree unless he or she holds an applicable master?s degree.
- A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.
- The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

## Examinations and pass requirements
The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

## Curriculum: Year 1

### Core modules
Thesis: Quantity surveying 990 (BRK 990) - Credits: 360.00

## Curriculum: Final year

### Core modules
Thesis: Quantity surveying 990 (BRK 990) - Credits: 360.00

# PhD Real Estate (12262019)

| | | | |
|---|---|---|---|
| **Minimum duration of study** | 2 years | | |
| **Contact** | Dr DGB Boshoff | douw.boshoff@up.ac.za | +27 (0)124203781 |
| | Prof BG Zulch | benita.zulch@up.ac.za | +27 (0)124202851 |

### Programme information

A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.

### Admission requirements

Refer to G Regulations G.42 to G.54.

- No student will be admitted to the study for a doctor?s degree unless he or she holds an applicable master?s degree.
- A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.
- The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

### Examinations and pass requirements

The doctoral examination, either written or oral, is compulsory, and covers the content of the thesis as well as the sections of the field of study on which the thesis is based.

### Curriculum: Year 1

#### Core modules

Thesis: Real estate 990 (EMW 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Real estate 990 (EMW 990) - Credits: 360.00

## PhD Technology and Innovation Management (12261082)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Admission requirements

Please contact the programme coordinator for details.

### Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, no candidate is admitted to doctoral studies unless such a candidate holds a master's degree in Engineering or an equivalent master's degree.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD (Engineering) degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article from/issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research

and/or creative work which makes a real and substantial contribution to the knowledge of engineering science and/or practice.

## Curriculum: Year 1

**Core modules**

Thesis: Technology and innovation management 990 (ITB 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**

Thesis: Technology and innovation management 990 (ITB 990) - Credits: 360.00

# PhD Technology and Innovation Management (12263215)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

## Admission requirements

Please contact the programme coordinator for details.

## Other programme-specific information

Also consult the General Regulations.

a. Subject to the stipulations of the General Regulations, a master's degree is required for admission to studies for a PhD.
b. Unless otherwise decided by the Dean, on the recommendation of the supervisor, the PhD degree is awarded on the basis of a thesis and an examination on the thesis.
c. Unless the Senate, on the recommendation of the supervisor, decides otherwise, a student, before or on submission of a thesis, must submit proof of submission of an article issued by an accredited journal, to the Head: Student Administration. The submitted article should be based on the research that the student has conducted for the thesis and be approved by the supervisor if the supervisor is not a co-author. The supervisor shall be responsible for ensuring that the paper is taken through all the processes of revision and resubmission, as may be necessary. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.
d. The student must provide proof by means of his work, thesis and examination of advanced original research and/or creative work which makes a real and substantial contribution to the knowledge of Engineering Science and/or Practice.

## Curriculum: Year 1

**Core modules**

Thesis: Technology and innovation management 990 (ITB 990) - Credits: 360.00

## Curriculum: Final year

**Core modules**

Thesis: Technology and innovation management 990 (ITB 990) - Credits: 360.00

## PhD Town and Regional Planning (12262023)

| | |
|---|---|
| **Minimum duration of study** | 2 years |

### Programme information

A student for the PhD degree must submit a thesis as well as an academic article(s) dealing with a topic in the field of study.

Also refer to G Regulations G.42 to G.54.

### Admission requirements

A candidate is admitted to doctoral studies only if he or she holds a master's degree.

A student must have successfully completed a relevant module in research methodology in order for his/her study proposal to be approved.

### Additional requirements

A student must have successfully completed a relevant module in research methodology in order for his/her study proposal to be approved.

### Examinations and pass requirements

An oral and/or written doctoral examination is required dealing with the contents of the thesis as well as the subject matter of the discipline on which it is based.

### Curriculum: Year 1

#### Core modules

Thesis: Town and regional planning 990 (SSB 990) - Credits: 360.00

### Curriculum: Final year

#### Core modules

Thesis: Town and regional planning 990 (SSB 990) - Credits: 360.00

# Modules

## Earth studies 110 (AAL 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the basic concepts of ecology, natural resources and stress on the environment; systems thinking; earth as system; changing paradigms and values; ecological design principles; geo-referencing; geo-mapping, basic site survey.

## Earth studies 210 (AAL 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Meso-environment:
Climate: atmospheric constituents and processes, weather systems, heat radiation and transfer, solar charts, sun movement and heat gain control.
Air: airflow patterns around structures, natural ventilation.
Water vapour: diffusivity, transfer and condensation.
Heat: thermal comfort and comfort indices, thermal performance of materials and structures, time lag, decrement and periodic heat transfer.

## Earth studies 223 (AAL 223)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Programmes** | BSc Interior Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 3 |

**Module content**

The impact of social, economic and political systems on, and the multidisciplinary approach to design decisionmaking for inclusive environments and barrier-free environments. The application of this understanding in developing communities.

## Earth studies 224 (AAL 224)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 4 |

**Module content**

Environmental filters and forecasting techniques:
Sound: the physical nature of sound, physiology of hearing, sound and noise sources, transfer, absorption and isolation, noise control; measurement, levels, frequency analysis, A-loading, room acoustics, reverberation periods.
Light: properties of natural light, design criteria, daylight factors, diffusion, quality, energy requirements and saving.

## Earth studies 320 (AAL 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |

| | |
|---|---|
| **Prerequisites** | AAL 210 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Ecosystemic thinking for the designer in terms of culture, science and environment. The designer as critic; analysis of precedents. Application of principles of sustainable development and ecological design including energy demand and efficiency and energy dissipation.

## Labour law 311 (ABR 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Human Resource Management<br>BSc Construction Management<br>BSocSci Industrial Sociology and Labour Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial every 2nd week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 1 |

**Module content**

Basic principles of the employment contract. Collective labour law. Statutory conditions of employment. Individual labour disputes. Collective labour disputes. Settlement procedures.

## Labour relations 320 (ABV 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Human Resource Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BSocSci Industrial Sociology and Labour Studies |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 2 |

**Module content**

The theoretical basis of Labour Relations
In this section the basic concepts, historical context and theoretical approaches to the field of labour relations will be discussed. The institutional framework in which labour relations operates, will be addressed with particular emphasis on the structural mechanisms and institutional processes. The service relationship that forms the basis of labour relations practices, will also be analysed.
Labour Relations practice
In this section students are taught the conceptual and practical skills related to practice aspects such as handling of grievances, disciplining, retrenchments, collective bargaining, industrial action and dispute resolution.

## Afrikaans 110 (AFR 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BCom Law<br>BDiv<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIS Publishing<br>BPolSci Political Studies<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Law<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |

| | |
|---|---|
| **Department** | Afrikaans |
| **Period of presentation** | Semester 1 |

**Module content**

*This module is only offered in Afrikaans

**Taalkundekomponent**: Inleiding tot die Afrikaanse taalkunde met klem op lees-en skryfvaardigheid.
**Letterkundekomponent**: Inleiding tot die Afrikaanse en Nederlandse letterkunde aan die hand van kortverhale en gedigte.

## Afrikaans 120 (AFR 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BCom Law<br>BDiv<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIS Publishing<br>BPolSci Political Studies<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Law<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 2 |

**Module content**

*This module is only offered in Afrikaans

**Taalkundekomponent**: Inleiding tot die Afrikaanse sintaksis, fonetiek en taalgeskiedenis.
**Letterkundekomponent**:Inleiding tot die Romankuns Inleiding tot die Drama

## Afrikaans 210 (AFR 210)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BA Languages<br>BA Law<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 1 |

**Module content**

Leer Nederlands
Die module het as uitkoms die verwerwing van lees-, praat-, skryf- en luistervaardighede in Nederlands. 'n Goeie kennis van Afrikaans is 'n voorvereiste. Die module is kontrastief. Klem word gelê op die verskille tussen die Afrikaanse en Nederlandse grammatika, woordeskat en kultuur.

## Afrikaans 214 (AFR 214)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | AFR 110 and AFR 120 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 1 |

**Module content**

*Taalkundekomponent*: Morfologie, sintaksis, leksikologie en semantiek. *Letterkundekomponent*: Afrikaanse poësie

## Afrikaans 220 (AFR 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | AFR 110 and AFR 120 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 2 |

**Module content**

Afrikaanse prosa
Literatuurteorie en -kritiek

## Afrikaans 311 (AFR 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | AFR 214 and AFR 220 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 1 |

**Module content**

Taalkundekomponent
Capita selecta uit die Afrikaanse taalkunde
Letterkundekomponent
Afrikaanse prosa

## Afrikaans 321 (AFR 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | AFR 214 and AFR 220 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 2 |

**Module content**

Afrikaanse poësie
'n Keuse uit eietydse Nederlandstalige literatuur; analitiese teksondersoeke met aandag aan agtergrond- en resepsieaangeleenthede.
Die Afrikaanse drama word binne die breër konteks van die Afrikaanse letterkunde geplaas.

## African languages literature: Capita selecta 121 (AFT 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | NDE 110/SEP 111/ZUL 111/STW 111 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module presented in English and African Language |
| **Department** | African Languages |
| **Period of presentation** | Semester 2 |

**Module content**

Aspects of the literature of isiNdebele/isiZulu/Sepedi/Setswana such as an introduction to literary concepts such as literary text(s), topic, characters, events, time and place; the analysis of selected short stories.

## African languages literature: Capita selecta 220 (AFT 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | NDE 210/SEP 211/ZUL 211/STW 211 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module presented in English and African Language |
| **Department** | African Languages |
| **Period of presentation** | Semester 2 |

**Module content**

Aspects of the literature of isiNdebele/isiZulu/Sepedi/Setswana such as the continuation of the study of concepts such as text, topic, characters, events, time and place; the study of plot and style; the critical analysis of a novel/novelette.

## African languages literature: Capita selecta 320 (AFT 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | NDE 310/SEP 310/ZUL 310/STW 310 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |

| | |
|---|---|
| **Department** | African Languages |
| **Period of presentation** | Semester 2 |

**Module content**

Aspects of the literature of isiNdebele/isiZulu/Sepedi/Setswana such as the critical analysis of a dramatic work and poetry (selected poems).

## Archaeology 110 (AGL 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Anthropology and Archaeology |
| **Period of presentation** | Semester 1 |

**Module content**

*Optional Field school usually in April
Introduction to Archaeology
An introduction as to how archaeologists study the past via the artefacts left behind by our ancestors. Basic introduction to archaeological theory and how it has contributed to interpretation of the past is discussed. Topics range from the origins of the human family in Africa over three million years ago to the study of more recent times.

## Archaeology 120 (AGL 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Anthropology and Archaeology |
| **Period of presentation** | Semester 2 |

**Module content**

African and world archaeology

Africa is the home of humanity in both a biological and cultural sense and we have the artefacts and sites to prove it. Topics range from the famous 3 million year-old Australopithecine 'Lucy' ancestor found in Ethiopia to the 'Out of Africa' dispersal of modern humans, and the emergence of human symbolism, rock art and the emergence of complex societies at society at Lake Chad (Daima) and southern Africa (Mapungubwe and Great Zimbabwe). The main aim is to situate events in Africa in global perspective.

## Academic information management 101 (AIM 101)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BA<br>BA Audiology<br>BA Extended programme<br>BA Fine Arts<br>BA Information Design<br>BA Languages<br>BA Speech-Language Pathology<br>BA Visual Studies<br>BDiv<br>BDram<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BMus<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSc Computer Science<br>BSc Construction Management<br>BSc Information and Knowledge Systems<br>BSc Quantity Surveying<br>BSc Real Estate<br>BSocSci Heritage and Cultural Tourism<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BTRP<br>BTh |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology. Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

## Academic information management 102 (AIM 102)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |

| | |
|---|---|
| **Programmes** | BA Law<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Architecture<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Culinary Science<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Medical Sciences<br>BSc Meteorology<br>BSc Microbiology<br>BSc Nutrition<br>BSc Physics<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BVSc<br>LLB |
| **Service modules** | Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology. Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

## Academic information management 111 (AIM 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |

| | |
|---|---|
| Programmes | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BAdmin Public Management Public Administration<br>BAdmin Public Management and International Relations<br>BCMP<br>BChD<br>BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Extended programme<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BDietetics<br>BDiv<br>BDram<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BNurs<br>BOH<br>BOccTher<br>BPhysio<br>BPolSci International Studies<br>BPolSci Political Studies<br>BRad Diagnostics<br>BSW<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Architecture<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Construction Management<br>BSc Culinary Science<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Medical Sciences<br>BSc Meteorology<br>BSc Microbiology<br>BSc Nutrition<br>BSc Physics<br>BSc Plant Science<br>BSc Quantity Surveying<br>BSc Real Estate<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BSocSci Heritage and Cultural Tourism<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BSportSci<br>BTRP<br>BTh<br>Diploma in Theology<br>MBChB |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

### Module content

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology.

## Academic information management 121 (AIM 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BAdmin Public Management Public Administration<br>BAdmin Public Management and International Relations<br>BCMP<br>BChD<br>BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Extended programme<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BDietetics<br>BDiv<br>BDram<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BNurs<br>BOH<br>BOccTher<br>BPhysio<br>BPolSci International Studies<br>BPolSci Political Studies<br>BRad Diagnostics<br>BSW<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Architecture<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Construction Management<br>BSc Culinary Science<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Medical Sciences<br>BSc Meteorology<br>BSc Microbiology<br>BSc Nutrition<br>BSc Physics<br>BSc Plant Science<br>BSc Quantity Surveying<br>BSc Real Estate<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BSocSci Heritage and Cultural Tourism<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BSportSci<br>BTRP<br>BTh<br>Diploma in Theology<br>MBChB |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

### Module content

Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

## Academic literacy 110 (ALL 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Landscape Architecture |
| **Service modules** | Faculty of Health Sciences<br>Faculty of Theology and Religion |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 1 |

### Module content

This module intends to equip students to cope more confidently and competently with the reading and understanding of a variety of texts, to apply these skills in a variety of contexts and to follow the conventions of academic writing.

## Academic literacy for Information Technology 121 (ALL 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 web-based period per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 2 |

**Module content**

By the end of this module students should be able to cope more confidently and competently with the reading, writing and critical thinking demands that are characteristic of the field of Information Technology.

## Academic literacy for Construction Economics 122 (ALL 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 web-based period per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 1 |

**Module content**

By the end of this module students should be able to cope more confidently and competently with the reading, writing and critical thinking demands that are characteristic of the field of Construction Economics.

## Academic literacy for Town and Regional Planning 123 (ALL 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 web-based period per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 1 |

**Module content**

By the end of this module students should be able to cope more confidently and competently with the reading, writing and critical thinking demands that are characteristic of the field of Town and Regional Planning.

## Elective module 110 (ARC 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

## Dissertation: Architecture 890 (ARG 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MArch |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Mini-dissertation 895 (ARG 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 110.00 |
| **Programmes** | MSc Applied Science Architecture (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Thesis: Architecture 990 (ARG 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Architecture |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Industrial analysis 313 (BAN 313)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | BES 220 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Mathematical statistics provides the basis for a number of important applications in the engineering environment. This module provides an introduction to the most important of these applications and will include the following syllabus themes: Monte Carlo simulation, decision analysis, forecasting and data-dependent modelling.

## Industrial analysis 780 (BAN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Industrial Systems<br>BScHons Financial Engineering |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | Not for Industrial Engineering students |
| **Contact time** | 24 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

- Monte Carlo Simulation
- Continuous Simulation
- System Dynamics
- Multi-objective Decision-making
- Operations Research
- Decision Analysis
- Discrete Simulation

## Advanced aspects of operations research 780 (BAO 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Decision makers are frequently faced with complex problem environments. The module introduces two advanced topics in the field of Operations Research that can assist in the development of more relevant decision support models. The first topic deals with multi objectivity and introduces a variety of interventions to incorporate the competing objectives into mathematical programming models. Secondly, the topic of Data Envelopment Analysis (DEA) is introduced, a non-parametric method used to empirically measure the productive efficiency of decision-making units. This linear programming methodology allows the decision maker to measure the productivity in complex environments with multiple inputs and outputs; uncover often overlooked relationships between in- and outputs; and analyse and quantify the inefficiencies of every unit evaluated.

## Solution algorithms in operations research 780 (BAR 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | BAN 313 or BAN 780 |
| **Contact time** | 48 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

When developing decision-support models using optimisation, the computational burden is often so great that exact optimal solutions are not attainable, or not efficiently found, especially in combinatorial and discrete optimisation problems. Often approximate solutions are adequate and can provide superior solutions to the current state-of-practice decision approaches. The module introduces a selection of heuristics and metaheuristics applied to a variety of problems frequently faced by Industrial Engineers. The module also introduces a methodology to test and validate heuristics to ensure robust and reliable application.

## Enterprise engineering and research methods 781 (BBA 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | Information Systems Design (BID 320) or similar course |
| **Contact time** | 48 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Enterprise Engineering can be defined as the body of knowledge, principles, and practices to design an enterprise. Due to their complexity and the continuously changing environment, enterprises need new approaches, tools and techniques to deliver innovative products and services to new markets in competitive environments. This module offers an introduction to the engineering design process applied to the enterprise as a system, and present existing approaches for designing, aligning and governing the enterprise. Within the design paradigm, the module also offers research methods (e.g. design research and action research) that are relevant for doing research within the enterprise engineering discipline.

The module covers:
•Background on systems thinking
•Systems design and systems engineering
•Prominent approaches for creating an enterprise engineering capability (e.g. Zachman, The Open Group, Dietz/Hoogervorst).
•Mechanisms and practices associated with different phases of enterprise design (e.g. enterprise modelling, languages, road maps, maturity assessment etc.)
•Research methods and techniques to validate and extend the EE knowledge base
•Case studies
•Change management

## Supply chain information and decision technology 780 (BCI 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Information technology is an important enabler of effective supply chain management, typically spanning the extended value chain from suppliers to customers. The timeliness and availability of relevant information are critical when applying supply chain strategies that increase service levels of and reduce cost and lead times. Value-added IT-based services are increasingly used to differentiate and develop relationships with customers. The objective of the course is to develop a sound understanding of components and priorities IT investment to enable supply chain integration and efficiency, the impact of business process change on IT implementation and selection of decision support systems.
• The Value of Information
• Leveraging Financial Information
• Advanced Supply Chain Planning and Execution
• Decision Support Systems
• IT Capabilities for Supply Chain Excellence
• Enterprise Resource Planning Systems
• Advanced Planning and Scheduling Systems
• Identification Technology
• Integrating Supply Chain IT

## Industrial and systems engineering research 780 (BCS 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | Any one of the following modules: BAR 780,BBA 781,BGH 780,BLK 781,BOZ 780,BPZ 782,BUY 780,BVK 780 |
| **Contact time** | 48 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

*This is a compulsory research module.

The module affords an individual student the opportunity of studying a designated area of coherent advanced knowledge under the tutorship of a senior staff member of the Department of Industrial and Systems Engineering. Eligibility, topic and scope of the intended project must be determined in consultation with the proposed supervisor.

## Design and analysis of experiments 780 (BDE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The design of an experiment may be defined as 'the logical construction of an experiment in which the degree of uncertainty with which the inferences are drawn may be well defined'. The module deals with the following:

- Principles of experimental design (Randomisation, Replication and Blocking (local control)
- One-Factor-Two-level Factorial Designs
- One-Factor-Multi-level Factorial Designs
- Completely Randomised Design (CRD) and introduction to ANOVA
- Randomised Complete Block Design (RBD)
- Latin Square Design (LSD)
- Balanced Incomplete Block Design (BIBD)
- Factorial Experiments (2nd and 3rd factorial experiments)
- Blocking and Confounding in Factorial designs
- Overview of Factorial Designs

## Industrial and organisational psychology 110 (BDO 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 1 |

**Module content**

*Only for BCur students

Introduction to industrial and organisational psychology
Industrial and Organisational Psychology is an applied field of Psychology that is involved with employee and organisational behaviour, and which has become a study field and professional speciality in its own right. This module aims to introduce the student to:

- the history and development of psychology and industrial and organisational psychology,
- the different sub-fields in psychology with special emphasis on the sub-fields of industrial and organisational psychology,
- how the different theoretical approaches in psychology view the human psyche and their views on human behaviour,
- genetics and the biological basis of human behaviour, to better understand the differences between people and to lay the foundation for ergonomical principles,
- how scientific research can be used to understand and handle human problems and to facilitate the optimal functioning of people in their work environments.

Individual processes
This section consists of the principles of learning as found in the work context. The role of perception in the work environment will be discussed by considering aspects such as shape, depth, distance and colour perceptions. Cognition, thought, reasoning, memory, creativity and decision-making will be included. Intelligence will be addressed and placed in an industrial and organisational psychology perspective.

### Industrial and organisational psychology 120 (BDO 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | BDO 110 GS |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 2 |

**Module content**

*Only for BNurs students

Human development and personality
This module consists of a discussion of the life span and important periods in human development with emphasis on their meaning in the work context. With regard to personality, the following themes will be addressed: the cultural context of personality, its formation and determinants of personality; personality as determinant of behaviour as well as the development and maintenance of self-image. Attention will be given to the basic methods of personality measuring and personality assessment.

Motivation and employee well-being
One of the many factors that form part of individual processes is Motivation and Emotion. An understanding of individual processes will contribute to an understanding of how and why employees perform in their workplaces. The first part of this semester course aims to introduce the student to the foundational theories of motivation and emotion. The second part of this semester course is concerned with the recognition and classification of psychological disorders and the management and promotion of psychological well-being in organisations. A positive view of psychological health aims at facilitating people’s inner resources or strengths and resiliencies so that they stay healthy and cope effectively.

## Industrial and organisational psychology 229 (BDO 229)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCur Nursing Management<br>BCur Nursing Science (Education and Administration) |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Health Sciences |
| **Prerequisites** | BDO 219 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 2 |

**Module content**

*Only for BCur students

## Inventory modelling 780 (BEE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |

**Period of presentation** Semester 1 or Semester 2

**Module content**

• Theory of Inventory Systems:
Inventory models and modelling including time and certainty complexities, linear and non-linear systems and feedback systems
• Review of inventory models:
Types and representations (classic, shortage, capacity constraint, time value of money, deterioration, time varying, stochastic inputs, imperfect quality, integrated scheduling and lot sizing models, service systems and retrial queues)
• Review of important inventory papers, their approaches and their foci:
• Modelling and Solution techniques:
Characterisation and assumptions
Mathematical Modelling, Mathematical Programming, Heuristics, Simulation Models, Control Theory and other approaches
• State of the art of modelling:
Current challenges and research trends
• Technological solutions of inventory modelling and management:
Algorithms and software, integration to MRP, ERP and scheduling modules, integration to WMS modules, and demonstrations

## Taxation 200 (BEL 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 32.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Law |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 111 and FRK 121 or FRK 100 or FRK 101. Only available to BCom (Option Taxation, Accounting Sciences, Financial Management Sciences, Financial Sciences, Informatics, Investment Management and Law) students. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Taxation |
| **Period of presentation** | Year |

**Module content**

In this module an introduction to taxation as a discipline in the South African tax environment is provided. The income tax concepts covered in this module are gross income, special inclusion, exempt income, general deduction, special deduction, prohibited deduction and allowed assessed loss. The implications of a capital gains tax event, specific sections of the Income Tax Act applicable on individuals as well as fringe benefits and specific allowances for individuals are discussed. Concepts such as the prepaid tax system, tax implications of donations tax events as well as the tax implications of a deceased person will be provided. Finally an introduction to the basic principles of VAT is included.

## Taxation 300 (BEL 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 40.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Law |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | BEL 200 and FRK 221 GS or FRK 201 GS |
| **Contact time** | 1 discussion class per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Taxation |
| **Period of presentation** | Year |

**Module content**

The purpose of the module is to enable the learner to calculate the value-added tax liability and to journalise transactions; calculate the normal tax liability (including the determination of taxable capital gains and assessed capital losses) of individuals, companies, estates and trusts,discuss tax principles on value-added tax and normal tax; and calculate and discuss provisional and employees' tax and to object against an assessment.

## Marketing Management 120 (BEM 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |

| | |
|---|---|
| **Programmes** | BA Visual Studies<br>BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BIS Publishing<br>BSc Culinary Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Marketing Management |
| **Period of presentation** | Semester 2 |

**Module content**

This module provides an overview of the fundamentals of marketing by considering the exchange process, customer value, marketing research and the development of a marketing plan. It also addresses the marketing mix elements with specific focus on the seven service marketing elements namely the service product, physical evidence, people, process, distribution, pricing and integrated marketing communication.

## Consumer behaviour 212 (BEM 212)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BA Visual Studies<br>BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BSc Culinary Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | BEM 120 GS |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Marketing Management |
| **Period of presentation** | Semester 1 |

**Module content**

Internal and external influencing factors of consumer behaviour, the consumer's decision process and application fields of consumer behaviour, consumerisms and social responsibility, buying behaviour of consumers in both product and service related industries, consumer psychology and the influence thereof on buying behaviour, psychology of pricing, influencing factors in consumer buying behaviour, the impact of various forms of marketing communication on buying behaviour.

## Integrated brand communications 224 (BEM 224)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BA Visual Studies<br>BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | BEM 120 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Marketing Management |
| **Period of presentation** | Semester 2 |

**Module content**

Integrated brand communications approach, marketing communication planning, objectives and budgets for integrated marketing communications, principles and strategising of marketing communication elements, new media, the brand name communication process, marketing metrics and evaluation for marketing communication effectiveness.

## Marketing management 321 (BEM 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BA Visual Studies<br>BCom<br>BCom Business Management<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | BEM 120 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Marketing Management |
| **Period of presentation** | Semester 2 |

**Module content**

Strategic issues in marketing, strategic marketing, strategic analysis (market analysis, customer analysis, competitor analysis and internal analysis), market strategies (competitive strategies, strategies in the product life cycle and relationship building strategies) and strategy implementation and control.

## Business law 210 (BER 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BSc Geoinformatics<br>BScAgric Agricultural Economics and Agribusiness Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 1 |

**Module content**

Basic principles of law of contract. Law of sales, credit agreements, lease.

## Business law 220 (BER 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | Examination entrance for BER 210 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 2 |

**Module content**

Labour law. Aspects of security law. Law of insolvency. Entrepreneurial law; company law, law concerning close corporations. Law of partnerships.

## Business law 310 (BER 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BSc Architecture<br>BSc Construction Management<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to law. General principles of the law of contract. Specific contracts: purchase contracts; letting and hiring of work; employment contracts. Agency. General aspects of entrepreneurial law. Dispute resolution – mediation and arbitration.

## Engineering statistics 220 (BES 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | WTW 158 GS, WTW 164 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Engineering systems are often subjected to variation, uncertainty and incomplete information. Mathematical statistics provides the basis for effectively handling and quantifying the effect of these factors. This module provides an introduction to the concepts of mathematical statistics and will include the following syllabus themes: data analysis, probability theory, stochastic modelling, statistical inference and regression analysis.

## Applied engineering statistics 780 (BES 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module presents an applied approach to solve real-world engineering problems. The premise of the course is that data analysis, and thus, applied statistics, is an inseparable part of conducting research and solving engineering problems. The module presents the elements of different types of statistical studies as they relate to different industrial settings. The aim of the module is to promote inductive reasoning through the gathering, analysing and interpreting of diverse types of observational data. The outcome of the module is an engineer equipped to select and apply statistical methods appropriate to an industrial setting.
The course covers the following topics:
• Contextualisation: Different types of industrial processes and research settings, related types of statistical studies and a framework for understanding and applying statistics
• Principles of probabilistic and rational data gathering
• The use of common and specialised probability distributions (such as the Gamma, Exponential and Weibull distributions) in solving real-life problems, conducting scientific research and analysing stochastic and deterministic processes
• Data transformations: When and how to transform data
• Bridging the gap between technology and statistical analysis: The use of EXCEL in resolving basic and advanced statistical problems

## Facilities planning 320 (BFB 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

This module introduces the principles, approaches, methods, techniques and tools to systematically determine facility requirements, determine the required space of and relationships between activities, develop and evaluate alternative plans and layouts and present the results.  Aspects such as facilities location, manufacturing and service process design, capacity planning, materials handling, personnel facilities, storage and warehousing are also addressed.  A structured facility design project forms an integral part of the course.

## Quality assurance 410 (BGC 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to quality and quality management systems. Statistical process control. Acceptance control.

## Building organisation 121 (BGG 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 3.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

The structure of the building industry and the role of building disciplines and related parties.

## Quality management 780 (BGH 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Professionally, engineers are confronted with issues related to product quality and performance or organisational excellence. The intention of this course is to provide an overview of the domain of modern quality management and to equip the student with theory, methodologies and tools and techniques to improve and achieve product quality and performance excellence.
The course covers the following topics;
• Contextualisation: The History, Guru's, Principles, Industrial setting and the Domain of Quality Management
• Practices of improving and achieving product quality: Role in Industrial Engineering, On-line and Off-line Quality Control Practices
• Frameworks of improving organisational excellence: National Quality Awards, ISO 9000 and other frameworks
• Practices of improving performance excellence: Quality and Competitive advantage, Customer and Supplier relationships, People Empowerment and Motivation, Quality Leadership and Organisational change.

## Health and safety in the workplace 780 (BGW 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

## Probability models 780 (BHM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours per semester |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The objective of the module is that students be exposed to probability theory, learn the ability to follow fairly involved theoretical reasoning, continue to learn how to reason mathematically, and solve problems of a more practical nature.
It covers:
• Probability theory: Random variables and random vectors, Sequence of random variables, Transformation of Probability distributions
• Stochastic Processes: Examples of stochastic processes; various types of stochastic processes
• Poisson Processes: Homogeneous and non-homogeneous stochastic processes with examples
• Renewal Processes: Renewal functions; ordinary and delayed renewal processes; Regenerative stochastic processes
• Discrete-time Markov chains: continuous time Markov chains with focus on examples in Reliability, queuing and inventory models.

## Housing 320 (BHU 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Concepts, principles, history, current trends in settlement, shelter and integrated living environments; role of housing in society; statutory policy and planning frameworks and paradigms; housing delivery options; housing development management; financing and property rights options; housing types and densities; housing product, norms and standards; management and maintenance of social housing stock; housing needs assessment and post-occupancy evaluation; consumer education and protection.

## Dissertation: Library science 890 (BIB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIS Library Science |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Thesis: Library science 990 (BIB 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Library Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Information systems design 320 (BID 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Systems development planning, system requirement analysis, different approaches towards structured analysis and design of systems, process design, database design and normalization, object-oriented design and modelling, information system application building and testing.

## Engineering economics 420 (BIE 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Money-time relationships and equivalence (interest formulae, effective interest rate, bonds and loans). Bases for comparison of alternatives (present worth, annual worth, Internal rate of return, external rate of return, investment balance diagrams, Decision making among alternatives (useful lives equal to study period, useful lives different among alternatives, mutually exclusive alternatives in terms of combinations of proposals). The influence of inflation on engineering economic calculations. Decision making among alternatives on an after-tax basis. Replacement analysis (the economic life of an asset, retirement without replacement). Risk analysis of cash flows.

## Dissertation: Industrial engineering 890 (BIR 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Industrial Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Year |

## Dissertation 891 (BIR 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Industrial Systems |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Year |

## Thesis: Industrial engineering 990 (BIR 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Industrial Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Year |

## Information systems 780 (BIS 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

To introduce the student with a background in transactional application software development to a variety of aspects in the wider field of information technology. Emphasis is on the functional design of Business Intelligence systems from an Industrial Engineering perspective. The aim is to enable the student to appreciate the scope of management challenges in the integrated environment of business processes, transactional application software, data, IT infrastructure and telecommunications, data warehousing, and the necessary management information needed at various levels in an organisation.
It covers:
• Technology trends
• Context diagram of application software portfolio
• Review of typical transactional information systems
• Role of Business Intelligence and data warehousing
• Business dimensional lifecycle
• Business requirement definition
• Basic elements of the data warehouse
• Extraction, Transformation and Loading processes
• Dimensional modelling (star schema)
• Metadata
• Information delivery

## Thesis: Industrial systems 990 (BIT 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Industrial Systems |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Year |

## Professional and technical communication 210 (BJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods.

## Building cost estimation 700 (BKR 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Quantity Surveying<br>BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Estimation of building costs – principles and process; elements of a price; rough quantities and inclusive quantities (elemental and builders' quantities) for estimating; estimating methods; pricing of various trades and preliminaries; analysis of building cost; building cost escalation; design cost management.

## Lean supply chain strategies and systems 780 (BLC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Supply chain executives need to contribute and support long term strategic objectives by providing a competitive edge through an aligned supply chain strategy. The course addresses the impact of lean principles in supply chain management and practical approach to implementing lean thinking and demand driven supply chains. The course provides a framework for the strategic supply chain decisions, both in designing and managing an efficient extended supply chain. The latest innovations, trends and challenges in agile supply chain strategies and systems are reviewed. Team leadership skills are developed through practical applications, approaches and best practices of lean supply chain design and management. Supply chain leadership perspectives will be provided by executives and managers from industry and team-based simulation games.
Course outline:
• Fundamentals of lean management
• Lean Thinking and Supply Chain (SC) management
• Customer Value
• Network design strategies
• Supply Chain Integration and barriers to Integration
• SC performance measurement
• Extended Value Chain and Value Stream Mapping
• Eliminating Waste in the Supply Chain
• Applying Lean Principles to Supply Chain Operations
• Inventory positioning approaches
• Operational Executive Problems
• A3 Performance Management

## Industrial logistics 320 (BLK 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | (BOB 310) |
| **Contact time** | 2 discussion classes per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Role of logistics in the economy and organisation. Customer service. Forecasting. Logistics information systems and electronic information flow. Inventory management. Managing materials flow. Distribution channels. Transportation. Warehousing. Packaging. Strategic purchasing. Global logistics. Organising and controlling logistics. Supply chain management. Supply chain finance and performance measurement. SCOR reference models. Implementing logistics strategy.

## Business logistics 780 (BLK 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

## Supply chain processes 781 (BLK 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

A key objective of supply chain management is to develop competiveness and achieve a market advantage through the implementation of cross-functional processes as the mechanism to coordinate internal and external activities.
The course aims to create an understanding of the importance of integrating key supply chain business processes and to develop the ability to analyse and implement such processes across functional and corporate silos. Standardised process definitions and practices, including strategic and operational sub-processes and key performance measurements, are considered.
Course outline:
• Customer Relationship Management Process
• Supplier Relationship Management Process
• Customer Service Management Process
• Demand Management Process
• Order fulfilment Process
• Manufacturing Flow Management (Planning and Control) Process
• Product Development and Commercialisation Process
• Returns Management Process
• Assessment of Supply Chain Management (SCM) Processes
• Implementing and Sustaining SCM Processes
• Supply Chain Mapping Approaches
• Supply Chain Performance Measurement

## Biometry 120 (BME 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Culinary Science<br>BSc Ecology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Nutrition<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BVSc |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Veterinary Science |
| **Prerequisites** | At least 4 (50-59%) in Mathematics in the Grade 12 examination, or at least 50% in both Statistics 113, 123 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Simple statistical analysis: Data collection and analysis: Samples, tabulation, graphical representation, describing location, spread and skewness. Introductory probability and distribution theory. Sampling distributions and the central limit theorem. Statistical inference: Basic principles, estimation and testing in the one- and two-sample cases (parametric and non-parametric). Introduction to experimental design. One- and twoway designs, randomised blocks. Multiple statistical analysis: Bivariate data sets: Curve fitting (linear and non-linear), growth curves. Statistical inference in the simple regression case. Categorical analysis: Testing goodness of fit and contingency tables. Multiple regression and correlation: Fitting and testing of models. Residual analysis. Computer literacy: Use of computer packages in data analysis and report writing.

## Process optimisation 781 (BMK 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Process optimisation is an engineering discipline which focuses on the tools and techniques used specifically for business process analysis, design, and optimisation. As physics determines the physical behaviour of tangibles, process physics forms the foundation of business process behaviour. Traditionally, operations research techniques are used by Industrial Engineers to optimise business processes, process optimisation provides a more focused approach using techniques such as Social Network Analysis, System Dynamics, image profiling and process mining to uncover analytical models.
The outcome of this course is to enable the student to create an integrated, analytical business process behaviour profile. This supports the analysis, design and optimisation of business processes in a Business Engineering lifecycle. The following topics are covered in the course:

• Standard Process Physics principles, facts and models.
• Process Intelligence
• Adaptive process control and SMART processes
• Robustness and complexity analysis
• Process mining
• Social Network Analysis

Process optimisation requires an understanding of operations research within the business engineer framework. This course requires a full understanding of undergraduate Industrial Engineering modules as well as a postgraduate understanding of resource optimisation and enterprise architecture.

## Operational management 310 (BOB 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to operations management, operations strategy and competitiveness. World-class and agile manufacturing. Operations planning in the service industries. The manufacturing management environment. Batching principles (EOQ and DEL). Manufacturing planning and control systems. Sales and operations planning. Capacity planning and control. Demand management. Master production scheduling. Materials requirements planning (MRP). Distribution requirements planning. Just-in-time (JIT) manufacturing. Synchronous manufacturing (Theory of constraints). Comparing MRP, JIT and TOC. Shop-floor scheduling and control. Integration and implementation of manufacturing planning and control systems. Enterprise Resource Planning (ERP) systems. Business process transformation.

## Operational research 410 (BON 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | (BES 220), (BOZ 312) |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Review of basic probability, Markov chain models, Markov decision models. Queuing systems: M/M/1 queues (both finite and infinite capacity), etc.; deterministic and stochastic inventory models. Competitive games: pure and mixed strategies, optimum strategy, two-person zero-sum games, graphical methods and applications, LP methods for games.

## Plant biology 161 (BOT 161)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Ecology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Microbiology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | MLB 111 GS |
| **Contact time** | 2 lectures per week, fortnightly practicals |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Department of Plant and Soil Sciences |
| **Period of presentation** | Semester 2 |

**Module content**

Basic plant structure and function; introductory plant taxonomy and plant systematics; principles of plant molecular biology and biotechnology; adaptation of plants to stress; medicinal compounds from plants; basic principles of plant ecology and their application in natural resource management.

## Building drawings 111 (BOU 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 practical per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Students are introduced to design aspects in the built environment by doing basic technical drawings of simple building structures with appropriate detail sketches. Assignments during the semester expose the students to building plan interpretation through the following topics: foundations; super-structure; roof structure; window and door types; plan and sectional drawings and local authority submission criteria.

## Building drawings 121 (BOU 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 practical per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Broadens the vocabulary of the technical language from BOU 111. Students are introduced to other aspects of the building industry that include the following topics: topography; symbols; ergonomic design principles; orientation of buildings; perspective drawings; waterproofing and dampcourse applications.

## Operational research 312 (BOZ 312)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

### Module content

Introduction to Operations Research, and more specifically the branch of optimisation and its application to industrial problems. In the module the topics of linear and integer linear programming are introduced. The focus is on identifying and scoping appropriate problems, the subsequent formulation of problems, solution algorithms, and post-optimisation sensitivity analysis. Students are exposed to solving problems using optimisation software.

## Operations research 780 (BOZ 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | BAN 313 or BAN 780 |
| **Contact time** | 48 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Module content

Building on undergraduate modules in Operations Research, the module aims to extend the mathematical programming and optimisation capabilities by introducing uncertainty. Many decision makers are confronted with complex environments in which data is not known with certainty, or in which the decision constraints are uncertain. For cases where one knows the shape, or can assume that the uncertainty follows a known probabilistic distribution, stochastic programming can be used. In the module both chance-constrained programming and fixed recourse are introduced. Fuzzy optimisation is introduced for cases where the shape and/or distribution of the uncertainty are not known.The module also addresses the uncertainty when a decision maker is confronted with multiple, competing objectives.

## Professional ethics 211 (BPE 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BCom Accounting Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 1 |

**Module content**

In the first quarter of this module students are equipped with an understanding of the moral issues influencing human agency in economic and political contexts. In particular philosophy equips students with analytical reasoning skills necessary to understand and solve complex moral problems related to economic and political decision making. We demonstrate to students how the biggest questions concerning the socio-economic aspects of our lives can be broken down and illuminated through reasoned debate. Examples of themes which may be covered in the module include justice and the common good, a moral consideration of the nature and role of economic markets on society, issues concerning justice and equality, and dilemmas of loyalty. The works of philosophers covered may for instance include that of Aristotle, Locke, Bentham, Mill, Kant, Rawls, Friedman, Nozick, Bernstein, Dworkin, Sandel, Walzer, and MacIntyre. In the second quarter of the module the focus is on professionalism, careers and ethics. Codes of ethics in business and professions, professional codes, as well as ethical issues in the accountancy profession are discussed.

## Project 410 (BPJ 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | Finalists only |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Choice of project topic. Appointment of project leader. Literature study, analysis and creation of alternatives.

## Project 420 (BPJ 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | BPJ 410 |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Narrowing of topic choice. Detailed solution of chosen alternative. Writing of final project report and presentation of project.

## Practical training 310 (BPY 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

*Attendance module only
During or at the end of the second year of study, students in industrial engineering undergo at least six weeks of prescribed practical training in the industry. A satisfactory report on the practical training must be submitted to the Faculty Administration within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the chairman of the School of Engineering.

## Practical training 410 (BPY 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

*Attendance module only
During or at the end of the third year of study, students in industrial engineering undergo at least six weeks of prescribed practical training in the industry. A satisfactory report on the practical training must be submitted to the department within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the chairman of the School of Engineering.

## Productivity 220 (BPZ 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Qualifying and quantifying productivity: efficiency, effectiveness, utilisation, profitability and competitiveness. Method study: critical examination and process flow charts and diagrams. Work measurement: time study and activity sampling. Organisational behaviour: motivation, incentive schemes, group forming, work teams, job design and change management. Ergonomics.

## Business engineering 321 (BPZ 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Strategic analysis; strategy formulation; blue-ocean strategy; grand strategy matrix; SWOT/ TOWS analysis; strategy canvas; customer segmentation; marketing mix; value chain; business model canvas; business model analysis; combination of business models to create new ideas; change management; entrepreneurship; creating a business plan; integration of theory with real world application.

## Business engineering 421 (BPZ 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Integration of engineering functions; strategic planning; organisational structures; business management; systems engineering; work-flow management; process modelling; business architecture; change management and motivation; marketing management and industry exposure. Business management game project.

## Production management 781 (BPZ 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

## Manufacturing planning systems 782 (BPZ 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | Operations Management and Operations Research (advisable but not mandatorily required) |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Review of MPC, Agile Manufacturing Processes, Models of MPC
**Section 1**: Review of MPC Theories and Framework
**Section 2**: Research Framework for Problems in Manufacturing Systems
1. Mathematical Model based Problems and their techniques
2. Estimation and Hypothesis based Problems and their techniques
**Section 3**: Introduction to MPC Problems and sample Models
1. Forecasting models
2. Aggregate planning models
3. Lot sizing and disaggregation models
4. Finite Scheduling models
5. Lean Manufacturing Models
6. Basic Distribution and Replenishment Models
7. Basic Supply Chain Structural Analysis and Performance Models
**Section 4**: Agile Panning Problems and Techniques
1. Multi-Level Master Scheduling Techniques
2. Constraint Scheduling – (TOC theory, applications and optimisation)
3. Lean Manufacturing Implementation (from Flow Lean to Process Kaizen )
4. Introduction to CONWIP ideology
5. Introduction to Demand Driven MRP

## Quantity surveying practice 300 (BRK 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Quantity Surveying |
| **Prerequisites** | HVH 200 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Management theory; basic principles of production management, lists of materials; pricing; payment certificates; final accounts; contract price adjustments; application of computer-based measuring programmes.

## Quantity surveying practice 700 (BRK 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Programmes** | BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Construction Procurement Guidelines; standards for uniformity; contract administration; project administration; conditions of appointment and fee accounts; consortiums; tendering for professional services; professional indemnity; Public Private Partnerships; Quantity Surveying Professions Act; Council for the Built Environment Act; CIDB Act.
Construction Industry Development Board Act (CIDB Act), Public Finance Management Act (PFMA), Municipal Finance Management Act (MFMA) and Preferential Procurement Policy Framework Act (PPPFA).

## Research report 785 (BRK 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

An essay on a subject approved by the head of department should be handed in during the final year of study.

## Dissertation: Quantity surveying 890 (BRK 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Mini-dissertation: Quantity surveying 895 (BRK 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |

| | |
|---|---|
| **Period of presentation** | Year |

### Thesis: Quantity surveying 990 (BRK 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Construction Management<br>PhD Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

### Mini-dissertation: Industrial engineering 895 (BSC 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Year |

### Business engineering 780 (BSI 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Organisations are complex systems which consist of people, processes, customers, resources and regulatory environments. Business Engineering (BE) is a discipline which uses an engineering approach towards introducing planned business change into the organisation. This includes formal analysis, design, implementation and maintenance of the holistic business system; requiring a deep understanding and knowledge of the interaction and balance of complex business system elements.
The outcome of the course is to enable the student to understand the art and science of engineering complex business systems. The following topics are covered in the course:
• BE principles for design, implementation and optimisation of complex business systems
• BE programme process which governs the implementation of holistic business changes
• BE programme and project structures
• BE Tools and techniques used throughout the BE lifecycle for engineering modelling and optimisation.
• Business
• Models and innovation approaches
• Integrated Business planning
• Business Process reference models for strategic, tactical, core and support processes.
Business engineering is the ultimate pinnacle of industrial engineering competency – being able to construct business systems serving complicated organisational value propositions. The course requires a full understanding of undergraduate Industrial Engineering modules as well as a postgraduate understanding of resource optimisation, enterprise architecture, and supply chain engineering.

## Management accounting 410 (BSR 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FBS 110 |
| **Contact time** | 6 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

The work of management and the need for managerial accounting information. The changing business environment. Cost terms, concepts, and classification. Job order costing. Process costing. Activity-based costing and quality management. Cost-volume-profit relations. Variable and fixed costing. Budgeting and control. Standard costs and flexible budgets. Segment reporting and decentralisation. Relevant costs for decision-making. Allocations of service departments cost to operating departments.

## Engineering management 310 (BSS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Programme and systems engineering
Concepts: Application of project management, systems thinking, systems approach, product, system and project life cycles, project phases and specification practices. Development models: stage-gate development, project charter, systems engineering models, systems engineering management and life cycle characteristics. Planning and Scheduling: task definition, work breakdown structures, duration estimation, Gantt charts, critical path, resource handling. Costs and Budgets: cost estimates, project life cycle costs, work authorisation. Control: project organisation. Legal: contracts, intellectual property. Case studies and semester project
Engineering Economics
Decision making in an engineering environment. Allocation of cost. Money-time relationships (discreet interest formulae, tables, financial calculator, Excel). Bases for comparison of alternatives (present worth, annual worth,). Decision making among alternatives before and after tax (useful lives equal to study period, useful lives different among alternatives).

## Systems engineering 410 (BSS 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 1 discussion class per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

A company's ability to remain competitive hinges increasingly on its ability to develop successful products. In practice this is often determined by how well the company performs systems engineering. Applying the principles of systems engineering allows designers to understand the big picture, i.e. how a product needs to perform technically as well as within its application domain, e.g. environmentally, human interfaces, and so on. This module equips the student with the relevant tools and process understanding to successfully apply systems engineering to product development. Some of these tools and processes include specification practices, requirements engineering, systems engineering management and verification and validation processes.

## Plant genetics and crop biotechnology 361 (BTC 361)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Microbiology<br>BSc Plant Science<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GTS 251 and {GTS 261 GS or BOT 261} and {GTS 351 and GTS 352 are recommended} |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 2 |

**Module content**

Plant genetics and genomics: gene control in plants, epigenetics, co-suppression, forward and reverse genetics, structural and functional genomics. Plant development: signal perception, cell death, control of cell division. Plant-environment interactions. Crop genetic modification: food security, GMO regulation, plant transformation, whole-chromosome transformation, synthetic biology, homologous recombination. Crop molecular markers: marker types, genotyping, QTL mapping, marker-assisted breeding. Future of crop biotechnology: applications of genomics, biopharming, genetical genomics, systems biology

## Reliability engineering 780 (BTH 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

To make students conversant with the concepts, tools and techniques of reliability engineering.
Capita selecta from:
• Introduction to Reliability Engineering
• Reliability Mathematics
• Probability Plotting
• Reliability Prediction for Design
• Reliability Testing
• Reliability Growth
• Maintainability
• Reliability Management

## Management practice 700 (BTP 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BScHons Quantity Surveying<br>BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

A study of effective business management with reference to various organisational functions. Attention is paid to the built environment practitioner within this context.

## Simulation modelling 321 (BUY 321)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | (BAN 313) |
| **Contact time** | 6 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to simulation as technique. Simulation methodology. Formulation of problem situations by means of simulation models with the emphasis on discrete models. Input and output analysis. Introduction to simulation software.

## Simulation modelling 780 (BUY 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | BAN 313 or BAN 780 |
| **Contact time** | 48 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

In recent years the boundaries between different simulation paradigms such as discrete event simulation, system dynamics and agent-based models have become less distinct. Improvements in computational efficiency also allow much richer and complex models to be built. This course introduces agent-based models (ABM) as a class of computational models that deal with autonomous agents and their interactions with other agents, and their surrounding environments. Course content covers basic theoretical foundations of ABM and then focuses on a few specific application areas where ABM is used for decision-making: pedestrian and transport models; production and logistics; as well as biology.

## Supply chain design 780 (BVK 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Industrial Engineering<br>BScHons Applied Science Industrial Systems |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Industrial and Systems Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Strategic design of supply chain networks, inventory management and supply chain integration. Framework for strategic alliances and third party logistics. Analysis and application of alternative supply chain reference models as the basis for modelling, analysis and improvement.
Course outline:
• Supply Chain Network Design
• Strategic Management of Inventory
• Supply Chain Integration
• Strategic Alliances
• Coordinated Product and Supply Chain Design
• Supply Chain Modelling (SCOR, VRM)

## Building science 110 (BWT 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Principles, methods and materials used in best practice in the construction of simple single-storey buildings up to wall plate height.

## Building science 120 (BWT 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | BWT 110 GS |
| **Contact time** | 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Principles, methods and materials used in best practice in the construction of simple single-storey buildings from wall plate height to completion including finishes and external work. Introduction to alternative practices and materials for sustainability.

## Building science 210 (BWT 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | BWT 110 GS and BWT 120 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Erection and construction of multi-storey buildings, including site management and temporary site work, building equipment and earthwork machinery, specialised foundations, bulk excavations and advanced concrete construction, including retaining walls. Timber and steel structures as construction methods.

## Building science 220 (BWT 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Material study of metals and advanced materials. Study and development of sensitivity for and the philosophy of industrial safety, accident prevention and total loss control safety risk management in the construction industry.

## Building science 310 (BWT 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Erection and construction of specialised building components and finishes. Acoustics. Material study of plastics, glues, rubber, mastics, bonding agents, fibre cement, bituminous products, sealers, epoxies and waterproofing.

## Building science 320 (BWT 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Thermal properties of insulation systems and construction materials. Critical review of current development and construction practice; alternative construction technologies; innovation in construction; technical evaluation of innovative construction materials and methods; life cycle costing and life cycle analysis; the National Building Regulations.

## Air quality control 780 (CAM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Environmental Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Air quality awareness and impacts of air pollutants. South African air pollution legislation. Meteorology and dispersion modelling. Measurement of air pollution – sampling and analysis. Equipment design of settling chambers and cyclones. Venturis and other wet cleaning equipment. Bag filters. Electrostatic precipitators. Incinerators, adsorption and absorption equipment.

## Air quality control 787 (CAM 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Environmental Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Air quality awareness and impacts of air pollutants. South African air pollution legislation. Meteorology and dispersion modelling. Measurement of air pollution – sampling and analysis. Equipment design of settling chambers and cyclones. Venturis and other wet cleaning equipment. Bag filters. Electrostatic precipitators. Incinerators, adsorption and absorption equipment.

## Dissertation: Control 890 (CBC 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Dissertation: Control engineering 890 (CBH 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Biochemical engineering 310 (CBI 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CIR 211), (CHM 215) |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Characterisation and taxonomy of biological material. Biochemistry and the chemistry of life. Biological growth requirements, metabolism, growth kinetics and product formation. Enzyme chemistry and kinetics, basic stoichiometry of biological reactions as well as mass - and energy balances for these processes using a chemical engineering approach. Biological reactor, operation and downstream processing.

## Multivariable control system design 700 (CBO 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Control Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

## Multivariable control system design 707 (CBO 707)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

## Bioprocessing 732 (CBP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Description of industrial biotechnology in a process engineering environment. Focus on specific applications in the mining, agricultural, paper and pulp, medical, pharmaceutical, veterinary, brewing and food industries. Principles including implications of bio-prospecting, bio-safety, inoculum production, aseptic growth, quality control and product formulation as applicable to bio-processes. Fermentation with various microbial groups, bio-leaching, gene transfer, solid-substrate fermentation, enzymatic catalysis and immunology. Bioreactors, batch and continuous processing. Bio-remediation.

## Multivariable control system theory 700 (CBT 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Control Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Multivariable control system theory 707 (CBT 707)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Thesis: Chemical technology 990 (CCT 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Principles of environmental engineering 780 (CEM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Environmental Engineering<br>BEngHons Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Engineering principles for environmental preservation and management, pollution control, life-cycle assessment, interactions in the macro and micro-environments, global and ecological systems, social-economic factors in environmental systems, predictive models for the current and future environment, environmental engineering as the driver of economic systems.

## Principles of environmental engineering 787 (CEM 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Environmental Technology |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Engineering principles for environmental preservation and management, pollution control, life-cycle assessment, interactions in the macro and micro-environments, global and ecological systems, social-economic factors in environmental systems, predictive models for the current and future environment, environmental engineering as the driver of economic systems.

## Thesis: Environmental technology 990 (CET 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Fluoro-materials science research and technology 732 (CFT 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

## General chemistry 171 (CHM 171)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electronic Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Mining Engineering |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 1 practical per week, 1 web-based period per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

General introduction to inorganic, analytical and physical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities and solutions, atomic structure, periodicity. Molecular structure and chemical bonding using the VSEPR model. Principles of reactivity, electrochemistry, energy and chemical reactions, entropy and free energy. Appropriate tutorial classes and practicals.

## General chemistry 172 (CHM 172)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 1 practical per week, 1 web-based period per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 2 |

**Module content**

General introduction to inorganic, analytical and physical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities and solutions, atomic structure, periodicity. Molecular structure and chemical bonding using the VSEPR model. Principles of reactivity, electrochemistry, energy and chemical reactions, entropy and free energy.
Appropriate tutorial classes and practicals.

## General chemistry 181 (CHM 181)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | CHM 171 |
| **Contact time** | 1 discussion class per week, 1 practical per week, 1 web-based period per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 2 |

**Module content**

General physical-analytical chemistry: Physical behaviour of gases, liquids and solids, intermolecular forces, solutions, chemical equilibrium, acids and bases, buffers, precipitation. Organic chemistry: Structure (bonding) and functional groups, nomenclature, isomerism, introductory stereo-chemistry, introduction to chemical reactions and chemical properties of organic compounds.
Appropriate tutorial classes and practicals.

## Chemistry 215 (CHM 215)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | CHM 171 or CHM 172 and CHM 181 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

Organic chemistry. Chemical properties of organic (including aromatic) compounds. Functional group transformation and synthesis.

## Chemistry 226 (CHM 226)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | CHM 171 or CHM 172 and CHM 181 |
| **Contact time** | 2 lectures per week, 6 ppw |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 2 |

**Module content**

Theory: Introduction to instrumental chemical analysis. Integration of electronic, chemical, optical and computer principles for the construction of analytical instrumentation. Detail discussion of principles and some instrumental methods from three disciplines within analytical chemistry, namely electrochemistry, spectroscopy and chromatography. This includes potentiometry, (AA) atomic absorption-, (ICP) atomic emission-, ultraviolet (UV)-, and infrared (IR) spectroscopy, potentiometric and photometric titrations, gas chromatography, liquid chromatography as well as combinations of these techniques. Practical: IR spectroscopy, UV spectroscopy, AA spectroscopy, potentiometric titration, gas chromatography.

## Information literacy 121 (CIL 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

*No exemption examination

Why computers matter to you? Networking. Information resources (including the Department of Library Services). Quality of information. Ethics, plagiarism and copy right. Searching the Internet. Information-seeking srategies. Location and access. Specific search environments (including all electronic databases and journals in the Department of Library Services applicable to the relevant faculties). Referencing techniques. Use, synthesis and evaluation of information. New trends. Content specific to the University of Pretoria.

## Chemical engineering materials 210 (CIM 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CHM 181 |
| **Contact time** | 2 lectures per week, 2 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the synthesis, processing, structure, physical properties, and technical performance of important engineering materials: metals, ceramics, polymers and composites. Structural, mechanical, thermodynamic, and design related issues important to chemical engineering applications. Materials specification with emphasis on the corrosion of metals and life time estimation for polymer components.

## Chemical engineering design 320 (CIO 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CTD 223), SWK 210, (COP 311) |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Steady and unsteady state conductive heat transfer in one to three dimensions. Temperature distributions. Convective heat transfer. Application of boundary layer theory. Determination of film coefficients. Design of heat transfer equipment. Radiant heat transfer. Application of the mechanical energy balance to single phase Newtonian fluids in steady state systems. Adjustment for multiphase, non-Newtonian as well as pulsating systems. Orifice design. Optimal economic choice of pipe diameters, pumps and control valves.

## Process integration 732 (CIP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |

| | |
|---|---|
| **Programmes** | BEngHons Chemical Engineering<br>BEngHons Water Utilisation Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 44 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Chemical engineering 113 (CIR 113)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Dimensions, units and their conversion. The mol unit, density, concentration. Specific volume, bulk density, density of ideal mixtures. Temperatures and conversions. Pressure, absolute and gauge. Expression of concentration. Empirical formulae. Introduction to material balances: strategy for solving problems. Material balances without chemical reaction. Combinations of equipment.

## Chemical engineering 123 (CIR 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CIR 113, CHM 171 GS |
| **Contact time** | 2 lectures per week, 2 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Chemical reaction and stoichiometry, excess reactant, conversion, yield, selectivity. Material balances with recycle streams, bypass streams and purge streams. Gases, vapours and liquids: ideal gas law, SG and density of gases, $Nm^3$. Material balances where gases are involved. Fuels and combustion: coal analysis, combustion calculations.

## Chemical engineering 211 (CIR 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CIR 123 |
| **Contact time** | 3 lectures per week, 3 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Vapour pressure, phase changes, equilibrium. Vapour/gas equilibrium; Henry’s law. Enthalpy and enthalpy balances. Heat of reaction. Data and data sources, steam tables. Enthalpy and combustion; flame temperature. Heats of solution and mixing. Miscible and immiscible liquid mixtures; dew point, bubble point. Simultaneous mass and enthalpy balances. PVT properties of real gases, PVT-diagrams of pure compounds. Vapour liquid equilibrium for ideal mixtures (Raoult's law).

## Chemical engineering 310 (CIR 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CTD 223), CHM 215 |
| **Contact time** | 2 lectures per week, 2 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Fundamentals of phase and chemical equilibrium with emphasis on vapour/liquid systems leading to the study of separations and reacting systems. Concepts and formalism of thermodynamics. Postulates and laws of thermodynamics. Thermodynamic functions (enthalpy, entropy, Gibbs free energy). Thermochemistry and Ellingham diagrams. Phase Equilibria: Phase diagrams of single substances, phase boundaries, the Phase Rule. Phase diagrams of mixtures, steam distillation, eutectic mixtures. Solution thermodynamics: Ideal and non-ideal solutions, excess properties and activity coefficient models. The equations of state of ideal and real gases, residual properties and fugacity. Vapour-liquid equilibrium from equations of state and the approach. Application of thermodynamics to equilibrium between fluid- (gas and liquid) and condensed (liquid and solid) phases. Chemical reaction equilibrium.

## Chemical engineering 702 (CIR 702)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Chemical engineering 707 (CIR 707)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Chemical Engineering 787 (CIR 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Chemical engineering 807 (CIR 807)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Dissertation: Chemical engineering 890 (CIR 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Thesis: Chemical engineering 990 (CIR 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Chemical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Thesis: Environmental engineering 991 (CIR 991)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |

| | |
|---|---|
| **Period of presentation** | Year |

## Professional and technical communication 310 (CJJ 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CIR 123 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Effective communication with engineering and technical audiences, as well as with the community at large, is taught. The emphasis is on written documentation. Formal communication is characterised by: the use of appropriate language and style; effective structuring of information; the use of modern electronic communication technologies, with emphasis on word processing, spreadsheets, appropriate email protocols, effective use of graphic information, effective and correct presentation of numerical data, correct referencing methods, seamless inclusion of mathematics expressions, tables, diagrams and appendices in written work; appropriate methods for levelling communication to the requirements of the target audience.

## Kinetics 321 (CKN 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CTD 223) |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Batch reactors; basic reaction kinetics; fitting of experimental reaction data; flow reactor basics.

## Environmental nanomaterials 732 (CKO 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to nanotechnology, industrial production of nanomaterials, physico-chemical properties of nanomaterials, identification of nanomaterials sources (point vs diffuse sources) to aquatic systems. Fate, behaviour and transport of nanomaterials in different environmental media (freshwater, sediments, wastewater, and soil). Fractal theory and transformation pathways of nanomaterials: chemical, biological, physical and interactions with macromolecules transformations. Nanoecotoxicology: concept of toxicity within nanomaterials regime, nanomaterials toxicity tests (acute vs. chronic toxicity), mechanisms of nanomaterials toxicity, biocompatibility of nanomaterials, bioaccumulation and persistence. Risk assessment paradigm: Hazard identification (production volumes, material flows, nanowastes generation, bioaccumulation, long-range transport, and persistence), hazard characterization (in vitro vs. in vivo studies, adverse outcome pathways), exposure assessment (life cycle assessment and environmental uptake), risk assessment, and risk management (regulation, nanowastes and by-products management protocols). Sustainable nanotechnology paradigm: safe-by-design concept, risk modelling and predictions.

## Laboratory 321 (CLB 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CJJ 310/CJJ 210, CHM 226, CPN 321#, CKN 321#, (CMO 310), CIO 320# |
| **Contact time** | 2 lectures per week, 8 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Laboratory safety and general industrial safety practices. Techniques for planning of experiments. Experimental work illustrating: Analysis: Composition of coal and gas, heat of combustion, viscosity. Mass transfer: Gas absorption, batch distillation, azeotropic distillation, fractional distillation and liquid-liquid extraction. Heat transfer: Condenser, shell and tube heat exchanger, heat loss from insulated pipes. Piping system design: Frictional energy loss through pipes and fittings. Measuring equipment: Rate of flow, temperature. Reporting of laboratory results.

## Model-based control laboratory 732 (CML 732)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Control Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 12 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Mass transfer 310 (CMO 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CTD 223), COP 311# |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Separation by means of equilibrium stages. Design of flash distillation systems, distillation columns, absorbers and strippers by hand and computer calculations. Design of membrane separation systems.

## Carbon materials science research and technology 732 (CMS 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## General chemistry 117 (CMY 117)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BDietetics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Culinary Science<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geology<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Medical Sciences<br>BSc Meteorology<br>BSc Microbiology<br>BSc Nutrition<br>BSc Physics<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |
| **Prerequisites** | A candidate must have Mathematics for at least 60% and 60% for Physical Sciences. |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

General introduction to inorganic, analytical and physical chemistry. Atomic structure and periodicity. Molecular structure and chemical bonding using the VSEOR model. Nomenclature of inorganic ions and compounds. Classification of reactions: precipitation, acid-base, redox reactions and gas-forming reactions. Mole concept and stoichiometric calculations concerning chemical formulas and chemical reactions. Principles of reactivity: energy and chemical reactions. Physical behaviour gases, liquids, solids and solutions and the role of intermolecular forces. Rate of reactions: Introduction to chemical kinetics.

## General chemistry 127 (CMY 127)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BDietetics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Culinary Science<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geology<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Medical Sciences<br>BSc Meteorology<br>BSc Microbiology<br>BSc Nutrition<br>BSc Physics<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |

| | |
|---|---|
| **Prerequisites** | Natural and Agricultural Sciences students: CMY 117 GS or CMY 154 GS Health Sciences students: none |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 2 |

**Module content**

Theory: General physical-analytical chemistry: Chemical equilibrium, acids and bases, buffers, solubility equilibrium, entropy and free energy, electrochemistry. Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds.

## Chemistry 133 (CMY 133)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | As for BSc Four-year programme |
| **Contact time** | 2 lectures per week, 3 discussion classes per week, Fortnightly practicals, Foundation Course |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

The field of Chemistry – an overview; Mathematics in Chemistry; atomic theory: historical overview; atoms, molecules and ions; relative atomic mass; electronic structure of atoms; the periodic table; periodicity; chemical bonding.

## Chemistry 143 (CMY 143)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | CMY 133 |
| **Contact time** | 2 lectures per week, 3 discussion classes per week, Fortnightly practicals, Foundation Course |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

Bonding and molecular geometry: VSEPR theory; bonding and organic compounds (structural formulas, classification and nomenclature); matter and its properties; mole concept; reaction stoichiometry; reactions in aqueous solutions: precipitation, acid base and redox.

## Chemistry 154 (CMY 154)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | CMY 133 and CMY 143 |
| **Contact time** | 2 tutorials per week, 3 lectures per week, Foundation Course, fortnightly practicals |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Semester 1 |

**Module content**

Principles of reactivity: energy and chemical reactions. Physical behaviour of gasses, liquids, solids and solutions and the role of intermolecular forces. Rate of reactions: Introduction to Chemical kinetics. Introduction to chemical equilibrium. Introduction to organic chemistry: hybridisation, isomers (structural, geometrical and conformational), additions reactions and reaction mechanisms.

## Physical chemistry 382 (CMY 382)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |

| | |
|---|---|
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | CMY 282, CMY 283, CMY 284 and CMY 285 |
| **Contact time** | 1 discussion class per week, 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Quarter 4 |

**Module content**

Theory: Molecular quantum mechanics. Introduction: Shortcomings of classical physics, dynamics of microscopic systems, quantum mechanical principles, translational, vibrational and rotational movement. Atomic structure and spectra: Atomic hydrogen, multiple electron systems, spectra of complex atoms, molecular structure, the hydrogen molecule ion, diatomic and polyatomic molecules, structure and properties of molecules. Molecules in motion: Viscosity, diffusion, mobility. Surface chemistry: Physisorption and chemisorption, adsorption isotherms, surface tension, heterogeneous catalytic rate reactions, capillarity.

## Analytical chemistry 383 (CMY 383)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | CMY 282, CMY 283, CMY 284 and CMY 285 |
| **Contact time** | 1 discussion class per week, 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Quarter 1 |

**Module content**

Theory: Separation methods: Extraction, multiple extraction, chromatographic systems. Spectroscopy: Construction of instruments, atomic absorption and atomic emission spectrometry, surface analysis techniques. Mass spectrometry. Instrumental electrochemistry.

## Organic chemistry 384 (CMY 384)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | CMY 282, CMY 283, CMY 284 and CMY 285 |

| | |
|---|---|
| **Contact time** | 1 discussion class per week, 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemistry |
| **Period of presentation** | Quarter 3 |

**Module content**

Theory: NMR spectroscopy: applications. Aromatic chemistry, Synthetic methodology in organic chemistry. Carbon-carbon bond formation: alkylation at nucleophilic carbon sites, aldol and related condensations, Wittig and related reactions, acylation of carbanions (Claisen condensation).

## Transfer processes 311 (COP 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | WTW 238, (WTW 263) |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Momentum transfer. Fluid statics. Control volume approach for conservation of mass, energy, and momentum. Application to pumps and turbines. Navier-Stokes equations, derivation and applications. Laminar and turbulent boundary layer theory. Heat transfer: fundamentals of heat transfer. Differential equations of heat transfer. Steady state conduction. Introduction to unsteady state conduction. Convection heat transfer and the thermal boundary layer. Radiation heat transfer. Mass transfer: fundamentals of mass transfer. Diffusion and the diffusion coefficient. Differential equations of mass transfer. Steady state molecular diffusion in one or more dimensions.

## Program design: Introduction 110 (COS 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom Statistics<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Extended programme - Mathematical Sciences<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | COS 132 , COS 151 and Maths level 5 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

The focus is on object-oriented (OO) programming. Concepts including inheritance and multiple inheritance, polymorphism, operator overloading, memory management (static and dynamic binding), interfaces, encapsulation, reuse, etc. will be covered in the module. The module teaches sound program design with the emphasis on modular code, leading to well structured, robust and documented programs. A modern OO programming language is used as the vehicle to develop these skills. The module will introduce the student to basic data structures, lists, stacks and queues.

## Operating systems 122 (COS 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 132 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

Fundamental concepts of modern operating systems in terms of their structure and the mechanisms they use are studied in this module. After completing this module, students will have gained, as outcomes, knowledge of real time, multimedia and multiple processor systems, as these will be defined and analysed. In addition, students will have gained knowledge on modern design issues of process management, deadlock and concurrency control, memory management, input/output management, file systems and operating system security. In order to experience a hands-on approach to the knowledge students would have gained from studying the abovementioned concepts, students will have produced a number of practical implementations of these concepts using the Windows and Linux operating systems.

## Imperative programming 132 (COS 132)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom Statistics<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BIS Multimedia<br>BIT<br>BSc Actuarial and Financial Mathematics<br>BSc Computer Science<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | APS of 30 and level 5 (60-69%) Mathematics |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module introduces imperative computer programming, which is a fundamental building block of computer science. The process of constructing a program for solving a given problem, of editing it, compiling (both manually and automatically), running and debugging it, is covered from the beginning. The aim is to master the elements of a programming language and be able to put them together in order to construct programs using types, control structures, arrays, functions and libraries. An introduction to object orientation will be given. After completing this module, the student should understand the fundamental elements of a program, the importance of good program design and user-friendly interfaces. Students should be able to conduct basic program analysis and write complete elementary programs.

## Introduction to computer science 151 (COS 151)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics |

| | |
|---|---|
| **Service modules** | Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | APS of 30 and level 5 (60-69%) Mathematics. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module introduces concepts and terminology related to the computer science discipline. General topics covered include the history of computing, machine level representation of data, Boolean logic and gates, basic computer systems organisation, algorithms and complexity and automata theory. The module also introduces some of the subdisciplines of computer science, such as computer networks, database systems, compilers, information security and intelligent systems. The module also focuses on modelling of algorithms.

## Theoretical computer science 210 (COS 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 and COS 151 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module introduces students to a framework for investigating both computability and complexity of problems. Topics include, but are not limited to: finite-state machines, regular expressions and their application in a language such as awk, the Halting problem, context-free grammars, P vs NP problem, NP-complete class, reduction techniques, regular languages, DFAs and NFAs, Lattices, Church-Turing thesis.

## Data structures and algorithms 212 (COS 212)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

Data abstraction is a fundamental concept in the design and implementation of correct and efficient software. In prior modules, students are introduced to the basic data structures of lists, stacks and queues. This module continues with advanced data structures such as trees, hash tables, heaps and graphs, and goes into depth with the algorithms needed to manipulate them efficiently. Classical algorithms for sorting, searching, traversing, packing and game playing are included, with an emphasis on comparative implementations and efficiency. At the end of this module, students will be able to identify and recognise all the classical data structures; implement them in different ways; know how to measure the efficiency of implementations and algorithms; and have further developed their programming skills, especially with recursion and polymorphism.

## Software modelling 214 (COS 214)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 212 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

The module will introduce the concepts of model-driven analysis and design as a mechanism to develop and evaluate complex software systems. Systems will be decomposed into known entities, such as design patterns, classes, relationships, execution loops and process flow, in order to model the semantic aspects of the system in terms of structure and behaviour. An appropriate tool will be used to support the software modelling. The role of the software model in the enterprise will be highlighted. Students who successfully complete this module will be able to concep-tualise and analyse problems and abstract a solution.

## Netcentric computer systems 216 (COS 216)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module will introduce the student to netcentric systems by focusing on the development of systems for the web, mobile devices and the cloud.  To lay the foundation on which the rest of the module can follow, traditional web-based programming languages such as HTML5, JavaScript, CSS and Python will be covered differentiating between client-side and server-side computation.  Persistence of web-based data will be included for both client and server-based computation.  These technologies will be extended and applied to mobile platforms where the availability of a connection, location-services and mobile device limitations play a role.  For cloud platforms, aspects relating to task partitioning, security, virtualisation, cloud storage and access to the shared data stores, data synchronisation, partitioning and replication are considered. In order to practically demonstrate that a student has reached these outcomes, students will be required to use, integrate and maintain the necessary software and hardware by completing a number of smaller practical assignments where after integrating all these technologies into a comprehensive and practical programming project is required.

## Introduction to database systems 221 (COS 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module will expose students to the evolution of databases systems. They will be able to model data conceptually, in terms of models such as conceptual, relational, object oriented, graph-based and network and the mapping between models, in particular between the conceptual and relational model. Foundational concepts relating to the relational model will be considered, such as: entity and referential integrity, relational algebra and calculus, functional dependency, normals forms, Indexing of database systems and transaction processing will also form an integral part of the curriculum. The physical data representation of the databases system both in memory and within the file system of the operating system will be considered.

## Concurrent systems 226 (COS 226)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIS Multimedia<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 122 and COS 212 |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

Computer science courses mostly deal with sequential programs. This module looks at the fundamentals of concurrency; what it means, how it can be exploited, and what facilities are available to determine program correctness. Concurrent systems are designed, analysed and implemented.

## Computer organisation and architecture 284 (COS 284)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 212 GS |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module provides the foundations on which other modules build by enabling a deeper understanding of how software interacts with hardware. It will teach the design and operation of modern digital computers by studying each of the components that make up a digital computer and the interaction between these components. Specific areas of interest, but not limited to, are: representation of data on the machine-level; organisation of the machine on the assembly level; the architecture and organisation of memory; inter- and intra-component interfacing and communication; data paths and control; and parallelism. Topic-level detail and learning outcomes for each of these areas are given by the first 6 units of ‘Architecture and Organisation’ knowledge area as specified by the ACM/IEEE Computer Science Curriculum 2013.
The concepts presented in the theory lectures will be reinforced during the practical sessions by requiring design and implementation of the concepts in simulators and assembly language using an open source operating system.

## Software engineering 301 (COS 301)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 27.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 212 and COS 214 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

**Module content**

The module exposes students to problems associated with software development on an industrial scale. Overall goals of the module are: to become familiar with the latest trends in software engineering; to understand the software engineering process and to appreciate its complexity; to be exposed to a variety of methodologies for tackling different stages of the software lifecycle; to understand and apply the concepts of systems administration and maintenance; to complete the development of a fairly large object orientation-based software product. The focus of the module is on a project that lasts the whole year. The project is completed in groups of approximately four (4) students and teaches students to take responsibility for a variety of roles within a group, and to understand the different requirements for these; to experience the advantages and problems of working in a group; professionalism with regards to particularly colleagues and clients.
After the successful completion of this module, the student will be able to: understand the psychology of a client; work in groups; and have an appreciation for planning, designing, implementing and maintaining large projects. These qualities should place the students in a position in which they are able to handle software development in the corporate environment.

## Artificial intelligence 314 (COS 314)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

The main objective of this module is to introduce a selection of topics from artificial intelligence (AI), and to provide the student with the background to implement AI techniques for solving complex problems.
This module will cover topics from classical AI, as well as more recent AI paradigms. These topics include: search methods, game playing, knowledge representation and reasoning, machine learning, neural networks, genetic algorithms, artificial life, planning methods, and intelligent agents. In the practical part of this module, students will get experience in implementing
(1) game trees and evolving game-playing agents;
(2) a neural network and applying it to solve a real-world problem; and
(3) a genetic algorithm and applying it to solve a real-world problem.

## Database systems 326 (COS 326)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 221 |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module builds on a prior introductory module on database technology and provides more advanced theoretical and practical study material for managing large volumes of data, for example, noSQL database systems and MapReduce. The module will consider file system models, for example Hadoop, relevant for big data storage, manipulation at scale, mining and visualisation.  Basic knowledge of parallel decomposition concepts will be included.

## Computer security and ethics 330 (COS 330)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module develops an appreciation of the fundamentals and design principles for information assurance and security. Students will develop a clear understanding of the basic information security services and mechanisms, enabling them to design and evaluate the integration of solutions into the user application environment. Emphasis will be placed on services such as authorisation and confidentiality. Students will acquire knowledge and skills of Security Models such as the Bell-LaPadula, Harrison-Ruzzo Ullman and Chinese Wall Model. Students will develop a detailed understanding of the confidentiality service by focusing on cryptology and the practical implementation thereof. The student will be introduced to professional and philosophical ethics. At the end of the module students will be able to engage in a debate regarding the impact (local and global) of computers on individuals, organisations and society. The professionalism of IT staff will be discussed against national and international codes of practices such as those of the CSSA, ACM and IEEE.

## Computer networks 332 (COS 332)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 216 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

The objective of this module is to acquaint the student with the terminology of communication systems and to establish a thorough understanding of exactly how data is transferred in such communication networks, as well as applications that can be found in such environments. The study material includes: concepts and terminology, the hierarchy of protocols according to the OSI and TCP/IP models, protocols on the data level, physical level and network level as well as higher level protocols. The practical component of the module involves programming TCP/IP sockets using a high level language. The emphasis throughout is on the technical aspects underlying the operation of networks, rather than the application of networks.

## Programming languages 333 (COS 333)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

Programming languages are the backbone for software development. Each language has its own different syntax and semantics, but there are many common concepts that can be studied and then illustrated through the languages. The module concentrates on issues of object orientation, including delegation, iteration and polymorphism. It surveys how languages provide the basic building blocks for data and control, as well as exception handling and concurrency. At the end of the module, students will be able to appreciate the rich history behind programming languages, leading to independent principles that evolve over time. They will be skilled at using a variety of programming languages, including new paradigms such as functional, logical and scripting, and will know how to learn a new language with ease. From this experience, they will be able to apply evaluation criteria for choosing an appropriate programming language in a given scenario.

## Compiler construction 341 (COS 341)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science |
| **Prerequisites** | COS 211 and COS 212 |
| **Contact time** | 1 practical per week, 2 lectures per week |

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|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module will introduce the student to the fundamentals of compiler construction. These include: the structural difference between a high-level and a von-Neumann language, the meaning of syntax and semantics and what semantics-preserving correctness means; the concepts of regular expressions, finite automata, context-free grammars in the context of programming languages; the need to construct parse-trees for given programmes; the application of data structures and algorithms for the purpose of code-analysis, code-optimisation and register-allocation; and the limits of code-analysis in terms of undecideability and the halting problem.
After successful completion of the module, the student will have an understanding of the importance of compilers and will understand how to implement a compiler, in terms of its components, the scanner, parser, type checker and code-generator for a given grammar.

## Computer graphics 344 (COS 344)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Prerequisites** | COS 110 and WTW 124 or WTW 146 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

**Module content**

The aim of this module is to acquire a sound knowledge of the basic theory of interactive computer graphics and basic computer graphics programming techniques. The theory will cover graphics systems and models, graphics programming, input and interaction, geometric objects and transformations, viewing in 3D, shading, rendering techniques, and introduce advanced concepts, such as object-oriented computer graphics and discrete techniques. The module includes a practical component that enables students to apply and test their knowledge in computer graphics. The OpenGL graphics library and the C programming language will be used for this purpose.

## Research report 700 (COS 700)

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|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Computer Science |

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|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

**Module content**

This module requires the student to conduct independent research under supervision of a staff member on a topic agreed upon by the student and staff member. The module consists of two parts: Research methods and the project. During the first semester, formal lectures will be presented on best research practices (counting 10 credits). The project (counting 20 credits) involves application of the taught research methods to complete a research project. The project serves as an opportunity for the student to explore one of the department's areas of research in greater depth. The end product may be a new piece of software, a model or an algorithm, or an extension of these. It could be an experimental, or theoretical piece of reasoning. The final outcome of the project is a technical report.

## Artificial intelligence (I) 710 (COS 710)

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|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module focuses on two Computational Intelligence paradigms, namely Evolutionary Computation and Swarm Intelligence. Within the Evolutionary Computation paradigm, algorithmic models of Darwinian evolution will be studied, including genetic algorithms, genetic programming, evolutionary strategies, evolutionary programming, differential evolution, cultural algorithms and co-evolution. Within the Swarm Intelligence paradigm algorithm models of social organisms found in nature will be studied, including ant algorithms and particle swarm optimisation. These algorithms will mostly be studied in the context of complex optimisation problems, including multi-objective optimisation, dynamic environments, constraints, and finding multiple solutions. Prior knowledge assumed include good programming skills and an undergraduate module in calculus.

## Artificial Intelligence (II) 711 (COS 711)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |

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|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module focuses on three Computational Intelligence paradigms, namely Artificial Neural Networks, Artificial Immune Systems, and Fuzzy Systems. Within the Artificial Neural Networks paradigm algorithmic models of neural learning will be studied, including supervised, unsupervised, and reinforcement learning. Aspects that influence the performance of artificial neural networks will be studied in depth. Within the Artificial Immune Systems paradigm algorithm models of different views of the human biological immune system will be studied, including negative selection, clonal selection, network theory and danger theory models. The Fuzzy Systems paradigm include models of reasoning with uncertainty, specifically fuzzy logic and rough sets. Prior knowledge assumed include good programming skills and an undergraduate module in calculus.

## Computer and information security (I) 720 (COS 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module focuses on state-of-the-art security topics that are current and relevant to industry. The curriculum for the module is determined annually to reflect the current research directions as pursued by the information and Computer Security Architectures (ICSA) research group. The main topics include, but are not limited to: Applied security, including operating system security, secure coding, and cryptography; Trust and trust management systems; Privacy and privacy-enhanced technologies; Social Engineering. Students will be challenged to contribute innovative research ideas in the field of Computer Security by completing a number of mini projects such as writing research papers and writing software programs.

## Computer and information security (II) 721 (COS 721)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |

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|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module focuses on state-of-the-art information security topics that are current and relevant to industry. The curriculum for this module is annually determined to reflect the current research directions as pursued by the Information and Computer Security Architectures (ICSA) research group. The main topics include, but are not limited to: Information security management, including policies, standards and procedures; Risk management; Privacy; Ethics; Legal issues in Information Security; Information security services and technologies. Students will be challenged to contribute innovative research ideas in the field of Information Security Management by completing a number of mini projects such as writing research papers and writing software programs.

## Software engineering (I) 730 (COS 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers various perspectives of Software Engineering theory and practices. It provides an overview both of the challenges in contemporary software engineering (such as scale, complexity and urgency) and of the recommended practices for overcoming these challenges. It will familiarise students with both the historical and current theories about activities for the design, development, deployment and ongoing operation of software. It will show how these activities aim to be predictable, repeatable, robust, value-producing, and how they aim to meet the specified requirements for the intended system users. It will also emphasise that standardisation and reuse can be important factors in successfully engineering software. The module assumes prior knowledge about Software Engineering at the level of an introductory/undergraduate module.

## Software engineering (II) 731 (COS 731)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module discusses software architecture, including the representation of designs, definitions, styles and patterns of architecture. Its themes include model-driven architecture, formal modelling and analysis, and architectural description languages. The module will show that the architecture of a software system is determined by the collection of significant design decisions made early on in the development of that system – decisions concerning the components comprising the system, repeating-patterns of system-wide aspects, and the platforms on which the system will be built. It will discuss how, once these decisions are made and subsequently followed, they end up profoundly affecting the development, deployment, use and ongoing enhancement of that system. The module assumes that the student is familiar with software development lifecycle concepts, and that she/he has been part of at least one significant software development effort. Those who have not completed COS730 will be provided additional background.

## Formal aspects of computing (I) 740 (COS 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The focus of this module is on a formal approach to deriving algorithms, known as “correctness by construction”. It relies on Dijkstra's guarded command language (GCL) for specifying the derived algorithms. The requirements of an algorithm are initially stated in terms of a pre- and a post-condition, specified in first order predicate logic. Strategies are given for progressively refining these specifications to GCL notation which can, in turn, easily be translated into a conventional programming language. The surprising power of the method will be demonstrated. Not only are algorithms guaranteed to be correct (in the same sense that the proof of a mathematical theorem is guaranteed to be correct); they frequently turn out to be remarkably efficient. In the early part of the module, a number of well-known algorithms (such as linear and binary search, raising a number to an integer power, finding the approximate log of a number, etc) will be derived in order to become thoroughly familiar with the approach. Later various intermediate level algorithms will be derived (such as simple raster drawing algorithms, pattern matching algorithms, finding the longest string of a certain type, an algorithm to solve the majority voting problem, etc). Finally, the method will be used to derive state-of-the-art algorithms to minimize finite automata and to construct formal concept lattices. The theory necessary to understand these topics will be provided. The value-objectives of the module are: to develop an appreciation that theory can be effectively deployed to solve practical problems; to value the elegance of the algorithmic solutions; and to value a correctness-by-construction mindset over one that is content with debugging into correctness. A basic understanding is assumed of first order predicate logic, as well as competency in mathematical reasoning.

## Formal aspects of computing (II) 741 (COS 741)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The status of Computer Science, including software science, as a proper “science” is closely related with our ability to construct accurate and precise models of the structures and processes of computational systems. The precision of these models is closely related with our ability to express them in formal notations with mathematical rigour, such that it also becomes possible to reason formally about relevant and interesting properties of these models. Examples of such interesting properties are logical consistency (i.e. absence of inherent contradictions), or safety properties such as deadlock freeness. This modules focuses on formal languages and techniques which are suitable for such purposes. Of particular importance are process algebras with which systems of parallel and concurrent computation can be formally described. Other suitable formalisms may be discussed as well, such that the contents of this module may slightly vary from year to year.

## Educational software development 750 (COS 750)

| | |
|---|---|
| **Qualification** | Postgraduate |

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|---|---|
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module provides the foundation to evaluate and develop educational software. It will introduce didactic principles applicable to the discipline of Computer Science. Using these principles, educational software, such as tools for teaching programming, on-line testing software, and adaptive software to name a few, can be evaluated and developed. Computer Science topics of interest are: programming environments, persistence of information and knowledge, knowledge representation etc.

## Data mining 781 (COS 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Data mining is the extraction of novel knowledge, or hidden patterns, from large data bases. The focus of this course is on how the computational intelligence techniques (such as evolutionary algorithms, swarm algorithms and neural networks) can be used for knowledge extraction. In addition, traditional machine learning techniques (such as decision trees and rule induction) will be covered. The pre-processing of data in preparation for data mining algorithms, as well as the post-processing of results after data mining, will be discussed. Exploratory data analysis and statistical data mining methods are also investigated. Finally, some attention will be given to more modern problems, such as the extraction of hidden knowledge from unstructured data, such as text and images. It is highly recommended that students do COS710 and COS711, as knowledge of these modules are assumed.

## Generic programming 782 (COS 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |

| | |
|---|---|
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module introduces the concepts of generic programming in order to generate code at compile-time. Of particular interest is the automatic generation of design pattern implementations at compile-time for use at run-time. To this end, design patterns and compile-time programming techniques such as: basic compile-time programming constructs, object allocation, generalised functors, smart pointer and multi-methods are discussed in detail and applied to design patterns.

## Digital forensics and investigations 783 (COS 783)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module will teach the basic theoretical concepts of digital forensic investigations. This module is designed to prepare a student for a wide range of people including, but not limited to, law enforcers, crime investigators and people responsible for internal incident investigations in larger organisations. Digital forensics is a relatively new and upcoming field. It is a field that is not well known by most organisations and therefore, such organisations are ill informed about the digital forensic processes required to conduct a successful digital forensic investigation. The large number of digital devices used to commit crimes or other related incidents, such as fraud and corruption, proved motivation for this module in order to investigate and combat these incidents successfully. The main topics covered, but not limited to, include: An introduction to Digital Forensics; Digital forensic processes; Hardware forensics; Digital forensics tools (software forensics); Forensic readiness; A digital forensics laboratory/facility; Network forensics; Live forensics; Professionalism and ethics in digital forensics; Cyber forensics; Cyber law. Students will be challenged to contribute innovative research ideas in the field of Digital Forensics by completing a number of mini projects such as writing research papers and writing software programs.

## Computer networks 784 (COS 784)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers computer networking principles and the operation of the TCP/IP protocol suite. The module includes studying the operation of relevant protocols, administration of network services, troubleshooting, as well as network design issues and challenges. Prior knowledge is assumed on basic data communications principles, the ISO OSI reference model, and the basic operation of protocols in the TCP/IP protocol suite.

## Computer graphics 785 (COS 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module is intended as an advanced module in real-time computer graphics and shader programming. The module includes the following topics: Advanced texture mapping, curves and curved surfaces, shadow mapping, skeletal animation, particle systems, ray tracing and collision detection. The module assumes prior knowledge of introductory graphics as presented in an undergraduate module and a working knowledge of linear algebra and calculus.

## Parallel and distributed computing 786 (COS 786)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Computational science relies on the analysis of often complex models, for its empirical data and analyses typically involve an enormous amount of calculations. Parallel computing is one means of reducing the time needed to complete such calculations. This module will examine the kinds of problems that lend themselves to parallel computation and the methods for implementing programs to solve such problems. The aim of the module is to provide a background for parallel and distributed computing as well as practical knowledge of the implementation of computational experiments.

## Spatial databases 787 (COS 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT<br>BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers the major themes of spatial databases with application to geographic information systems (GIS), i.e. systems concerning data with an implicit or explicit reference to a location relative to the earth. Topics covered include an introduction to spatial databases and spatial data management systems, representation of geographic data, spatial data modelling, computational geometry, spatial data indexing, query processing and spatial data standards. For Computer Science students the module is an introduction to the ever increasing application field of geographics information systems (GIS), and for Geoinformatics students the module provides insight into the Computer Science foundations of the field.

## Information hiding 788 (COS 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Information hiding is a category of computer security that focuses on embedding information in digital objects. Information, such as digital signatures, are sometimes embedded in objects to indicate ownership or origin – a technology that is called watermarking. Alternatively information is sometimes hidden in digital objects to facilitate invisible or inaudible communication – called steganography. Steganography focuses on the confidentiality of information, while watermarking is used to protect intellectual property. This module covers the techniques and algorithms used in both technologies to embed information in objects with minimal perceptual and audible changes to the objects. The module also provides a brief overview of different multimedia formats, such as image, audio and video, in order to understand their potential and limitations in the field of information hiding. Potential attacks on information hiding systems are also investigated.

## Special topics (I) 790 (COS 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

From time to time, the department presents lectures on special topics within Computer Science. This module will be used to present such special topics.

## Special topics (II) 791 (COS 791)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BScHons Computer Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

From time to time, the department presents lectures on special topics within Computer Science. This module will be used to present such special topics.

## Big data science elective 801 (COS 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Big data science elective 802 (COS 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

**Module content**

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Particle technology 410 (CPA 410)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | COP 311 |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Humidification and dehumidification of air. Water cooling, drying, crystallisation, ion exchange, particle technology, particle movement in a fluid, sedimentation. Hydrocyclones, flotation, filtration. Centrifuges. Fluidised bed technology. Mixing. Comminution. Pneumatic transport.

## Process control 410 (CPB 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | CPN 321 GS |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Dynamic properties of equipment, instruments and processes. Mathematical modelling and computer simulation of processes in the time, Laplace and frequency domains. Linearisation and non-linear processes. Stability of control systems. Controller tuning. Methods for process identification. Digital process control. Z-transforms. Use of computers and microprocessors. Introduction to modern control theory: state-space approach. Applied process control. Choice of control instrumentation. Plantwide control strategy. Development of P and IDs.

## Continuing practice development 710 (CPD 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BArchHons<br>BIArchHons<br>BLArchHons |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 1 |

## Continuing practice development 720 (CPD 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BArchHons<br>BIArchHons<br>BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 1 |

## Continuing practice development 730 (CPD 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BArchHons<br>BIArchHons<br>BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 4 |

## Continuing practice development 740 (CPD 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BArchHons<br>BIArchHons<br>BLArchHons |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 3 |

## Continuing practice development 810 (CPD 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | MArch (Professional)<br>MIntArch (Professional)<br>MLArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

## Design project 421 (CPJ 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CPB 410), (CRO 410), BIE 310/BSS 310, CIO 320, CPS 420#, CPR 420# |
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Application of chemical engineering principles for the complete design of a chemical plant.

## Process dynamics 321 (CPN 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CIO 310#, CKN 321# |
| **Contact time** | 3 tutorials per week, 4 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Application of the continuity equations, transport equations and phase relationships to describe time-dependent behaviour of processes. Linearisation and use of transfer functions. Stability analysis, effect of dead time and inverse response. Elements of a control loop. Control principles and mechanisms.

## Product design 732 (CPO 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Polymer processing 732 (CPP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Chemical engineering practice 420 (CPR 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CLB 321 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Design economics and process evaluation. Cost estimation and time-value of money. Control applications, choice of instrumentation and development of a plantwide control strategy. Development of PandID's. Safety: Site plan and layout, area classification, hazard and operability analysis (HAZOP). Occupational Safety and Health Act, Engineering Profession of South Africa Act. Requirements to maintain continued competence and to keep abreast of up-to date tools and techniques. ECSA code of conduct, Continuing Professional Development, ECSA outcomes, ECSA process and reasons for registration as PrEng. Displays understanding of the system of professional development. Accepts responsibility for own actions. Displays judgment in decision making during problem solving and design. Limits decision making to area of current competence. Reason about and make judgment on ethical aspects in case study context. Discerns boundaries of competence in problem solving and design. Case studies typical of engineering practice situations in which the graduate is likely to participate.

## Process synthesis 410 (CPS 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CLB 321, CIR 310 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Development of new processing plants; Evaluating process alternatives; Developing a process flowsheet using a process synthesis approach. Applying thermodynamic principles to obtain an optimal synthesis route. Applications using computer packages.

## Process analysis 420 (CPS 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CPS 410 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Pinch analysis and exergy analysis. Optimisation techniques. Flowsheet optimisation. Economic evaluation of processes. Applications using computer packages.

## Polymer materials science and research 732 (CPW 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Practical training 311 (CPY 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CIR 211) |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

*Attendance module only
At the end of the second year of study, students in Chemical Engineering undergo at least six weeks of prescribed practical training in the industry. The student must also attend all excursions organised during the year by the department. A satisfactory report on the practical training must be submitted to the Faculty Administration within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the Chairman of the School of Engineering.

## Practical training 411 (CPY 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | (CMO 320), CPY 311 |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

*Attendance module only
At the end of the third year of study, students in chemical engineering undergo at least six weeks of prescribed practical training in the industry. The student must also attend all excursions organised during the year by the department. A satisfactory report on the practical training must be submitted to the department within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the chairman of the School of Engineering.

## Bio-reaction engineering 732 (CRH 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

In depth understanding of the important metabolic pathways in microorganisms, black box models for describing stoichiometry of bioreactions, metabolic flux analysis as the basis for metabolic (genetic) engineering, kinetics of microbial conversions and basic bioreactor design.

## Reactor design 410 (CRO 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | CKN 321 GS |
| **Contact time** | 3 tutorials per week, 4 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Heterogeneous catalysis: diffusion in reaction for catalyst pores and different catalyst geometries. Inter and intraparticle heat and mass transfer processes. Reactor design: energy and continuity equation for different types of reactor: stirred tank, pipe, radial flow, slurry and fluidised. Modelling of non-ideal flow in reactors.

## Research orientation 700 (CRO 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

Design, construction and testing of experimental setup. Initial test experiments, calibrations and modifications. Preliminary results. Experimental plan and schedule for the research dissertation. Detailed predictions on anticipated measurements. Directly relevant literature (core essentials taken from CIR 702).

## Reactor design 780 (CRO 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Reactor design 787 (CRO 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

## Research project 411 (CSC 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CLB 321, CPB 410 # and CRO 410 # |
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The execution of a complete literature study and research project on a chosen subject.

## Research project 421 (CSC 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |
| **Prerequisites** | CSC 411 |
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Interpretation of the research results of CSC 411. The writing of a project report and scientific article.

## Separation technology 732 (CSK 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Process control system research and development 732 (CSP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BEngHons Control Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Specialisation 420 (CSS 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | CPJ 421# |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

A module to be selected from the list of available specialisation topics, including Process Control, Chemical Product Design, Environmental Engineering, Nuclear Engineering, Polymer Processing, Reactor Design, and Water Utilisation Engineering.

## Thermodynamics 223 (CTD 223)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | CIR 211, MPR 212/213, (WTW 258) |
| **Contact time** | 3 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Simple applications of the first and second laws of thermodynamics. The concepts of work, heat, enthalpy and entropy. The calculation of internal energy, enthalpy and entropy using the equations of state. Simple heat engine cycles. Refrigeration and gas liquefaction. Process efficiency by means of energy. Introduction to non-ideality in VLE and mixing behaviour.

## Dissertation 800 (CVD 800)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Chemical Engineering<br>MEng Control Engineering<br>MEng Environmental Engineering<br>MEng Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Dissertation 807 (CVD 807)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Chemical Technology<br>MSc Applied Science Control<br>MSc Applied Science Environmental Technology<br>MSc Applied Science Water Utilisation |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Additive technology 732 (CYM 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |

| | |
|---|---|
| **Programmes** | BEngHons Chemical Engineering<br>BScHons Applied Science Chemical Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Design investigation 801 (DIT 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 75.00 |
| **Programmes** | MArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Design investigation 802 (DIT 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 75.00 |
| **Programmes** | MLArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Design investigation 803 (DIT 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 75.00 |
| **Programmes** | MIntArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Architecture |
| **Period of presentation** | Year |

### Mini-dissertation: Design project and discourse 801 (DPD 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

### Mini-dissertation: Design project and discourse 802 (DPD 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MLArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

### Mini-dissertation: Design project and discourse 803 (DPD 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIntArch (Professional) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 6 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

### German: Cultural-professional (1) 113 (DTS 113)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BIS Publishing |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | Grade 12 German |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Comprehensive review of German grammar; development of reading, writing, speaking and understanding skills; analysis and interpretation of tests.

## German: Cultural-professional (2) 123 (DTS 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Publishing |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | DTS 113 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Continuation of comprehensive review of German; further development of reading, writing, speaking and understanding skills; analysis and interpretation of texts.

## German: Intermediate (1) 211 (DTS 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 104 or DTS 113 or DTS 123 (before 2011) or Grade 12 German |
| **Contact time** | 1 lecture per week, 4 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

This module focuses on the further development of communication skills with special emphasis on the receptive activities of the language, namely listening and reading. Careful attention is given to critical aspects of German grammar. Short fictional and non-fictional texts are used for comprehension as well as for demonstrating cultural aspects of the German-speaking countries. This module complies with the requirements for level B1.1 set by the “Common European Framework of Reference for Languages”.

## German: Intermediate (2) 221 (DTS 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 211 |
| **Contact time** | 1 lecture per week, 4 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

This module continues with the development of communicative skills of the language. Special attention is given to the comprehension of non-fictional and literary written texts, spoken and audio-visual inputs, as well as the application of knowledge of German grammar in oral and written production. This module complies with the requirements for level B1.2 set by the “Common European Framework of Reference for Languages”.

## German: Cultural-professional (7) 361 (DTS 361)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 221 or DTS 261, 262, 263 and 264 |
| **Contact time** | 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to German linguistics. This module complies with the requirements for level B2.1 set by the “Common European Framework of Reference for Languages”.

## German: Cultural-professional (8) 362 (DTS 362)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |

| | |
|---|---|
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 221 or DTS 261, 262, 263 and 264 |
| **Contact time** | 1 lecture per week, 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis, interpretation and appropriation of relevant texts from different disciplines. This module complies with the requirements for level B2.1 set by the “Common European Framework of Reference for Languages”.

## German: Cultural-professional (9) 363 (DTS 363)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 221 or DTS 261, 262, 263 and 264 |
| **Contact time** | 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Principles of textual grammar of the German language. This module complies with the requirements for level B2.2 set by the “Common European Framework of Reference for Languages”.

## German: Cultural-professional (10) 364 (DTS 364)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | DTS 221 or DTS 261, 262, 263 and 264 |
| **Contact time** | 1 lecture per week, 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Analysis, interpretation and appropriation of literary texts in cultural-historical perspective. This module complies with the requirements for level B2.2 set by the “Common European Framework of Reference for Languages”.

## Electrical drives 410 (EAD 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | ELX 311GS and EDF 320 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Single and three-phase DC-AC invertors, PWM, 4-quadrant conversion, DC and AC variable speed drives and high frequency transformer design.

## Advanced classical optics 732 (EAD 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Propagation and diffraction, linear optical systems theory, coherence, fundamentals of imaging, including MTF and basic aberration theory, some applications including: diffraction gratings, holography, gradient index media and periodic media.

## Intelligent systems 320 (EAI 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | WTW 258 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 1 web-based period per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 |

**Module content**

Practical application of neural networks, fuzzy logic, genetic algorithms and expert systems. Introduction to pattern recognition, optimization and problemsolving using intelligent systems techniques.

## Intelligent systems 732 (EAI 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

This module provides the theoretical background necessary to understand, research and develop real-world software and hardware systems that incorporate and exhibit intelligent behaviour. The module incorporates advanced theory from fields such as Artificial Intelligence, Computational Intelligence, Machine Learning, Pattern Recognition and Signal Processing. Core topics of the module include: Bayesian Theory, Neural Networks, Kernel Methods, Graphic Models, and Numerical Bayesian Methods.

## Advanced topics in intelligent systems 733 (EAI 733)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electronic Engineering |
| **Prerequisites** | EAI 732 |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The aim of the module is to augment the general background provided by the EAI 732 module with the specific theoretical background required for MEng. The module will, depending on the intended research field of the student, incorporate advanced theory from fields such as: Digital Image Processing, Computer and Robotic Vision, Probabilistic Robotics, Data Fusion, Hardware and Software Parallel Processing, Real-Time and Reactive Systems.

## Computer engineering: Architecture and systems 410 (EAS 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | EMK 310 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

This module aims to provide a strong foundation for allowing students to understand modern computer architectures and systems. Microarchitectures and instruction set architectures (ISAs) will be studied in detail, as well as computer memory types and their organisation. The study will also cover performance acceleration techniques such as caching and pipelining.
Topics relating to parallel processing will be studied, including instruction level parallel processing (SIMD), multi-threading and multi-core processors as well as their synchronisation. Specialised architectures and techniques used in embedded processors (such as those found in smartphones) will be explored. The module also provides an overview of advanced computer communication buses, memory and storage systems prevalent in enterprise class computing (data centres), including topics such as: network-attached storage NAS, virtualisation, clusters, grid computing and cloud computing. Practicals will demonstrate various elements of computer architectures using VHDL.

## Control systems 320 (EBB 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ELI 220 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

### Module content

Modelling and simulation of physical systems. Block and signal flow diagrams. State variable formulation. Time and frequency domain analysis. Stability and sensitivity. Design methods, cascade (eg. PID) and feedback controllers.

## Biosignals and systems 732 (EBB 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Bioengineering |
| **Prerequisites** | Bio-engineering: Bioelectricity and Electronics EBE 732 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

### Module content

The objective of the module is to teach the engineering student how to apply engineering tools to the analysis of biological systems for the purpose of (i) developing understanding of the anatomy and physiology of specific biological systems from an engineering perspective, (ii) deriving appropriate mathematical descriptions of biological systems, and (iii) engineering applicable therapeutic interventions. We will expand on the single nerve fibre studies considered in bioelectricity and electronics: where the latter examined the biophysics of single excitable cells (and electrostimulation thereof), this module will develop it into an analysis of the characteristics of populations of neurons. We will systematically develop a systems-level perspective, working our way through the hierarchical organisation of neural encoding and computation. Furthermore, we will discuss how to measure characteristics and parameters of a particular system (the auditory system) and how to glean information about lower hierarchical levels from these measurements. This is a course in modelling and measurement, using tools from signal processing, control systems, dynamics, probability theory, systems engineering and psychoacoustics.

## Control practice 780 (EBB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

## Bioelectricity and electronics 732 (EBE 732)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Bioengineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

This module focuses on electrophysiology, using a quantitative approach. Topics covered in the first part of the module are: electrical properties of the nerve cell membrane, action potentials and the Hodgkin-Huxley model, cable theory, the neuromuscular junction, and extracellular fields. The second part of the module builds on this background to discuss the theory and practice of electrical nerve stimulation. Applications of the theoretical work is discussed, including functional electrical stimulation (e.g. electrostimulation used for standing and walking in paraplegics), and cochlear implants for the deaf.

## Bioelectromagnetism and modelling 732 (EBI 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Bioengineering |
| **Prerequisites** | Undergraduate Electromagnetism EMZ 320 or equivalent |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The course provides an introduction to modelling of bioelectromagnetic systems using numerical methods. It focuses on the study of the interaction of electromagnetic fields with biological systems and application of this knowledge in the modelling of biological volume conduction problems. The finite element technique is used to analyse volume conduction problems. Students are introduced to an industry standard finite element software package, ANSYS, that is used to complete the practical component of the course.

## Property marketing 710 (EBM 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Marketing of professional services in the property industry. Marketing of large scale property developments. Marketing of specialized property services, i.e. shopping centre activities, hotels and hospitality properties, etc. Marketing of equity capital structures.

## Market and location studies 720 (EBM 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Market- and marketability analysis, the influence of location on the marketability and cost of ownership of property, different location models.

## Market and location studies of shopping centres 721 (EBM 721)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Market and marketability analysis of shopping centres, the influence of location on the marketability and cost of ownership of retail property, different location models of retail property.

## Electricity and electronics 111 (EBN 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Electrical quantities, units, definitions, conventions. Electrical symbols, ideal and practical current and voltage sources, controlled sources. Ohm’s law in resistive circuits, Kirchoff’s current and voltage laws, resistors in series and parallel circuits, voltage and current division, mesh current and node voltage methods. Circuit theorems: Linearity, superposition, Thevenin and Norton equivalent circuits, sources transformation, power calculation, maximum power transfer. Energy storage elements: current, voltage, power and energy in inductors and capacitors, inductors and capacitors in series and parallel. Ideal operational amplifiers and applications: inverting and noninverting amplifiers, summing amplifiers, current sources, integrators.

## Electricity and electronics 122 (EBN 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Civil Engineering<br>BEng Electrical Engineering<br>BEng Electronic Engineering<br>BEng Metallurgical Engineering<br>BEng Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Electrical quantities, units, definitions, conventions. Electrical symbols, ideal and practical current and voltage sources, controlled sources. Ohm’s law in resistive circuits, Kirchoff’s current and voltage laws, resistors in series and parallel circuits, voltage and current division, mesh current and node voltage methods. Circuit theorems: linearity, superposition, Thevenin and Norton equivalent circuits, sources transformation, power calculation, maximum power transfer. Energy storage elements: current, voltage, power and energy in inductors and capacitors, inductors and capacitors in series and parallel. Ideal operational amplifiers and applications: inverting and noninverting amplifiers, summing amplifiers, current sources, integrators.

## Non-linear control 780 (EBN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

## Optimal control 780 (EBO 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | Introductory control course such as EBB 320 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Optimal control of dynamic systems: continuous time systems, the Euler Lagrange equations, minimum time problems, the Pontryagin maximum principle; feasible control: computation of control input strategies for nonlinear systems such that the given control specifications are satisfied; feedback control of dynamic systems: dynamic programming for continuous time and discrete time nonlinear systems; applications in manufacturing systems; parametrisations of nonlinear/intelligent controller structures and applications of feasible control; linear systems: linear optimal control, linear optimal observers; application of feasible control in the computation of linear optimal output feedback controllers such that the design specifications are satisfied including: robustness against parameter variations, disturbance rejection, command following, frequency domain specifications.

## Facilities management 710 (EBS 710)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 6.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Management of different types of facilities and portfolios of assets. Principles of outsourcing and the outsourcing decision. Contractual relationships in facilities- and asset management.

## Property management 801 (EBS 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Shopping centre management 802 (EBS 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Principles of property management, leasing, management of shopping centres, risk management, financial management, internal management, marketing of management services.

## Automation 410 (EBT 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EBB 320 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Plant automation issues. The steps taken to establish controllers for industrial processes. Static and dynamic properties of sensors and actuators. Obtaining models from process data. Plant automation platforms. Model-bases PID and internal model control. Turning and troubleshoot control loops. Unconstrained single-input-single-output model predictive control. Economic evaluation of automation systems.

## Wireless telephony 710 (ECW 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Semester: Year course through CE@UP.
The Centre for Radio and Digital Communications (CRDC), within the Department of Electrical, Electronic and Computer engineering, University of Pretoria in collaboration with Motorola has developed a unique Certificate Course in Wireless Telephony (CCWT). With the emergence of 2.5G and 3G technologies and the convergence between IT and Cellular technologies, training engineers for these developments in crucial. This programme offers the person with certain common telecommunication principles and training in fundamental mobile principles to a specific system generation. The practical/laboratory component attempts to firmly embed these "cutting edge" wireless communications learning outcomes.

## Digital communication 310 (EDC 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | ELI 220 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Basic Signals Theory, Transform theory (Fourier, Laplace and Z-transform) and Linear Systems. Overview of stochastic processes: Stationarity and ergodicity. Noise and channel models. Transmission effects. Definition of information and coding of analog information sources. Shannon's Channel Capacity Theorem. Introduction to channel (error) detection and correction coding: Block and Convolutional coding. Maximum-likelihood sequence decoding: The Viterbi algorithm. Analysis of digital modulation techniques in AWGN. Optimal Receiver design. Nyquist and Partial-Response systems. Power Spectral Density (PSD) of random data signals. Digital Transmission through band-limited channels: ISI, Nyquist criteria and equalizers. Data communication standards and protocols. The focus will be on applications in the computer and network environments.

## Power electronics 320 (EDF 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | ELX 311 GS, ELI 220 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Semiconductor components: Power diodes, silicon-controlled-rectifiers, bipolar transistors, power mosfets, IGBTs, emerging devices. Ancillary issues: Heat sinks, snubbers, gate drive circuits. Converter topologies: AC-DC converters, DC-DC converters; Applications: Sizing of converter components, isolated high-frequency power supplies.

## Property valuation 200 (EDW 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EKN 110/120, EWS 110/120 |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Property economics and -finance, welfare and economic efficiency: economic efficiency through the price system. Real property: characteristics and functions of the real property market; pricing of land and resources. Development: the development process; timing and rate of development; finance for development; redevelopment; public sector development; economics of planning controls; the construction industry. Urban land use: land use and land values; pattern of urban land use; growth of urban areas; quality of urban environment; housing; regional policy. The government and land resources: impact of government economic policy on land resources; theory of urban public finance; taxation and land resources; recent developments.

## Property valuation 300 (EDW 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EDW 200 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

The concept of value, the valuer, standard of valuations, the Surveyor-general, local authorities, land use planning, town planning regulations, calculation of areas, records of the valuer. Factors affecting the value of different types of properties, appreciation and depreciation, different approaches to valuation, the value of improvements, the valuation report.

## Property valuation 700 (EDW 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |

| | |
|---|---|
| **Period of presentation** | Year |

**Module content**

Valuation of income-producing properties, commercial properties, lease agreements, land with development potential, mass valuation techniques and jurisprudence regarding property valuation.

## Property valuation 801 (EDW 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Property valuation 802 (EDW 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Power electronics 780 (EED 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electrical Engineering |
| **Prerequisites** | Undergraduate level Power electronics |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Power semiconductors - basic structure, I-V characteristic physics of device operation, switching characteristics, SOA; passive components; converter topologies - AC-DC rectifiers, DC-DC converters, DC-AC inverters, AC-AC converters and resonant converters; Dynamics and control - state space models, feedback control design; Ancillary issues - gate and base drives, snubber circuits and clamps, thermal modelling and heatsinking; Applications - electric utility applications, isolated switch-mode power supplies, optimising of the utility interface with power electronic systems.

## Electro-optics 732 (EEO 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | Telecommunications ETK 320 and Microwaves and antennas EMZ 320 or BEng (Electronic Engineering) |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The module covers the different parts of photonic systems, such as an optical telecommunication system. The contents include: laser sources (laser principles, semiconductor lasers), modulators (electro-optic, magneto-optic, acousto-optic), media (free space propagation, Gaussian beams, optical fibre) and detectors (photo-conductive, photo-voltaic).

## Dissertation 891 (EER 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Electrical, Electronic and Computer Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Research project 424 (EES 424)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ERS 220 |

| | |
|---|---|
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Specific niche areas from electronic engineering are addressed within the context of a research project. The student should be able to demonstrate competence in designing and conducting investigations and experiments; to analyse the results; to select and use appropriate engineering tools and software; to interpret and derive information from the data; to draw conclusions based on evidence and to communicate the purpose, process and outcomes in a report.

## Energy management 732 (EES 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electrical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Energy management theory, energy policy and strategic planning, load factor, diversity factor, load profiles, disaggregated load profiles, load duration plots, scatter plots, co-incident maximum demand, after-diversity maximum demand, seasonal swing, energy auditing, electricity pricing theory, electricity tariffs, energy norms, energy process modelling, demand-side management.

## Power distribution engineering 732 (EEV 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electrical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Utility source, medium voltage distribution, balanced and unbalanced fault conditions and selection of protective equipment: First cycle fault current calculations, contact parting symmetrical current calculations, power circuit breaker selection. Shunt capacitors: Selection, transients. Motors and motor starting, power quality issues: dips, harmonics, unbalance and flicker.

## Dissertation: Micro-electronic engineering 890 (EEY 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Microelectronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Heritage and cultural tourism 110 (EFK 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Historical and Heritage Studies |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the study of Heritage and Cultural Tourism; overview of South African resorts and nature conservation areas as tourist destinations within the broader context of heritage and cultural tourism. An introduction to the basic research skills in the HCT domain.

## Heritage and cultural tourism 120 (EFK 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Anthropology and Archaeology |
| **Period of presentation** | Semester 2 |

**Module content**

Archaeo-tourism
Analysis of tourist and other visitations to archaeological sites. Topics cover international and local legislation, ethics and best practices debates on who interprets and who ‘owns’ the past and profits from it. Also covered are site management plans, condition assessment and a consideration of the politics and ethics of ‘heritage’. Case studies range from large UNESCO World Heritage Sites to small, almost forgotten ‘places of the past’ scattered across the globe.

## Optical communications 732 (EFO 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

This course presents optical networks from a practical perspective. Strong emphasis is placed on contemporary topics such as fibre theory, components, transmission systems and networks. Operational matters such as survivability, management and deployment considerations are also addressed. A substantial practical component will include optical time-domain reflectometry and familiarisation.

## Interferometry 716 (EFR 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Credits: 16 (must be combined with Introduction to the science of measurement to form a 32 credit module)
Theory: Michelson interferometer, Mach-Zehnder interferometer, Shack-Hartmann interferometer, Fabry-Perot interferometer, introduction to polarisation interferometry, introduction to interference microscopy, introduction to optical thin films.
Practical: alignment of optical flats, evaluation of optical surfaces, interpretation of interferograms obtained from a Fisba interferometer, interpretation of Newton fringes, application of a wedge interferometer to determine the thickness of a thin film.

## Renewable energy 732 (EGH 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electrical Engineering<br>BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This course will cover various renewable energy technologies including Wind, Solar Photovoltaic systems, Distributed generation and Hybrid power system.

## e-Business and network security 410 (EHN 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Commerce via the Internet, electronic payment systems, virtual organisations and electronic business. Introduction to data security, system security, network security, user considerations, firewalls, encryption, access control and social engineering.

### Dissertation: Bioengineering 890 (EIB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Bioengineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

### Thesis: Biosystems 990 (EIC 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Biosystems |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

### Introduction to research 732 (EIN 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Bioengineering<br>BEngHons Computer Engineering<br>BEngHons Electrical Engineering<br>BEngHons Electronic Engineering<br>BEngHons Microelectronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

*This is a compulsory module.

The aim of this module is to teach students to critically evaluate research literature, including conference papers and journal articles, in order to determine the current state of knowledge in a particular specialist area. It will also provide students with the principles of research to enable them to conduct research and prepare an original project in their particular specialist area.

## Dissertation: Electronic engineering 890 (EIN 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Thesis: Electronic engineering 990 (EIN 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Thesis: Electronics 991 (EIN 991)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Electronics |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Electrical engineering 211 (EIR 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EBN 111 or EBN 122 and WTW 161/164 |

| | |
|---|---|
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Transient response phenomena in RC, RL and RLC circuits: Natural response and step response. Alternating current (AC) circuits: Phasors, impedances, and power in AC circuits. The application of Ohm’s law, Kirchoff’s circuit theorems, matrix methods and Thevenin and Norton equivalents to sinusoidal steady-state analysis. Three-phase circuits: Balanced three-phase circuits, star/delta configurations, and three-phase power transfer calculations. Magnetically coupled circuits: Mutual inductance, coupling factor, transformers, ideal transformers and autotransformers. Application of circuit theory to an induction machine: basic principles of induction machines, equivalent circuit and analysis thereof, calculation of power and torque through application of Thevenin's theorem. Synoptic introduction to other types of machines.

## Electrical engineering 221 (EIR 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | EBN 111 or EBN 122 and WTW 161/164 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Transient response phenomena in RC, RL and RLC circuits: Natural response and step response. Alternating current (AC) circuits: Phasors, impedances, and power in AC circuits. The application of Ohm’s law, Kirchoff’s circuit theorems, matrix methods, and Thevenin and Norton equivalents to sinusoidal steady-state analysis. Three-phase circuits: Balanced three-phase circuits, star/delta configurations, and three-phase power transfer calculations. Magnetically coupled circuits: Mutual inductance, coupling factor, transformers, ideal transformers and autotransformers. Application of circuit theory to induction motors: basic principles of induction motors, equivalent circuit and analysis thereof, calculation of power and torque through application of Thevenin's theorem. Synoptic introduction to other types of motors.

## Dissertation: Electrical engineering 890 (EIR 890)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 180.00 |
| **Programmes** | MEng Electrical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Thesis: Electrical engineering 990 (EIR 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Electrical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Thesis: Electrical 991 (EIR 991)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Electric |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Introduction to the science of measurement 716 (EIS 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Credits: 16 (must be combined with another 16 credit Laboratory in photonics module to form a 32 credit module)
Theory: Introduction to metrology, international equivalence of units of measurement, realisation of the SI units, principles of measurement, total quality management, data analysis and calculation of uncertainty of measurement. Practical: calibration of luminance and illuminance meters, calibration of an oscillator for frequency, calibration of a thermocouple and digital readout by comparison with an industrial platinum resistance thermometer, characterisation and composition of thin films, national measurement standards of length/mass/electrical current.

## Information technology practice 121 (EIW 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 36 other contact sessions per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance module only
This module is offered at the end of the first year of study. The duration is at least two weeks during which the students receive practical training in computers and computer networks. The module may for practical reasons be offered in a different time slot (e.g. at the beginning of the next year of study).

## Information technology practice 221 (EIW 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | EIW 121 |
| **Contact time** | 36 other contact sessions per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance module only
This module is offered at the end of the second year of study. The duration is at least two weeks during which the students receive practical training in computers and computer networks. The module may for practical reasons be offered in a different time slot (e.g. at the beginning of the next year of study).

## Information technology practice 320 (EIW 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | EIW 221 |
| **Contact time** | 36 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance module only
This module is offered at the end of the third year of study. The duration is at least two weeks during which the students receive practical training in computers and computer networks. The module may for practical reasons be offered in a different time slot (e.g. at the beginning of the next year of study).

## Professional and technical communication 210 (EJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods.

## Power network stability 732 (EKE 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

## Power system components 320 (EKK 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | EIR 211, 221 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Single and three-phase basic concepts, Transformers: the ideal transformer, equivalent circuit, single and three-phase transformers, auto-transformers, tap changing transformers. Synchronous machines: equivalent circuit, real and reactive power control, two-axis machine model. Transmission lines, Underground Cables, Capacitors, Reactors, Single and three-phase induction motors, Load modelling.

## Power system analysis 410 (EKK 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | EKK 320 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Power flow: bus admittance matrix, bus impedance matrix, Gauss Seidal and Newton Raphson methods. Fault analysis: balanced fault analysis, symmetrical components, unbalanced fault analysis. Power system protection: definite time, invese-definite-minimum-time (IDMT), introduction to over-current and earth fault protection, distribution system protection, transmission system protection, reticulation system protection. Sizing of protection devices. High voltage control: over-voltages, transients.

## Economics 110 (EKN 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |

| | |
|---|---|
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Economics |
| **Period of presentation** | Semester 1 |

**Module content**

This module deals with the core principles of economics. A distinction between macroeconomics and microeconomics is made. A discussion of the market system and circular flow of goods, services and money is followed by a section dealing with microeconomic principles, including demand and supply analysis, consumer behaviour and utility maximisation, production and the costs thereof, and the different market models and firm behaviour. Labour market institutions and issues, wage determination, as well as income inequality and poverty are also addressed. A section of money, banking, interest rates and monetary policy concludes the course.

## Economics 120 (EKN 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | EKN 110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or 60% in STK 113 and concurrently registered for STK 123 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Economics |
| **Period of presentation** | Semester 2 |

**Module content**

This module deals with the core principles of economics, especially macroeconomic measurement the private and public sectors of the South African economy receive attention, while basic macroeconomic relationships and the measurement of domestic output and national income are discussed. Aggregate demand and supply analysis stands core to this course which is also used to introduce students to the analysis of economic growth, unemployment and inflation. The microeconomics of government is addressed in a separate section, followed by a section on international economics, focusing on international trade, exchange rates and the balance of payments. The economics of developing countries and South Africa in the global economy conclude the course.

## Economics 214 (EKN 214)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Agribusiness Management<br>BCom Econometrics<br>BCom Economics<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSc Applied Mathematics<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | EKN 110 GS & EKN 120 OR EKN 113 GS & EKN 123; & STK 110 GS OR STK 113 & STK 123 & STK 120/121 or concurrently registered for STK 120/121 OR WST 111 & WST121 are prerequisites instead of STK 120/121 or WST 111 and concurrently registered for WST 121. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Macroeconomics
From Wall and Bay Street to Diagonal Street: a thorough understanding of the mechanisms and theories explaining the workings of the economy is essential. Macroeconomic insight is provided on the real market, the money market, two market equilibrium, monetarism, growth theory, cyclical analysis, inflation, Keynesian general equilibrium analysis and fiscal and monetary policy issues.

## Economics 234 (EKN 234)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Agribusiness Management<br>BCom Econometrics<br>BCom Economics<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Applied Mathematics<br>BSc Mathematics<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | EKN 214 and STK 120/121 or WST 121 OR concurrently registered for STK 120/121 or WST 121. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Macroeconomics
Application of the principles learned in EKN 214 on the world we live in. We look at international markets and dynamic macroeconomic models, and familiarise the students with the current macroeconomic policy debates. We also take a look at the latest macroeconomic research in the world. The course includes topics of the mathematical and econometric analysis of macroeconomic issues.

## Economics 310 (EKN 310)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Agribusiness Management<br>BCom Econometrics<br>BCom Economics<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSc Applied Mathematics<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | EKN 214, EKN 234 or EKN 224, EKN 244 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Public finance
Role of government in the economy. Welfare economics and theory of optimality. Ways of correcting market failures. Government expenditure theories, models and programmes. Government revenue. Models on taxation, effects of taxation on the economy. Assessment of taxation from an optimality and efficiency point of view. South African perspective on public finance.

## Economics 320 (EKN 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Agribusiness Management<br>BCom Econometrics<br>BCom Economics<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSc Applied Mathematics<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | EKN 310 GS |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Economic analyses
Identification, collection and interpretation process of relevant economic data; the national accounts (i.e. income and production accounts, the national financial account, the balance of payments and input-output tables); economic growth; inflation; employment, unemployment, wages, productivity and income distribution; business cycles; financial indicators; fiscal indicators; social indicators; international comparisons; relationships between economic time series - regression analysis; long-term future studies and scenario analysis; overall assessment of the South African economy from 1994 onwards.

## Wireless sensor networks 732 (EKS 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering |
| **Prerequisites** | ERN 780 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

WSN consist of individual nodes interacting with their environment by sensing or controlling physical parameters; these nodes have to collaborate (using wireless communication) to fulfil their tasks. The course can be structured in two parts: architectures covering single node and network architectures, and communication protocols focusing on algorithms and protocols relevant to wireless sensor networks. The latter include the physical layer, MAC protocols, link-layer, naming and addressing, time synchronisation, localisation and positioning, topology control, routing protocols, data-centric and content-based networking, transport layer an QoS, and advanced application support (e.g. security).

## Electronic defence - electronic countermeasures 780 (ELB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Radar, including aspects such as: radar frequency bands and their characteristics, radar types (eg tracking vs search radar), the radar range equation, radar cross-section (RCS), target characteristics such as scintillation and glint, pulse compression, coherent and non-coherent integration (eg Doppler processing), range and Doppler ambiquities, target tracking including simple tracking filters and angle-tracking techniques (eg monopulse), high range-resolution (HRR) techniques, and environmental effects such as atmospheric attenuation and multipath. Electronic attack (EA) - also referred to as jamming or electronic countermeasure (ECM) - including the relationship between good system design and EP, and basic EP techniques to counter the EA techniques listed above.

## Electronic defence - electronic support 781 (ELB 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The role of electronic support (ES) receivers from tactical and strategic perspectives. ES system architectures including analogue and digital receivers. The following topics will be considered: signal detection, parameter estimation including direction finding (DF) angle of arrival (AoA) estimation and pulse repitition interval (PRI) tracking, emitter classification and low probability of detection (LPD) and low probability of intercept (LPI) techniques to counter ES receivers.

## Linear systems 220 (ELI 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EIR 211/221 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Frequency domain analysis of linear time-invariant systems. Laplace, Fourier and Z-transforms applied to periodic, aperiodic and sampled signals; exponential and trigonometric Fourier series. Nyquist sampling theorem, transfer functions, poles and zeros, bandwidth and rise time, frequency response, impulse response, Bode diagrams, natural frequency, natural and forced response. Instability and oscillations. Computer simulation.

## Electronic engineering design 320 (ELO 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EMK 310 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

In this module, students are required to generate a creative system design through synthesis and integration of components and subsystems. Students have to acquire technical knowledge through independent learning, and demonstrate a competency to work in a technical design team to realise and demonstrate a working product. This practical component is augmented by theoretical instruction in the fundamentals of system engineering, industry standards and practices, PCB layout techniques, and packaging technology.

## Solid-state lighting 732 (ELV 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Photometry (quantities, units and definitions), light and vision (photopic, scotopic and mesopic), solid-state light sources, LED and OLED sources (luminous efficacy, rated life, thermal dependence, etc.), drive and control electronics for SSL (linear and on-linear dimming, thermal and light feed-back control, luminaire fundamentals and design, lighting design (CAD), specific lighting applications (task and ambient, indoor and outdoor, safety and security, automotive), SSL measurements (photometric, colorimetric, electrical and thermal). Cost-effective energy efficiency: principles and life cycle cost calculations. International standards and testing.

## Electrical machines 311 (ELX 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | EIR 211/221 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Magnetic circuits: flux, flux density, reluctance, hysteresis, MMF.Magnetic Energy, Conversion: Process, field energy, mechanical force in electromagnetic systems. Transformers: Types of transformers, per unit system, voltage regulation and efficiency, three phase circuit analysis. Principles of machines: Torque, speed, efficiency and heat loss, circuit models. Machines: Power transformers, DC motors, induction motors.

## Antenna theory 780 (EMA 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | Microwaves and antennas EMZ 320 or equivalent |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Types of antennas and radiation mechanisms, parameters of antennas, radiation integrals, near and far field radiation, duality theorem, wire antennas, antenna arrays, mutual coupling and mutual impedance, surface equivalence theorem, reaction theorem, moment methods in antenna analysis, travelling wave antennas, microstrip antennas, horn antennas, physical optics, reflector antennas, antenna synthesis.

## Multivariable control systems 732 (EMB 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | Introductory control course such as EBB 320 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to linear dynamic systems: Modes, stability, controllability, observability, multivariable poles and zeros, state-space and transfer function descriptions. Singular values and singular value decomposition. Feedback performance specifications in the frequency domain. Synthesis via state space methods. Optimal control techniques, model predictive control.

## Electromagnetic compatibility 310 (EME 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction - electromagnetic spectrum, parameters of digital signals, circuit theory vs. microwave techniques; Transmission lines - lumped element model, transmission line equations, wave propagation, lossless lines, input impedance, short and open circuited and ?/4 lines, power flow, transients, S-parameters; Electrodynamic fields - plane waves, propagation in dielectrics and conductors, shields, Lenz’s law, Faraday’s law, Maxwell’s equations, transformers, storage fields vs. radiation fields, near and far fields, mechanisms of radiation; Static electric and magnetic fields – sources of fields, voltage, electrostatic induction, capacitance, electric and magnetic dipoles, permittivity, permeability, conductivity, magnetic materials, etc.; Non-ideal components – non-ideal resistor, -inductor, - capacitor, - wires, high-frequency measurements; Electromagnetic compatibility – spectrum of digital signals, interference, PCB layout, PCB shielding, grounding methods, power supply decoupling, ground loops, differential and common mode radiation, cable shielding.

## Analogue electronic design 732 (EME 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Microelectronic Engineering |
| **Prerequisites** | EME 732 (E5), 3rd year Electronics or equivalent or permission from the lecturer |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The integrated circuit (IC) or “chip” is the motor of the present electronic revolution. The ever-increasing impact of electronics is driven mainly by large-scale ICs such as processor and memory chips. The electronic circuit techniques used in these chips can only be understood on a deep level by a study of classical analogue electronics aimed at integrated circuit design for fabrication in CMOS, bipolar and BiCMOS processes. In addition, analog circuit techniques perform an essential role in the interfaces between the “real world” and digital systems. Examples are: voltage references, amplifiers, filters, level-converters, buffers. Important topics in this respect are feedback and stability theory as specialized for electronic circuits. The course includes: IC fabrication technology, models for IC transistors, transistor current sources and amplifiers, output stages, operational amplifiers, frequency response and stability of feedback amplifiers, nonlinear and computational circuits.

## Electromagnetic compatibility 780 (EME 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

## Microprocessors 310 (EMK 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ERS 220 GS, ELI 220 GS, ENE 310/ ENE 310# |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Hardware based introduction to system designing microprocessors. General microprocessor architecture assembly language and limited C embedded code development, with specific focus on a RISC (Microchip PIC 18) and MIPS (Microchip PIC 32) type processor, memory interfacing and address decoding, microprocessor input/output and interfacing, general programming concepts, general microprocessor system design principles, current trends and new processors exposure to development boards and integrated development environments.

## Communication electronics 732 (EMK 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Microelectronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to radio communication systems, small signal amplifiers, multistage amplifiers, differential amplifiers, network noise, intermodulation distortion, noise factor and sensitivity, frequency selective networks, impedance matching, high frequency amplifiers, broadbanding techniques, AGC, oscillators, phase-locked loops, PLL applications, frequency synthesizers, power amplifiers, modulators and demodulators, frequency mixers.

## Microwave theory 780 (EMM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | EMZ 320 or equivalent |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Review of EM theory and transmission lines, analysis of transmission lines and waveguides, microwave network analysis, impedance matching, power dividers, couplers and hybrids, microwave filters.

## Introduction to laboratory measurements and computer simulations 101 (EMR 101)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

**Module content**

This module is presented at the end of the first semester during the recess period and lasts for one week. This module serves as an introduction to measurement techniques and basic principles of a laboratory for electrical, electronic and computer engineering students. It also provides basic training in a computer simulation environment (Matlab, including Simulink) in the computer laboratories. The importance and complementary nature of simulations and accurate experimental measurements is emphasized in the module.

## Modulation systems 310 (EMS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ELI 220 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Spectral analysis using the Fourier and Z-transforms. Transform identities. Convolution and correlation. Linear system theory. Analog and hybrid modulation systems: AM, PM, FM, PAM, PCM, Delta-modulation, PWM. Carrier synchronisation. Communication channels and transmission effects. Sampled Systems. Source digitisation (D/A conversion), quantisation noise. Introduction to information theory and source coding. Formatting and line codes. Spectral characteristics of random data signals. Introduction to digital modulation. Binary modulation techniques: PSK, FSK and ASK. Symbol synchronisation. PLL theory. Matched filter concepts. Analysis of digital modulation systems in AWGN. Simulation and practical implementation of simple digital communication building blocks and subsystems. The focus will be on analog modulation techniques as applied to radio communication systems.

## Research report 785 (EMW 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

A research report on a subject approved by the head of department has to be completed during the final year of study.

## Dissertation: Real estate 890 (EMW 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Real Estate |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Mini-dissertation: Real estate 892 (EMW 892)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Thesis: Real estate 990 (EMW 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Real Estate |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Electromagnetism 310 (EMZ 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | WTW 238 GS, WTW 263 GS, EIR 211/221 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Transmission line equations, wave propagation, input impedance, power flow; Electrostatics, charge and current, laws of Coulomb and Gauss, scalar potential, properties of materials, boundary conditions, capacitance, Magnetostatics, laws of Biot-Savart and Ampère, magnetic properties of materials, boundary conditions; Plane wave propagation, polarisation, power density; Wave reflection and transmission, normal and oblique incidence.

## Microwaves and antennas 320 (EMZ 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EMZ 310 GS, ENE 310 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Smith Chart;transients; Waveguides, stripline, microstripline; Network analysis,S-parameters, signal flow diagrams, matching networks; Power divider; Filter implementation, Richard's transformation, Kuroda'a identities; Antenna fundamentals, port and radiation characteristics, Friis transmission equation, halfwave dipole, aperture antennas, linear arrays, microstrip patch antenna and arrays; Antenna applications, satellite, base stations, adaptive beams; Radar range equation.

## Research methodology 732 (ENA 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

## Analogue electronics 310 (ENE 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ELI 220 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Amplifier concepts: gain, input impedance, output impedance, bandwidth, cascaded stages. Amplifier power dissipation and power efficiency. Operational amplifiers: non-ideal, limitations, low power, programmable. Diode operational circuits: Logarithmic amplifiers, peak detector, clamp, absolute value, voltage regulators. Feedback and stability in amplifiers. Operational circuits: Instrumentation amplifiers, multipliers, oscillators, filters, translinear circuits, and sampling electronics.

## Advanced electronics 410 (ENE 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ENE 310 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Bipolar and Field Effect Transistor (FET) amplifier design: bias and frequency response of small signal loaded single stage, multistage, differential stage, and feedback amplifiers. Amplifier figure of merit parameters, including total harmonic distortion. Large signal power amplifiers. Communication electronics: RF component modelling, two-port models for RF networks, matching networks, small signal narrowband RF amplifiers, RF oscillators.

## English 110 (ENG 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BAdmin Public Management and International Relations<br>BCom Law<br>BDiv<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Law<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week, 2 web-based periods per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 1 |

**Module content**

*Alternative evening classes - 2 discussion classes per week Introduction to Literature in English (1) This module introduces the study of literature by examining a number of texts representing different genres (poetry, prose, drama). The texts studied here will be mainly from the pre-twentieth century era and may include texts written in English from both Africa and other parts of the world. The aim of this module is to equip students with the critical and analytical skills required for a perceptive reading of poetry, novels and plays.

## English for specific purposes 118 (ENG 118)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BAdmin Public Management and International Relations<br>BCom Law<br>BIS Publishing<br>LLB |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 1 |

**Module content**

This module is intended to equip students with a thorough knowledge of English grammar and is particularly useful for those interested in a career in teaching, editing, document design or other forms of language practice.

## English 120 (ENG 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BAdmin Public Management and International Relations<br>BCom Law<br>BDiv<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Law<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 2 |

**Module content**

*Alternative evening classes: 2 discussion classes per week
Introduction to Literature in English (2)
This module introduces the study of post-nineteenth century literature by examining a number of texts representing different genres (poetry, drama, prose). Texts will be from both Africa and other parts of the world. By the end of this module students should have the background and analytical skills to perceptively read modern and contemporary poetry, novels and plays.

## Modern English literature and English studies 210 (ENG 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | ENG 110, ENG 120 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 1 |

**Module content**

*Alternative evening classes - 3 discussion classes per week
Modern English literature and English language studies
This module focuses on post-nineteenth century literature in English as well as on historical and theoretical aspects of the English language.

## English 220 (ENG 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | ENG 110, ENG 120 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 2 |

**Module content**

*Alternative evening classes - 3 discussion classes per week
Twentieth-century, postcolonial and contemporary literature
This module focuses on post-nineteenth century literature in English. Various genres are covered and particular attention is given to postcolonial writing.

## English 310 (ENG 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | ENG 210, ENG 220 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 1 |

**Module content**

Mediaeval and Renaissance literature
In this module students study the works of representative writers from Chaucer to Shakespeare and Milton. The general characteristics and techniques of these authors are discussed in relation to developments in aesthetic theory, generic conventions and socio-historical change.

## English 311 (ENG 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BIS Publishing<br>BPolSci International Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | ENG 158 and a minimum of 64 credits in ENG modules. In addition, students must achieve a minimum average of 65% in the second-year ENG modules or pass a departmental entrance test. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 1 |

**Module content**

Editing principles and practice
This module practises several basic language-editing skills on a variety of texts from different fields and of varying levels of complexity for specific target audiences. The principles of plain language editing are also introduced and strategies for overcoming textual complexity for given audiences are explored. Special attention is also given to the demands of editing South African English, client relations and the ethics of editing. Considerable practical work is required.

## English 320 (ENG 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci International Studies<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |

| | |
|---|---|
| **Prerequisites** | ENG 220 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 2 |

**Module content**

Augustan, Romantic and 19th-century literature
In this module students read a representative selection of 18th- and 19th-century texts in English. The general characteristics and techniques of these texts are discussed in relation to developments in aesthetic theory, generic conventions and socio-historical change.

## English 322 (ENG 322)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BIS Publishing<br>BPolSci International Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | ENG 158 and a minimum of 64 credits in ENG modules. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | English |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to teaching English to speakers of other languages.
This module introduces both the theoretical and practical dimensions of TESOL (Teaching English to Speakers of Other Languages). Areas covered include (i) the nature of the foreign/second language learning process; (ii) the major approaches and methods of foreign/second language teaching and (iii) focused methodologies for teaching grammar, pronunciation, vocabulary, speaking and listening.

## Energy optimisation 732 (ENO 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electrical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

In this module, a brief introduction about energy systems, energy system modelling and optimisation, and Matlab applications in energy optimisation problems are given. Practical industrial (as well as residential) energy management problems such as the load shifting for geysers, conveyor belts and pumping systems in terms of time-of-use tariff and/or maximum demand charge are covered.

## Research project 420 (ENR 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Specific niche areas from electrical engineering are addressed within the context of a research project. The student should be able to demonstrate competence in designing and conducting investigations and experiments; to analyse the results; to select and use appropriate engineering tools and software; to interpret and derive information from the data; to draw conclusions based on evidence and to communicate the purpose, process and outcomes in a report.

## Introduction to environmental sciences 101 (ENV 101)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BSc Environmental Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Meteorology<br>BSocSci Heritage and Cultural Tourism |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Quarter 1 |

**Module content**

Introducing the basic concepts and interrelationships required to understand the complexity of natural environmental problems, physical and human environment, human induced environmental problems, the ways in which the natural environment affects human society and biodiversity, an introduction to major environmental issues in Southern Africa and sustainable development in the context of environmental issues.

## Optical networking 716 (ENW 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

## Optical design 732 (EOD 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Review of thin lenses, image formation and first-order properties of imaging systems, optical transfer functions, aberration theory, imaging systems: telescopes, microscopes, etc., optical design methodology.

## Detection and estimation 732 (EOP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | Theory of bayesian inference ETB732 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Binary hypotheses, M hypothesis, decision criteria, performance. Estimation theory: Random parameters, Bayes estimation, multiple parameter estimation. Composite hypotheses. The general Gaussian problem. Performance bounds and approximations. Representations of random processes. Detection of signals-estimation of signal parameters, including detection in non-white noise, sufficient statistics. Signals with unwanted parameters, the composite hypothesis problem.

## Academic literacy (1) 110 (EOT 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 1 |

**Module content**

An introduction to academic literacy that considers various learning styles and strategies, and provides an initial exploration of the characteristics of academic language. The module focuses initially on academic listening and speaking. Practice in collecting information for academic tasks, as well as in the processing of academic information. In addition, the module has a focus on the enhancement of academic vocabulary, and some initial and elementary academic writing is attempted.

## Academic literacy (2) 120 (EOT 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Unit for Academic Literacy |
| **Period of presentation** | Semester 2 |

**Module content**

While retaining an emphasis on the collection and processing of academic information, this module also provides sustained practice in academic reading. Similarly, we concentrate on building up an academic vocabulary specific to certain fields of study. The final part of the module brings together academic listening, reading and writing. The production of academic information in the form of argumentative writing is the focus here, i.e. we concentrate on producing academic discourse that is rational, coherent, clear and precise.

## Introduction to property law 320 (EOW 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Moveable and immovable property. Rights over immovable property; private legal circumscription of ownership; relevant legislation pertaining to property; real securities; the registration of rights; zoning regulations.

## Feasibility studies 700 (EOW 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 18.00 |
| **Prerequisites** | EOW 710 GS |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Overview of factors affecting the feasibility of proposed developments. Detailed financial viability studies of different types of property developments.

## Property development 711 (EOW 711)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Principles of various types of residential, commercial and industrial property developments.

## Property development 801 (EOW 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |

| | |
|---|---|
| **Period of presentation** | Year |

## Property development 822 (EOW 822)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

## Shopping centre development 823 (EOW 823)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework) |
| **Prerequisites** | EOW 801 |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Principles and practical applications of viability studies for shopping centre development.

## Software engineering 321 (EPE 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | COS 212 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Software engineering deals with the application of engineering principles to develop and maintain high-quality software that is reliable and that works efficiently. Software engineering includes defining software requirements and performing software design, software construction, software testing, and software maintenance tasks. The module exposes students to various methodologies in the different stages of the software life cycle, the problems of group work, and software configuration management with versioning systems such as CVS. The student is exposed to object modelling techniques and languages such as UML, as well as advanced debugging and testing techniques.

## Project 400 (EPR 400)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 64.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | EWE 320 or ELO 320, Finalists only |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

**Module content**

This module entails the individual completion of an engineering project from concept to delivery. The student must demonstrate independent mastery of an engineering project. The module focuses on the formulation of an engineering problem, the development of appropriate technical specifications, project planning and management and then completion of a technical project of a given nature, scope and complexity. The nature of projects is either mainly design (design, synthesis and testing) with a smaller component of investigation (experimental work and data analysis), or, alternatively, mainly investigation with a smaller component of design. As final step in the project, the student evaluates the final outcome of the design or investigation against the specifications and he/she also evaluates the impact of the project (social, legal, safety and environmental). Oral and written technical communication is evaluated as an important part of the module.

## Project 402 (EPR 402)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 64.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | ERD 320 Finalists only |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

**Module content**

This module entails the individual completion of an engineering project from concept to delivery. The student must demonstrate independent mastery of an engineering project. The module focuses on the formulation of an engineering problem, the development of appropriate technical specifications, project planning and management and then completion of a technical project of a given nature, scope and complexity. The nature of projects is either mainly design (design, synthesis and testing) with a smaller component of investigation (experimental work and data analysis), or, alternatively, mainly investigation with a smaller component of design. As final step in the project, the student evaluates the final outcome of the design or investigation against the specifications and he/she also evaluates the impact of the project (social, legal, safety and environmental). Oral and written technical communication is evaluated as an important part of the module.

## Dissertation 890 (EPR 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Software Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Research project: Theory 732 (EPT 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electrical Engineering<br>BEngHons Electronic Engineering<br>BEngHons Microelectronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Module content

This module will cover the essential theoretical background of the student’s proposed M Eng topic and include inter alia the following:
(i) Field definition and descriptions
(ii) In-depth study into background and theory relevant to the problem to be addressed
(iii) Problem definition and description
(iv) Mathematical simulations of the problem

## Research project: Design and laboratory 733 (EPT 733)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering<br>BEngHons Electrical Engineering<br>BEngHons Electronic Engineering<br>BEngHons Microelectronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Module content

This module will include extensive laboratory experiments to test the principles and possible solutions of the proposed M Eng research project and will include inter alia the following. These will include hardware and/or software experiments:
(i) Introduction to instrumentation and measuring techniques in general and specifically as applied in the field of research.
(ii) Structured laboratory work to introduce the specific problem investigated for the research undertaken.
(iii) Structured laboratory work to test the proposed solution for the problem addressed.
(iv) Confirmation experiments.

## Practical wiring 200 (EPW 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 36 other contact sessions per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |

| | |
|---|---|
| **Period of presentation** | Year |

**Module content**

*Attendance module only
This module is presented during one of the recess periods during the second year. The duration is one week. During this period the student will become acquainted with relevant regulations and legislation and basic aspects of wiring practice. For practical reasons this module may be presented during another time slot, such as the beginning of the third year.

## Practical training and report 423 (EPY 423)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Four weeks practice-orientated experience at any institution of the student’s choice (preferably in electrical, electronic or computer engineering). The student must acquire experience in the working environment and more specifically work ethics, ecology, economy, punctuality, knowledge of human nature, etc. One week after the commencement of the second semester the student must submit a report on the aspects of his/her work experience as determined by the Head of the Department.

## New generation networks 732 (ERC 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | Computer Networks ERN 780 or BEng (Computer Engineering) UP or equivalent. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

### Module content

The module in Next Generation Networks will cover evolution of communications networks towards multiservice networks and convergence. Topics be covered include the current PSTN architecture, convergence of enabling technologies, NGN architectures and APIs, softswitches, and modelling and simulation of multiservice networks. The main objective of the course is to prepare students for advanced research in next generation communications networks.

## Computer engineering design 320 (ERD 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | EMK 310 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

### Module content

In this module, students are required to generate a creative system design through synthesis and integration of components and subsystems. Students have to acquire technical knowledge through independent learning, and demonstrate a competency to work in a technical design team to realise and demonstrate a working product. This practical component is augmented by theoretical instruction in the fundamentals of system engineering, industry standards and practices, PCB layout techniques, and packaging technology.

## Introductory radiometry and photometry 716 (ERD 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

### Module content

Introduction to laboratory equipment, solar cell, imaging radiometry, spectral radiometry, atmospheric transmittance, wavelength calibration of a monochromator, photometric measurements, measurement of colour.

Credits: 16 (must be combined with Introduction to the Science of measurement to form a 32 credit module)

## Dissertation: Computer engineering 890 (ERI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Computer Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Thesis: Computer engineering 990 (ERI 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Computer Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

## Computer networks 780 (ERN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Computer Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Review of computer networks infrastructure: The review will cover elementary concepts in computer networks; covering data communications, wide area networks, and local area networks.
Networking protocols: This section will explore both the architectural principles and mechanisms required for the exchange of data among computers, workstations, servers, and other data processing devices. Much of the material in this part relates to the TCP/IP protocol suite. Recent developments and state-of-art issues will also be focused upon.
Applications, service models and convergence of networks: This section will look at the application layer and explore various service models in the context of convergence. Students will be introduced to various Next Generation Networks technologies and issues.
Modelling and simulation: This section will cover research issues in computer networks. Students will be introduced to modelling, simulation techniques and tools.

## Research project 420 (ERP 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Specific niche areas from computer engineering are addressed within the context of a research project. The student should be able to demonstrate competence in designing and conducting investigations and experiments; to analyse the results; to select and use appropriate engineering tools and software; to interpret and derive information from the data; to draw conclusions based on evidence and to communicate the purpose, process and outcomes in a report.

## Digital systems 220 (ERS 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to digital circuit design, digital representations of numbers, device electronics in digital circuits, representation and simplification of logic functions, components of combinational circuits, analysis and design of combinational circuits, components of sequential circuits, analysis and design of sequential circuits, programmable components for combinatorial and sequential logic.

## Advanced topics of energy research 732 (ERT 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The module focuses on the research training on supply side, energy transmission, and demand side. Some related research papers and our finished projects will be taught. Energy optimisation techniques will be trained throughout the module. The teaching material also includes some of our newest research projects so that students are getting involved in most advanced research progresses. The expected learning outcomes are: (i) ability to identify if a problem is important to be investigated; (ii) ability to search references for research problems; (iii) ability to use energy management tools to model a research problem; (iv) ability to identify suitable optimization algorithms for an optimization problem arising from an energy management mathematical model; (v) ability to write research reports.

## Big data science elective 801 (ERZ 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Big data science elective 802 (ERZ 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Stochastic communications systems 320 (ESC 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | WTW 258, WTW 256, WTW 238 and EMS 310 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Review of signal theory. Introduction to stochastic processes: stationarity and ergodicity. Noise models. Channel models and transmission effects. Comparison of analogue and digital modulation systems in noise. Signal space concepts and geometric representation of signals. Statistical communication theory: channel capacity theorem. Design and realisation of binary and multi-level digital modulation systems. Spectral efficiency. Optimal receiver design: matched filter (MF) and correlation-type receiver structures. Nyquist and partial-response (PR) systems. Digital transmission through bandlimited AWGN channels: inter-symbol-interference (ISI). Introduction to linear estimation: equaliser algorithms and design. Introduction to channel (error correction) coding: Symbol-by-symbol versus maximum likelihood sequence estimation (MLSE) techniques. Block and convolutional codes. The focus will be on applications in the cellular and mobile communication fields where stochastic processes such as noise and channel effects are of prime importance.

## Electro-optical systems design 732 (ESD 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to electro-optical system design, optical radiometry and photometry, atmospheric effects, advanced radiometry, signatures and camouflage, performance analysis, electro-optical system analysis, spectral band considerations.

## DSP programming 300 (ESP 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 4.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | EPW 200 |
| **Contact time** | 36 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Year |

**Module content**

This module will deal only with the practical aspects of DSP applications: Universal applications of DSP (Space, medical, commercial, telecommunications, military, industrial and scientific); ADC and DAC; Discrete Fourier-Transform (DFT); Fast Fourier-Transform (FFT); z-Transform; Correlation and Convolution; Digital filter design; FIR and IIR filters; Adaptive digital filters; Computer architecture for DSP; Analysis of finite wordlength effects; Data, audio and video processing and compression. Simulation (MATLAB) and real-time implementation of selected signal processing algorithms on DSP hardware. Programming and mapping of DSP algorithms onto DSP hardware.

## DSP programming and application 411 (ESP 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE |
| **Prerequisites** | ESC 320 GS or EDC 310 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Fourier-Transform: revise the Discrete Fourier-Transform (DFT); Fast Fourier-Transform (FFT). Digital filters; cyclic convolution; overlap-and-add as well as overlap-and-save methods; design of FIR- and IIR-filters (incorporating the effect of finite word lengths). Implementation: computer architecture and DSP processors; Mapping of DSP algorithms onto DSP hardware. Projects: simulation (in C) and real-time implementation of selected signal processing algorithms on DSP hardware.

## Digital radio techniques 732 (ESR 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | ETD 732 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Analog vs digital radio techniques, review of baseband and bandpass sampling concepts, overview of DSP-principles, Z-Transform and digital filter design, digital modulation techniques and performance analysis, radio link power analysis and design, generic radio configurations, low noise amplifier and radio front-end design, high-speed A/D and D/A components and design, automatic gain (power) control, direct versus superheterodine downconversion methods, IF-sampling techniques, digital radio receiver design, analog vs digital (carrier and symbol) synchronisation methods, doppler tracking, analysis and design of diversity techniques, multiple-input/multiple output (multi antenna element) systems, space-time coding, modular embedded system design and rapid prototyping (RF, CMOS and FPGA implementation techniques and technologies), computer-aided design software, tools and techniques.

## Adaptive systems 732 (ETA 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | ETD 732 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Adaptive systems ETA732 covers the fundamentals of adaptive systems within the context of adaptive signal processing. The basic linear filtering problem with associated models and filter structures is introduced. Furthermore, the topics of stationary processes and models, spectrum analysis, eigen analysis, Wiener filters, linear prediction, Kalman filters, stochastic gradient methods and least squares methods are covered. Blind adaptive methods are presented within the context of the blind deconvolution problem. Lattice filter methods are covered as an extention to the basic topics of this course. Adaptive systems ETA732 will supply the student with valuable tools for the solution of statistical detection and estimation problems in the diverse fields of communications, control, radar, sonar, seismology and biomedical engineering.

## Digital communications 732 (ETD 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Digital Communications ETD 732 is a first semester graduate course in Electronic Engineering, presented by the Signal Processing and Telecommunications Group, in collaboration with the Centre for Radio and Digital Communication (CRDC). The content of the course is as follows: Introduction to digital communications, digital communications applications and services. Review of: probability and stochastic processes, source coding, characterisation of communication signals and systems and optimum receivers for the AWGN channel. Advanced synchronisation systems: Carrier and symbol recovery. Shannon’s channel capacity theorem and introduction to coding. Signal design for band-limited channels. Digital modulation techniques. Communication through band-limited linear filter channels. Introduction to adaptive equalisation. Spread spectrum signals for digital communications. Simulation of digital communication systems. Digital realisation of digital communication subsystems. Digital communication laboratory.

## Electrical drives 780 (ETE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | Undergraduate level Power electronics and Electric machines. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Power semiconductor devices and power electronic converters for drive applications. Theory of three-phase induction motor and synchronous motor machines. Adjustable speed induction motor drives: open-loop and closed-loop control, scalar and vector control, transient analysis of induction motor drives and introduction to vector/field-oriented control. Adjustable speed synchronous motor drives: Open-loop and closed-loop control, self-controlled permanent magnet synchronous motor drives. Introduction to spiral vector theory and analysis.

## Information security 780 (ETH 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Number theory: prime numbers, congruences, modular arithmetic, Euclid’s algorithm, Fermat’s theorem, Euler’s theorem, Euler’s phi-function. Block ciphers: Feistel cipher, DES, AES. Public key cryptography: RSA, Diffie-Hellman, digital signatures. Hash functions: MD 5, SHA-1, MAC, HMAC. Protocols: identification, authentication, key exchange, X.509. PGP, S/MIME, IPSec, SSL, VPN. Authentication protocols, key distribution, key management, random number generation.

## Coding theory 732 (ETK 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | ETD 732 |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The module addresses the analysis and design of block, convolutional and concatenated coding schemes for mobile fading channels. Information theory concepts, such as channel capacity and cutoff rates are addressed. Galois fields and mathematical operations are investigated. The construction of binary FIR and IIR convolutional codes, and non-binary dual-k convolutional codes are considered, followed by an in-depth discussion on the classic Viterbi algorithm. Binary block codes considered in this course include cyclic, Hamming and binary BCH block codes. Classic block code decoding algorithms, such as ML, syndrome and Meggit decoders are investigated. Non-binary Reed-Solomon block codes, as well as the Berlekamp-Massey decoding algorithm are presented. The Viterbi decoding of linear block codes, using BCJR trellises are investigated. The concept of coding for fading channels are considered, with the focus on aspects such as interleaving and employing channel state information in channel decoders. Classic concatenated coding schemes are considered. Iteratively decoded concatenated coding schemes, including iteratively decoded parallel, serial and hybrid concatenated coding and coded modulation are investigated. This includes an in-depth study of iteratively decoded concatenated coding scheme building blocks, such as puncturers, interleavers, recursive systematic convolutional codes and MAP decoders. Several promising fields of channel coding currently receiving much interest, such as multilevel coding, space-time coding and bit-interleaved coded modulation, are also considered.

## Topics in photonics 732 (ETP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The purpose of the Topics in Photonics course is to create the opportunity for experts to give lectures on specialised topics in the field of photonics, thus providing students with the opportunity to capitalise on the specialised knowledge of experts that are not permanently affiliated to the University.

## Mobile communication 732 (ETR 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to wireless, cellular, digital PCS mobile radio communication. Radio propagation and cellular engineering concepts. Digital MODulation-DEModulation (MODEM) techniques (cellular modulation standards). Error control coding for fading channels. Access technologies (FDMA, TDMA, CDMA, OFDMA, SDMA and hybrids). Spread-spectrum systems and concepts. Diversity techniques for mobile wireless radio systems. Cellular and wireless systems engineering (mobile cellular design). Adaptive equalisers for fading channels.

## Telecommunication systems engineering 732 (ETT 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Electronic Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Telecommunication systems engineering ETT 732 is a first semester graduate course in Electronic Engineering, presented by the Signals and Telecommunications Group. This module provides an Introduction to telecommunication concepts, telecommunication systems, virtual private networks (VPN), advanced intelligent networks (AIN), local number portability (LNP), computer-to-telephony integration (CTI), signalling system 7 (SS7), CTI technologies and application, ISDN, frame relay, ATM, ATM and frame relay internetworking, data over power lines, xDSL, microwave and radio-based systems, local multipoint distribution services (LMDS), specialized mobile radio (SMR), cellular communication, GSM, personal communication services (PCS), wireless data communication (Mobile IP), satellite communication (Networking, LEO), Sonet and SDH, wave division multiplexing (WDM), the internet (TCP/IP, VoIP, networking, management).

## Feasibility studies 710 (EUS 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Overview of factors affecting the feasibility of proposed property developments, including a brief introduction to town planning, valuation, financing, marketing and investment principles.

## Feasibility studies 720 (EUS 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying<br>BScHons Real Estate |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Detailed financial viability studies of different types of property developments; value management and life-cycle costing.

## Feasibility studies of shopping centres 721 (EUS 721)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Detailed financial viability studies of shopping centre developments; value management and life-cycle costing.

## Electrical engineering design 320 (EWE 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE |
| **Prerequisites** | EIR 211/221 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

In this module, students are required to generate a creative system design through synthesis and integration of components and subsystems. Students have to acquire technical knowledge through independent learning, and demonstrate a competency to work in a technical design team to realise and demonstrate a working product. This practical component is augmented by theoretical instruction in the fundamentals of system engineering, industry standards and practices, design for operational feasibility, power transformer design, power cable design, power capacitor design and protection system design.

## Real estate 110 (EWS 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to real estate. Different stakeholders in the property industry and the relationship to other industries. Fields of specialization in the property industry and the role and interaction of each.

## Real estate 120 (EWS 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EWS 110 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to property development. A study of the principles of property development including the relevant statutes and ordinances: Urban development, control of land in South Africa. Town planning.

## Real estate 210 (EWS 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EWS 110/120 |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Property Management. The role of the property manager, functions of property management, the management contract, the owner/manager relationship, principles of property maintenance, principles of energy management, principles of risk management, fire prevention and control, emergency management, environmental impact and pollution aspects, management budgets.

## Real estate 220 (EWS 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |

| | |
|---|---|
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EWS 110/120 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Property marketing. The role of property marketing in the real estate industry. Marketing principles and objectives. Methods of marketing of different types of property to obtain optimum results.

## Real estate 310 (EWS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EWS 210 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Property investment. The nature and scope of real estate investment, objectives of property investors, participants in the property investment process, the investment decision process, investment criteria, investment time horizons, decision-making approaches, different taxes applicable to property investment and -development.

## Real estate 320 (EWS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Real Estate |
| **Prerequisites** | EWS 120, EDW 200 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Overview of property development: the establishment of townships, types of dwelling units and housing types, principles of medium and high density residential developments, sectional title and group housing, development of retirement centres, introduction to commercial property development.

## Advanced literature study 789 (EXL 789)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Electrical, Electronic and Computer Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

An advanced literature study on a specialised topic with the aim of solving a particular problem, to be determined in conjunction with a lecturer in the department. The aim of the study is not to merely summarize the contributions in the literature on a specific topic, but to gather, interpret and apply previously recorded knowledge to solve a particular problem.

The aim of the advanced literature study is to give masters students the opportunity to broaden their knowledge in a certain field.  The topic of this study can be related, but is not restricted to the area of research for their dissertation.  There must however, be a clear distinction between the outputs of the advanced literature study and that of the dissertation.  The project for this course cannot form a subset of the dissertation.  This course is problem driven and the aim should be to identify a problem, gather, interpret and apply previously recorded knowledge to solve a particular problem.

## Facilities management 822 (FAM 822)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

## Financial management 110 (FBS 110)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 10.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BSc Applied Mathematics<br>BSc Construction Management<br>BSc Extended programme - Mathematical Sciences<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

*Only for BSc (Mathematical Statistics. Construction Management, Real Estate and Quantity Surveying) and BEng (Industrial Engineering) students.
Purpose and functioning of financial management. Basic financial management concepts.  Accounting concepts and the use of the basic accounting equation to describe the financial position of a business. Recording of financial transactions. Relationship between cash and accounting profit. Internal control and the management of cash. Debtors and short-term investments. Stock valuation models. Depreciation. Financial statements of a business. Distinguishing characteristics of the different forms of businesses. Overview of financial markets and the role of financial institutions. Risk and return characteristics of various financial instruments. Issuing ordinary shares and debt instruments.

## Financial management 210 (FBS 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Investment Management<br>BCom Law<br>BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | BCom Financial Sciences, Investment Management and Law: FRK111 and FRK121 (or FRK100 or 101),STK110,120 or FBS121, and simultaneously registered for FRK211;BSc Construction Management, Quantity Surveying and Real Estate: FBS110,120, STK110 and STK120 |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

*Only for BCom (Financial Sciences, Investment Management and Law) and BSc (Construction Management , Quantity Surveying and Real Estate) students.
Framework and purpose of financial management; understanding financial statements; analysis of financial statements for decision making; time value of money; risk and return relationships; business valuation; short-term planning; current asset management.

## Financial management 212 (FBS 212)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BCom Supply Chain Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 111 and 121/122 or FRK 100 or FRK 101 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

Role and environment of managerial finance; Financial statement analysis; Cash flow and financial planning; Time value of money; Risk and return. Capital investment decisions; Working capital management.

## Financial management 222 (FBS 222)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Marketing Management<br>BCom Supply Chain Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 111 and 122/121 or FRK 100 or FRK 101 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to management accounting; Cost terms, concepts and classifications; Job-order costing; Process costing; Cost behaviour; Variable versus absorption costing; Cost-volume profit relationships; Budgeting.

## Financial management 320 (FBS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Investment Management<br>BCom Law<br>BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FBS 210. Only available to 07130202, 07130203, 07130204, 07130071 and 07130151 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 2 |

**Module content**

*Only for BCom (Financial Sciences, Investment Management, and Law) and BSs (Construction Management, Quantity Surveying and Reak Estate) students.
Cost of capital; determination of capital requirements and the financing of a business to maintain the optimal capital structure; the investment decision and the study of financial selection criteria in the evaluation of capital investment projects; impact of inflation and risk on capital investment decisions; evaluation of leasing decisions; dividend decisions; international financial management.  Valuation principles and practices: an introduction to security analysis; hybrids and derivative instruments, mergers and acquisitions.

## Capita selecta in financial management 713 (FBS 713)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FBS 310, FBS 320 or FBS 300 and IOK 311, IOK 321 or ODT 300 and FRK 311, FRK 321 or FRK 300 |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

Objectives of financial management; Risk and return; Required rate of return and the cost of capital; Valuation; Capital investment decisions; Financial analysis; Aspects of behavioural corporate finance.

## Financial management 830 (FBS 830)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 2 |

## Financial management 831 (FBS 831)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Semester 1 |

**Module content**

"The goal of a firm is to maximise the long-term wealth of its shareholders." Why do most management experts generally accept this statement? How do all the other objectives of a firm relate to this goal? Why is the success of most companies measured in financial terms? In FBS 831 answers to these questions are sought. The nature of and interaction between different financial statements are investigated, as well as their role in the creation of shareholder wealth. Although maximising shareholder wealth is the basic general cornerstone of management, recent developments point out that non-quantitative factors are also important in the measurement of company performance.

## Property financial mathematics 320 (FBV 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Application of the principles of interest calculations on the property industry; more specifically the time value of money, introduction to financial return techniques, net present values and internal rate of return.

## Philosophy 110 (FIL 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BDiv<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to Philosophy
The two semester modules at first-year level introduce students to the four main subfields of Philosophy, namely epistemology and metaphysics, ethics and political philosophy. This module introduces students to two of these subfields. Students must contact the Department of Philosophy to ascertain which two subfields are covered in each semester as the choice may change from time to time due to availability of teaching staff. Students will become acquainted with the nature of philosophical reflection by exploring a number of classical philosophical themes in each subfield. Throughout the module there is an emphasis on developing those critical thinking, reading and writing skills that are required in Philosophy, while students become acquainted with the power of critique as critical judgment and discernment.

## Philosophy 120 (FIL 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BDiv<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to Philosophy
The two semester modules at first-year level introduce students to the four main subfields of Philosophy, namely epistemology and metaphysics, ethics and political philosophy. This module introduces students to two of these subfields. Students must contact the Department of Philosophy to ascertain which two subfields are covered in each semester as the choice may change from time to time due to availability of teaching staff. Students will become acquainted with the nature of philosophical reflection by exploring a number of classical philosophical themes in each subfield. Throughout the module there is an emphasis on developing those critical thinking, reading and writing skills that are required in Philosophy, while students become acquainted with the power of critique as critical judgment and discernment.

## Philosophy 210 (FIL 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |

| | |
|---|---|
| **Prerequisites** | At least one of FIL 110, 120 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 1 |

**Module content**

*History of modern philosophy I and II*

A concise history of modern philosophy. The following are examples of themes that may be explored: The Renaissance, the Scientific Revolution, the foundations of the modern worldview (in contrast to the premodern), the European Enlightenment, Romanticism, German Idealism (Kant and Hegel), Marx and Marxism, Kierkegaard and Existentialism, the philosophy of Nietzsche. A selection of contemporary critical responses to modern philosophy may be explored; these may include for example African philosophy, analytical (Anglo-American) philosophy, postmodernism, neo-Marxism, etc.

## Philosophy 220 (FIL 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | At least one of FIL 110, 120 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 2 |

**Module content**

*Political philosophy and ethics*

In this module the ways in which human reality is reflected on in practical philosophy, are examined. Both the analytical, interpretative perspective and the normative perspective are covered. This is done with the aid of a selection of key themes and texts from the history of philosophy, but with special attention to their contemporary relevance. The first of the two foci of this semester module will be on political philosophy. Among the issues that may be covered are justice, power, ideology, authority, the social contract, law, legitimacy, recognition, etc. The second focus of this semester module will be on ethics. Among the issues that may be covered are the formation of rules, principles, ideal, dispositions and the capability to judge that regulate such diverse phenomena as freedom, equality, rights, distribution, oppression. pluralism, and others. The classical approaches to ethics - virtue ethics, deontology, consequentialism - will form the backdrop against which moral philosophy will be discussed. In this module, in general, the student can expect to be exposed to the work of Plato, Aristotle, Augustine, Aquinas, Machiavelli, Hobbes, Locke, Kant, Hegel, Marx, Sidgwick, Nietzsche, Weber, Mead, Arendt, Habermas, Rawls, Ricoeur, Walzer, Young, Sen, Honneth, and others.

## Introduction to moral and political philosophy 251 (FIL 251)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Philosophy |
| **Period of presentation** | Quarter 2, 3 and 4 |

**Module content**

In this module students are equipped with an understanding of the moral issues influencing human agency in economic and political contexts. In particular philosophy equips students with analytical reasoning skills necessary to understand and solve complex moral problems related to economic and political decision making. We demonstrate to students how the biggest questions concerning the socio-economic aspects of our lives can be broken down and illuminated through reasoned debate. Examples of themes which may be covered in the module include justice and the common good, a moral consideration of the nature and role of economic markets on society, issues concerning justice and equality, and dilemmas of loyalty. The works of philosophers covered may for instance include that of Aristotle, Locke, Bentham, Mill, Kant, Rawls, Friedman, Nozick, Bernstein, Dworkin, Sandel, Walzer, and MacIntyre.

## Philosophy 310 (FIL 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | At least three of FIL 110, 120, 210, 220 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 1 |

**Module content**

Philosophical anthropology and cognitive philosophy

In this module the focus is on the quest to understand humankind and its relations to reality and knowledge. Both the analytical, interpretative perspective and the normative perspective are covered. This is done with the aid of a selection of key themes and texts from the history of philosophy, but with special attention to their contemporary relevance. The first of the two foci of this semester module is philosophical anthropology or contemporary metaphysics. Themes covered may include: Is a human more than the sum total of its properties?; the relation between consciousness, self-consciousness and the human unconscious; the meaning of life; the nature of personal identity; the issue of free will, and others. The second focus of the semester module is the congnitive disciplines of philosophy, such as philosophy of science, philosophy of mind and epistemology. In philosophy of science, themes covered may include the types of reasoning in science, the nature and role of explanations in science, the scientific realism debate, the nature of scientific progress, justification of scientific theories, the role of truth in science, and others. In philosophy of mind, themes covered may include the relation between spriit, psyche and body - the mind-body problem, the nature of consciousness and qualia, dualism, materialism, functionalism, physicalism, supervenience, intentionality, and others. In epistemology themes covered may include rationalism, empiricism, transcendental, idealism and Kant foundationalism coherentism, epistemic internalism and externalism, radical scepticism, and others.

## Philosophy 320 (FIL 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BA Visual Studies<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSocSci Industrial Sociology and Labour Studies<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FIL 110, 120, 210, 220 and 310 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Philosophy |
| **Period of presentation** | Semester 2 |

**Module content**

Philosophical hermeneutics and social philosophy
The first of the two foci of this semester module is a discussion and analysis of philosophical perspectives on the hermeneutical problem (the problem of understanding and interpretation), with particular attention to contemporary thinkers such as Nietzsche, Heidegger, Gadamer and Derrida. The second focus of the semester module is social philosophy where philosophical questions on social forms, structures, institutions, practices, habitus and ethos will be raised. A range of themes may be investigated, such as structure and agency, social imaginaries, new social formations, institutional cultures, gender and sexuality, subject constitution, and others. Furthermore, the framing of these themes in a spectrum of approaches including Critical Theory, Theory of Ideology, Constractariansim, Social Action Theory, Metaphorology, Critical Race Theory, Genealogy, and others will be analysed and explored.

## Advanced corporate finance 701 (FIN 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BComHons Financial Management Science<br>BComHons Investment Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FBS 310, FBS 320 or FBS 300 and FRK 311, FRK 321 or FRK 300 |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Financial Management |
| **Period of presentation** | Year |

**Module content**

*Only for BComHons: Financial Management Sciences and Investment Management students.
Objectives of financial management; Risk and return; Required rate of return and the cost of capital; Capital structure theory; Valuation; Capital investment decisions; Leasing; Dividend decision and long-term financing; Economic value added; Sustainable growth; Convertible bonds; Financial analysis; Financial planning and control; Mergers and acquisitions; Working capital management; Foreign trade and foreign exchange; International investments and International treasury; Aspects of behavioural corporate finance.

## Financial management 700 (FMT 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 18.00 |
| **Programmes** | BScHons Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |

| | |
|---|---|
| **Period of presentation** | Year |

**Module content**

Budget estimates, cash-flow schedules, financial statements and construction financial management calculations and accounting.

## Financial management 701 (FMT 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 18.00 |
| **Prerequisites** | FMT 700 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

The application of management principles such as: cost, budgets, cash-flow and financial statements, in construction financial management and construction project management.

## Financial accounting 111 (FRK 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BScAgric Agricultural Economics and Agribusiness Management<br>LLB |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Law<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 1 |

**Module content**

The nature and function of accounting; the development of accounting; financial position; financial result; the recording process; processing of accounting data; treatment of VAT; elementary income statement and balance sheet; flow of documents; accounting systems; introduction to internal control and internal control measures; bank reconciliations; control accounts; adjustments; financial statements of a sole proprietorship; the accounting framework.

## Financial accounting 121 (FRK 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BScAgric Agricultural Economics and Agribusiness Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | FRK 111 GS |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 2 |

**Module content**

Property, plant and equipment; intangible assets; inventories; liabilities; presentation of financial statements; enterprises without profit motive; partnerships; companies; close corporations; cash flow statements; analysis and interpretation of financial statements.

## Financial accounting 122 (FRK 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BSc Information and Knowledge Systems<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Law<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | FRK 111 GS or FRK 133, FRK 143 |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 2 |

**Module content**

Budgeting, payroll accounting, taxation – income tax and an introduction to other types of taxes, credit and the new Credit Act, insurance, accounting for inventories (focus on inventory and the accounting entries, not calculations), interpretation of financial statements.

## Financial accounting 211 (FRK 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | FRK 111 and FRK 121 or FRK 100/101 |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 1 |

**Module content**

Preparation and presentation of company annual financial statements in compliance with the requirements of the Companies Act, the Framework and Statements of Generally Accepted Accounting Practice relating to the following: presentation of financial statements; revenue; investments; provisions, contingent liabilities and contingent assets; events after the balance sheet date; inventories; income taxes; leases; property, plant and equipment; impairment of assets; intangible assets; investment property, changes in accounting estimates and errors; introduction to financial instruments.

## Financial accounting 221 (FRK 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | FRK 211 GS |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 2 |

**Module content**

Preparation and presentation of company annual financial statements in compliance with the requirements of Statements of Generally Accepted Accounting Practice relating to the following: employee benefits; the effects of changes in foreign exchange rates; accounting policies; earnings per share; cash flow statements; interests in joint ventures. Branch accounting. Introduction to consolidations, including basic consolidation techniques for both wholly-owned and partly-owned subsidiaries. Introduction to public sector accounting.

## Financial accounting 311 (FRK 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 211, 221 and INF 281 |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 1 |

**Module content**

Preparation and presentation of company annual financial statements in compliance with the requirements of International Financial Reporting Standards (IFRS) relating to the following: income taxes; property, plant and equipment; impairment; non-current assets held for sale; intangible assets; investment property; borrowing costs; leases; accounting policies; changes in accounting estimates and errors; segment reporting; certain aspects of financial instruments.

## Financial accounting 321 (FRK 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 311 GS and INF 281 |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Accounting |
| **Period of presentation** | Semester 2 |

**Module content**

Preparation and presentation of company annual financial statements in compliance with the requirements of International Financial Reporting Standards (IFRS) relating to the following: the effects of changes in foreign exchange rates; earnings per share; related party disclosure; associates. Complex consolidation issues, including intra-group transactions; dividends; preference shares; revaluations; horizontal, vertical and mixed groups; insolvent subsidiaries; change of interest; consolidated cash flow statement.

## French: Cultural-professional (1) 113 (FRN 113)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Publishing |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | Grade 12 French |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Comprehensive review of French grammar; development of reading, writing, speaking and understanding skills; analysis and interpretation of texts.

## French: Cultural-professional (2) 123 (FRN 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Publishing |
| **Service modules** | Faculty of Health Sciences |
| **Prerequisites** | FRN 113 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Comprehensive review of French grammar; further development of reading, writing, speaking and understanding skills; analysis and interpretation of texts.

## French: Intermediate (1) 211 (FRN 211)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 104 or FRN 123 |
| **Contact time** | 1 lecture per week, 4 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

This module focuses on the further development of communication skills with special emphasis on the receptive activities of the language, namely listening and reading. Careful attention is given to critical aspects of French grammar. Short fictional and non-fictional texts are used for comprehension as well as for demonstrating cultural aspects of the French-speaking countries.  This module complies with the requirements for level B1.1 set by the “Common European Framework of Reference for Languages”.

## French: Intermediate (2) 221 (FRN 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 211 |
| **Contact time** | 1 lecture per week, 4 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

This module continues with the development of communicative skills of the language. Special attention is given to the comprehension of non-fictional and literary written texts, spoken and audio-visual inputs, as well as the application of knowledge of French grammar in oral and written production. This module complies with the requirements for level B1.2 set by the “Common European Framework of Reference for Languages”.

## French: Cultural-professional (7) 361 (FRN 361)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 221 or FRN 261, 262, 263 and 264 (before 2011) |
| **Contact time** | 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |

| | |
|---|---|
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Principles of textual grammar of the French language. This module complies with the requirements for level B2.1 set by the “Common European Framework of Reference for Languages”.

## French: Cultural-professional (8) 362 (FRN 362)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 221 or FRN 261, 262, 263 and 264 (before 2011) |
| **Contact time** | 1 lecture per week, 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis, interpretation and appropriation of relevant audio-visual material and texts from non-fictional and fictional sources.
This module complies with the requirements for level B2.1 set by the “Common European Framework of Reference for Languages”.

## French: Cultural-professional (9) 363 (FRN 363)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 361 |
| **Contact time** | 1 practical per week, 2 discussion classes per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Principles of grammar of the French language. Introduction to professional translation and interpreting for the purpose of learning French as a foreign language.

## French: Cultural-professional (10) 364 (FRN 364)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |

| | |
|---|---|
| **Programmes** | BIS Publishing |
| **Prerequisites** | FRN 362 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Ancient and Modern Languages and Cultures |
| **Period of presentation** | Semester 2 |

**Module content**

Analysis, interpretation and appropriation of literary texts in cultural-historical perspective.

## Physics 116 (FSK 116)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Physics |
| **Period of presentation** | Semester 1 |

**Module content**

Introductory mathematics: Symbols, exponents, logarithms, angles in degrees, radial measure, goniometry, differentiation, and integration. Motion along a straight line: position and displacement, acceleration. Vectors: adding vectors, components, multiplying vectors. Motion in two and three dimensions: projectile motion, circular motion. Force and motion: Newton’s Law, force, friction. Kinetic energy and work: work, power. Potential energy: Centre of mass, linear momentum. Collisions: impulse and linear momentum, elastic collisions, inelastic collisions. Rotation: kinetic energy of rotation, torque. Oscillations and waves: Simple harmonic motion, types of waves, wavelength and frequency, interference of waves, standing waves, the Doppler effect. Temperature, heat and the first law of thermodynamics.

## Physics 176 (FSK 176)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electronic Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Mining Engineering |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Physics |
| **Period of presentation** | Semester 2 |

**Module content**

Introductory mathematics: Symbols, exponents, logarithms, angles in degrees, radial measure, goniometry, differentiation, and integration. Motion along a straight line: position and displacement, acceleration. Vectors: adding vectors, components, multiplying vectors. Motion in two and three dimensions: projectile motion, circular motion. Force and motion: Newton's Law, force, friction. Kinetic energy and work: work, power. Potential energy: Centre of mass, linear momentum. Collisions: impulse and linear momentum, elastic collisions, inelastic collisions. Rotation: kinetic energy of rotation, torque. Oscillations and waves: Simple harmonic motion, types of waves, wavelength and frequency, interference of waves, standing waves, the Doppler effect. Temperature, heat and the first law of thermodynamics.

## Building services 112 (GBD 112)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Sanitary services; soil and waste drainage for simple, multi-storey and multi-purpose buildings; local sewage by-laws; construction of all types of sewage and sanitary fittings.

## Building services 122 (GBD 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Sanitary services; hot and cold-water supply to simple and multi-storey buildings; local by-laws; water reticulation to town development; different hot-water systems; water purification systems; water and energy saving.

## Building services 211 (GBD 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the principles of indoor comfort. Heating, ventilation and air-conditioning systems. Installation and operation of lifts and other mechanical services. Fire detection and protection.

## Building services 221 (GBD 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Theory of electricity; regulations of electricity-supply authorities; electrical installations; distribution of electricity.

## Building services 222 (GBD 222)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Installation and operation of lifts and other mechanical services; cleaning and waste disposal systems; industrial kitchens and cold rooms; fire detection and protection; building access control systems; building management systems.

## Building services 311 (GBD 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | GBD 221 GS |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Principles of illumination; illumination installations; lightning security; security systems; communication systems. Multimedia installations.

## Building services preparatory 600 (GBD 600)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 1.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 or Semester 2 |

## Aspects of human geography 156 (GGY 156)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BSc Chemistry<br>BSc Environmental Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Meteorology<br>BSocSci Heritage and Cultural Tourism |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Quarter 2 |

**Module content**

This module begins by fostering an understanding of human geography. Then follows with the political ordering of space; cultural diversity as well as ethnic geography globally and locally; population geography of the world and South Africa: and four economic levels of development. The purpose is to place South Africa in a world setting and to understand the future of the country.

## Southern African geomorphology 166 (GGY 166)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BPolSci International Studies<br>BSc Chemistry<br>BSc Environmental Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Meteorology<br>BSocSci Heritage and Cultural Tourism |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Health Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Quarter 3 |

**Module content**

Investigating southern African landscapes and placing them in a theoretical and global context. The geomorphological evolution of southern Africa. Introduction to the concepts of Geomorphology and its relationships with other physical sciences (e.g. meteorology, climatology, geology, hydrology and biology). The processes and controls of landform and landscape evolution. Tutorial exercises cover basic techniques of geomorphological analysis, and topical issues in Geomorphology.

## Geomorphology of the built environment 265 (GGY 265)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Architecture<br>BSc Engineering and Environmental Geology<br>BSc Landscape Architecture<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Quarter 3 |

**Module content**

*This module is for Architecture and Landscape Architecture students only.
The theory component covers geomorphological aspects of the built environment including landscape identification; weathering or deterioration of natural stone and application to design and preservation of buildings and monuments; slope hydrology and stability conditions; soil erosion processes and construction impacts; drainage modification in urban areas; wetland identification, human impacts and rehabilitation; recreational impacts and management. In addition to the theory a field-based project is undertaken.

## Introductory geographic information systems 283 (GGY 283)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities |
| **Prerequisites** | GMC 110 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to Geographic Information Systems (GIS), theoretical concepts and applications of GIS. The focus will be on the GIS process of data input, data analysis, data output and associated technologies. This module provides the foundations for more advanced GIS and Geoinformatics topics.

## Geographic data analysis 220 (GIS 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |

| | |
|---|---|
| **Programmes** | BSc Chemistry<br>BSc Engineering and Environmental Geology<br>BSc Environmental Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Information and Knowledge Systems<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GMC 110 and (STK 110 OR BME 120) |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 2 |

**Module content**

The nature of geographical data and measurement.Application of statistics in the geographical domain. Probability, probability distributions and densities, expected values and variances, Central Limit theorem. Sampling techniques. Exploratory data analysis, descriptive statistics, statistical estimation, hypothesis testing, correlation analysis and regression analysis.

## Geographic information systems 310 (GIS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 22.00 |
| **Programmes** | BSc Chemistry<br>BSc Environmental Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Information and Knowledge Systems<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GGY 283 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 1 |

**Module content**

Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications. A project or assignments of at least 64 notional hours.

## Spatial analysis 320 (GIS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 22.00 |
| **Programmes** | BSc Chemistry<br>BSc Environmental Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Information and Knowledge Systems<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GIS 310 or TDH |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 2 |

**Module content**

Construction of Raster Geovisualisations, spatial model construction and use, multi-criteria decision analysis. Factor analysis: Principle component analysis. Geostatistics: Spatial dependence modelling, ordinary kriging. Markov chains and cellular Automata, combined models.

## Introductory soil science 250 (GKD 250)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Biotechnology<br>BSc Chemistry<br>BSc Ecology<br>BSc Engineering and Environmental Geology<br>BSc Environmental Sciences<br>BSc Geography<br>BSc Geology<br>BSc Landscape Architecture<br>BSc Meteorology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | CMY 117 GS or TDH |
| **Contact time** | 1 practical per week, 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Department of Plant and Soil Sciences |
| **Period of presentation** | Semester 1 |

**Module content**

Origin and development of soil, weathering and soil formation processes. Profile differentiation and morphology. Physical characteristics: texture, structure, soil water, atmosphere and temperature. Chemical characteristics: clay minerals, ion exchange, pH, buffer action, soil acidification and salinisation of soil. Soil fertility and fertilisation. Soil classification. Practical work: Laboratory evaluation of simple soil characteristics. Field practicals on soil formation in the Pretoria area.

## Introduction to geology 155 (GLY 155)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BSc Computer Science<br>BSc Engineering and Environmental Geology<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geology<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | A candidate must have passed Mathematics with at least 60% in the Grade 12 examination. |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Semester 1 |

**Module content**

Solar system; structure of solid matter; minerals and rocks; introduction to symmetry and crystallography; important minerals and solid solutions; rock cycle; classification of rocks. External geological processes (gravity, water, wind, sea, ice) and their products (including geomorphology). Internal structure of the earth. The dynamic earth – volcanism, earthquakes, mountain building – the theory of plate tectonics. Geological processes (magmatism, metamorphism, sedimentology, structural geology) in a plate tectonic context. Geological maps and mineral and rock specimens.

## Earth history 163 (GLY 163)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BSc Computer Science |

| | |
|---|---|
| **Prerequisites** | GLY155; a special exemption is given to 2nd-year students registered for degrees in Plant Sciences, Entomology, Ecology and Zoology |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Semester 2 |

**Module content**

This module will give an overview of earth history, from the Archaean to the present. Important concepts such as the principles of stratigraphy and stratigraphic nomenclature, geological dating and international and South African time scales will be introduced. A brief introduction to the principles of palaeontology will be given, along with short descriptions of major fossil groups, fossil forms, ecology and geological meaning. In the South African context, the major stratigraphic units, intrusions and tectonic/metamorphic events will be detailed, along with related rock types, fossil contents, genesis and economic commodities. Practical work will focus on the interpretation of geological maps and profiles.

## Structural geology 254 (GLY 254)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GLY 151, GLY 161, WTW 114/WTW 158 and FSK 116/FSK 176 |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Quarter 2 |

**Module content**

Integrated theoretical and practical course dealing with the principles of rock deformation and analysis of deformed rocks. Stress, strain and rheology, joints, experimental rock deformation, fault systems and Anderson’s theory of faulting. Folds and interference folding, tectonic fabrics, shear zones, progressive deformation. Stereographic projection and structural analysis.

## Geology for engineering 256 (GLY 256)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | Only for BEng Mining Engineering and BEng Civil Engineering students. |

| | |
|---|---|
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Semester 1 |

**Module content**

This module is given to Mining and Civil Engineering students, focused on the practical application of basic geological principles to engineering problems. The course covers basic rock identification, principles of stratigraphy and landscape formation, and engineering applications of geology such as mining, slope stability, and civil applications. Practicals cover geological maps and profiles, as well as basic rock identification.

## Geodynamics and ore formation 352 (GLY 352)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | GLY 256 |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Quarter 3 |

**Module content**

This module is offered to mining engineering students, and addresses the processes that formed mineral deposits, and the geological approach to exploiting such deposits. The module covers the principles of ore-forming processes and geological environments of ore formation, ore classification schemes, the geometry and geostatistical evaluation of ore bodies, the principles of rock deformation, stress, strain and rheology, joints, fault systems, folds and interference folding, tectonic fabrics, shear zones, and progressive deformation. The practicals cover the identification and classification of ore deposits, and the recognition and mitigation of geologically related mining hazards such as faults, shears and folding.

## Ore deposits 361 (GLY 361)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Five of the second year modules: GLY 253, GLY 254, GLY 255, GLY 261, GLY 262, GLY 265 |
| **Language of tuition** | Module is presented in English |
| **Department** | Geology |
| **Period of presentation** | Quarter 2 |

**Module content**

Systematic review of major metallic and non-metallic ore types and examples in South Africa and world-wide; ore type models (grades, tonnages); geometry of ore bodies; mining. Ore samples and ore mineralogy. Mapping techniques.

## Remote sensing 220 (GMA 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BSc Environmental Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Geology<br>BSc Information and Knowledge Systems<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GMC 110 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 1 |

**Module content**

This module will provide a thorough introduction to the basic scientific principles involved in remote sensing, and some of the applications to studies of the Earth's surface. This includes examining the basic physics of electromagnetic radiation and the complex interactions of radiation with the surface and atmosphere (i.e. spectral signatures). In addition, basic concepts of photogrammetry will be discussed. The theoretical background laid out in the first half of the module will provide the tools for examining various remote sensing applications using data obtained in different parts of the electromagnetic spectrum. The applications will include uses of satellite remote sensing data for mapping and monitoring vegetation, soils and minerals, snow and ice, water resources and quality, and urban landscapes. The laboratory section will include hands-on experience with various satellite image data sets.

## Cartography 110 (GMC 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Meteorology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 2 |

**Module content**

Spherical trigonometry. Geometrical geodesy: Datum surfaces and coordinate systems in Geodesy, Calculations on the ellipsoid, Datum transformations. Map projections: Projection principles, distortion determination, and construction of conformal, equivalent and equidistant projections, the Transverse Mercator projection and UTM projection of an ellipsoidal earth, projection transformations. Space geodesy: Time systems, Celestial and observer coordinate systems, Global Navigation Satellite Systems (GNSS), Satellite orbits and orbital parameters, 3-D positioning. A project or assignments of at least 64 notional hours.

## Mineralogy 210 (GMI 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Crystallography and internal order in minerals (space groups, unit cells, X-ray diffraction data). Bonding, mineral chemistry and solid solution (types of solid solution, calculation of mineral formulae and cation valency). Subsolidus reactions and defects in minerals (thermodynamic basis, defects, importance of subsolidus reactions). Classification and crystal structures of minerals. Mineralogical instrumentation and analysis. Major rock types and their classification. Mineralogical aspects of minerals processing.

## Introductory genetics 161 (GTS 161)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Ecology<br>BSc Entomology<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Nutrition<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BVSc |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Veterinary Science |
| **Prerequisites** | MLB 111 GS |
| **Contact time** | 2 lectures per week, fortnightly practicals |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 2 |

**Module content**

Chromosomes and cell division. Principles of Mendelian inheritance: locus and alleles, dominance interactions and epistasis. Probability studies. Sex determination and sex linked traits. Pedigree analysis. Extranuclear inheritance. Genetic linkage and chromosome mapping. Chromosome variation.

## Molecular genetics 251 (GTS 251)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Ecology<br>BSc Entomology<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | GTS 161 GS |
| **Contact time** | 2 lectures per week, fortnightly practicals |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 1 |

**Module content**

Chemical nature of DNA. Replication transcription, RNA processing and translation. Control of gene expression in prokaryotes and eukaryotes. Recombinant DNA technology and its applications in gene analysis and manipulation.

## Genetic diversity and evolution 261 (GTS 261)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Ecology<br>BSc Entomology<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | GTS 251 GS |
| **Contact time** | 2 lectures per week, fortnightly practicals |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 2 |

**Module content**

Chromosome structure and transposable elements. Mutation and DNA repair. Genomics and proteomics. Organelle genomes. Introduction to genetic analysis of populations: allele and genotypic frequencies, Hardy Weinberg Law, its extensions and implications for different mating systems. Introduction to quantitative and evolutionary genetics.

## Genome evolution and phylogenetics 354 (GTS 354)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GTS 251 GS and GTS 261 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 1 |

**Module content**

Mechanisms involved in the evolutions of genomes. Comparison of the molecular organisation of viral, archaea, eubacterial and eukarytotic genomes. Genome project design, DNA sequencing methods and annotation. Molecular evolution. Phylogenetic inference methods. Applications of phylogenetics and contemporary genome research.

## Population and evolutionary genetics 367 (GTS 367)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | GTS 251 and GTS 261 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 2 |

**Module content**

Genetic and phenotypic variation. Organisation of genetic variation. Random genetic drift. Mutation and the neutral theory. Darwinian selection. Inbreeding, population subdivision and migration. Evolutionary quantitative genetics. Population genomics. Human population genetics. Levels of selection and individuality. Arms races and irreversibility. Complexity. Applied evolution.

## Humanities and social sciences 110 (HAS 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Anthropology and Archaeology |
| **Period of presentation** | Semester 1 |

**Module content**

Social sciences: Perspectives on contemporary society
An introduction to long-standing questions about the nature of human societies and contemporary challenges. Topics to be discussed include globalisation and increasing connectedness; rising unemployment, inequality and poverty; rapid urbanisation and the modern city form; transformations in the nature of work; environmental degradation and tensions between sustainability and growth; shifts in global power relations; the future of the nation-state and supra-national governance structures; and possibilities for extending human rights and democracy. Critical questions are posed about modern selfhood, sociality, culture and identity against the background of new communications technologies, ever more multicultural societies, enduring gender, class and race inequities, and the emergence of new and the resurgence of older forms of social and political identity. These issues are approached from the vantage of our location in southern Africa and the continent, drawing on social science perspectives.

## Humanities and social sciences 120 (HAS 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Afrikaans |
| **Period of presentation** | Semester 2 |

**Module content**

Humanities: Text, culture and communication
Successful communication of ideas, values and traditions depends on understanding both the literal and implied meanings of texts. In this module students are introduced to a variety of texts, including original literary and visual texts, with a view to developing an understanding of how textual meanings have been constructed and negotiated over time. Students are encouraged to understand themselves as products of – and participants in – these traditions, ideas and values. Appropriate examples will be drawn from, among others, the Enlightenment, Modernism, Existentialism, Postmodernism and Post-colonialism.

## Law of lease contracts 720 (HKR 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

Principles of the contractual relationship between tenant and landlord for different types of properties, general clauses that should be included in leases and the legal consequences for parties involved.

## Quantities 101 (HVH 101)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Introduction to quantity surveying, mensuration; interpretation of drawings, methodology of measuring, working up processes, general instructions, measuring of simple building elements.

## Quantities 200 (HVH 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BSc Quantity Surveying |
| **Prerequisites** | BWT 110 GS, BWT 120 GS and HVH 101 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Measuring of simple buildings and simple building elements, and external works. Abstracting and billing.

## Quantities 300 (HVH 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BSc Quantity Surveying |

| | |
|---|---|
| **Prerequisites** | BWT 210 GS, BWT 220 GS, GBD 112 GS, GBD 122 GS and HVH 200 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Measuring of concrete structures, precast concrete, structural steelwork, waterproofing, advanced brickwork, rubble walling, stone masonry, plumbing and drainage and electrical work. Theory of monetary allowances in bills of quantities. Abstracting and billing.

## Quantities 700 (HVH 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Measuring of demolitions, alterations, advanced earthworks and mechanical services. Preliminaries, types of bills of quantities and compilation of bills of quantities including the application of the procurement prescripts of the Construction Industry Development Board in the Public Sector. Geotechnical and civil engineering works.

## Engineering asset management 801 (IAM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Asset management 780 (IBB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

The ISO 55000 standard (under development) defines an Asset as “something that has potential or actual value to an organisation”. The value will vary between different organisations and their stakeholders. Value can be tangible or intangible, financial or non-financial. Asset Management is defined as “the set of coordinated activities that an organisation uses to realise value from assets in the delivery of its outcomes or objectives.” Realisation of value requires the achievement of a balance of costs, risks and benefits, often over different timescales. The overall objective of this module is to apply the basic principles of planning, organisation, leading and control to the management of assets, in particular engineering assets. This includes aspects such as support, operation, performance evaluation and continual improvement. Current standards (e.g. ISO 55000), guidelines (e.g. PAS-55) and other government documents on asset management are also addressed in this module.

## Decision analysis and risk management 780 (IBD 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Decision analysis 804 (IBD 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Decision analysis 880 (IBD 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Techno-economics analysis (TEA), also referred to as economic feasibility studies, is a core technique which is used to support decision making in all for-profit organisations and sometimes more broadly in the public sector. The fundamental principle of the analysis is that only investments or projects which show a positive return on investment should be approved and implemented. Although stated simply, this principle is complex to apply since it changes according to the manner in which costs and income are accounted or measured. The simplest approaches use the generic models of net present values, discounted cash flows, internal rates of return and the time value of money to compare expenses against earnings. In this module, the student will be given an introduction to the principles of techno-economics and the structure of TEA. This introduction will be followed by material on the core calculations of TEA, including present value, future value and return. The students will be required to apply the initial TEA structure to a class project in order to acquire the basic knowledge with which such an analysis can be completed, and as a consequence, how to guide decisions relating to investment in future projects.

## Reliability engineering 801 (IBI 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Industrial marketing 880 (IBM 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 14 lectures per week, 2 web-based periods per week, 22 other contact sessions per week, 6 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Technological entrepreneurship 780 (IEE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

Technical solutions can overcome various problems confronting the world, but new business leaders need to emerge by identifying these potential opportunities that can lead to sustainable enterprises with more employment opportunities. The module highlights the role of technology innovation and strategy in entrepreneurship, the development of business models and plan, the lean start-up principle, legal aspects and venture leadership. Entrepreneurship is an intellectual discipline in its own right with its own systematic methods and techniques that can be learned and mastered through professional practice and hard work. This module will equip you with the fundamentals of technological entrepreneurship that can be applied in new ventures or your existing career.

## Technological intrapreneurship 880 (IEE 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Technological Intrapreneurship or Corporate Entrepreneurship (CE) refers to the means by which an organisation revitalises itself and alter its competitive contour through embarking in entrepreneurial activities which focus on innovation. CE is one of the key tools to take organisations forward in an environment faced by global challenges. This module focuses on the fundamentals of CE, how to design an entrepreneurial organisation, building cultures to support technological intrapreneurship and enable continuous intrapreneurial performance within a corporation

## Research project 780 (IGB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Engineering and Technology Management |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

The research project is the capstone of the MOT programme. It comprises an independent research study into an area of technology management, applying the principles learned during the programme. Although this is a research project of limited breadth and scope, it nonetheless has to comply with the requirements of scientific research on post-graduate level. The total volume of work that is to be invested in this module by an average student must be 320 hours. Normal requirements for assessment that include the use of an external examiner apply to this module.

## Engineering services management 801 (IGB 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Advanced engineering services management 802 (IGB 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Mini-dissertation 898 (IGB 898)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MEng Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

**Module content**

The research component is the capstone of the MTM programme. It comprises an independent research study into an area of engineering, project or technology management, applying the principles learned during the programme. Although not a full master’s dissertation, it is essential to produce something original and useful, both to an academic field in the respective programmes and to the public/private sector that searches for solutions. Although this is a dissertation of limited breadth and scope, it nonetheless has to comply with the requirements of scientific research.

## Thesis: Engineering management 990 (IGB 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Engineering Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Engineering geology 703 (IGL 703)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 Contact hours |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Geology |
| **Period of presentation** | Semester 1 |

## Engineering geology 704 (IGL 704)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Geology |
| **Period of presentation** | Semester 2 |

## Project human resource management 801 (IHR 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 lectures per week, 4 web-based periods per week, 5 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Maintenance management 801 (IIB 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Marketing management 801 (IIM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 12 discussion classes, 20 lectures per week, 22 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Engineering logistics 780 (IIX 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Engineering logistics 801 (IIX 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Technology commercialisation 881 (IKG 881)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The survival of modern companies increasingly depends on the development and successful commercialisation of new products and services. The module is designed to address the principles embedded in the process of identifying, transferring and commercialising inventions and knowledge within the context of national systems of innovation. The intention is to integrate the functional elements of innovation management with emphasis on the entrepreneurial process of commercialising new methods, practices, processes, products, services, systems and technology towards the generation of economic growth, wealth and prosperity.

## Quality management 801 (IKK 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Engineering technology economics 780 (IKN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

Engineering Economy assists the engineer in making a wide range of decisions. These decisions involve the fundamental elements of monetary cash flow, time, value of money, project life and the interest rate. Engineering Economy calculates the net present worth, future worth, annual equivalent worth and the internal rentability of the cash flows of the alternatives under consideration. By applying these values in different ways, the most economical alternative can be identified. Calculation of these values for a cash flow takes into account the effective interest rate, inflation and the income tax payable.

## Information management 884 (ILB 884)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 14 lectures per week, 2 web-based periods per week, 22 other contact sessions per week, 6 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

## Legal aspects of project management 803 (ILC 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Life cycle engineering 780 (ILE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Life cycle management of SHE 802 (ILE 802)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Literature study 801 (ILS 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MEng Technology and Innovation Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

**Module content**

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake a detailed and comprehensive literature review. This module is an integral part of the research component and will be aligned with the research proposal of the student. The major part of the module consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading and individual assignments.

## Literature study 802 (ILS 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Maintenance management 780 (IMC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

The ageing of production assets, process plants, assembly plants, power generation systems and mining machinery, as well as the increasing cost of maintenance has prompted many organisations to view the management of the maintenance process as a higher priority. Neglecting maintenance will cause rapid deterioration of assets and have a negative impact on the company's bottom line. The management of maintenance requires a professional approach due to the complexity of the resources, modern technology and processes involved. The main focus of this module is to establish a holistic focus on the maintenance process, and to enable students to analyse the improvements required using first principles, and other related techniques. A major outcome is the development of a maintenance configuration.

## Knowledge management 880 (IMK 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The objective of this module is to provide an overview of the fundamental concepts and theories of knowledge management from the perspective of technology and innovation management in competitive organisations. Topics addressed include inter alia: Definitions, evolution and context of knowledge; the sourcing, transfer and dissemination of knowledge in the sciences and engineering environments; knowledge management in specific applications such as project management, technology and business intelligence, innovation, etc; human and organisational factors for successful knowledge management in technology-based enterprises.

## Project management practice 801 (IMP 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Multimedia 110 (IMY 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Multimedia |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed – requires departmental selection. Open to BIT, BSc:IT and BSc CS students.
Mark-up Languages. This module explores the role of mark-up languages in the information environment; the difference between the logical structure and the appearance of documents; the study of HTML, CSS and XHTML; the building of websites and basic information architecture.

## Multimedia 120 (IMY 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Multimedia |
| **Prerequisites** | IMY 110 |
| **Contact time** | 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed – requires departmental selection.
Multimedia for the Web. This module introduces the process of creating and editing images, animation, basic interactive content, and sound for the web using multimedia authoring tools, such as Adobe Photoshop, Adobe Flash (with basic ActionScript), and Adobe Audition.

## Multimedia 210 (IMY 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Information and Knowledge Systems |
| **Prerequisites** | IMY 110 or equivalent HTML knowledge |
| **Contact time** | 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed – requires departmental selection.
Advanced Markup Languages 1. This module investigates XML and its related technologies (such as XSLT, XPath, XSL-FO, DTD, XML Schema, and namespaces) as a vital part of the web development process.

## Multimedia 211 (IMY 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Multimedia |
| **Prerequisites** | Departmental selection |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed - requires departmental selection.
Multimedia and hypermedia theory. This module offers the opportunity to make a thorough study of the theory and applications of multimedia and hypermedia. This includes: multimedia products, multimedia authoring tools, hypermedia databases, digital publications on the World Wide Web, New Media, as well as information architecture, websites and the social realities and impact of the World Wide Web.

## Multimedia 220 (IMY 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIS Multimedia<br>BIT<br>BSc Information and Knowledge Systems |

| | |
|---|---|
| **Prerequisites** | IMY 210 and COS 216 |
| **Contact time** | 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed - requires departmental selection.
Advanced Markup Languages 2. This module assumes knowledge of dynamic scripts and basic web based technologies such as PHP as well as the use of relational databases like MySQL. The module explores the interplay between scripting languages, databases, and current industry standard web technologies, from both the server-side and client-side perspectives. The module has a focus on developing hands-on practical skills.

## Multimedia: Project 300 (IMY 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 45.00 |
| **Programmes** | BIS Multimedia<br>BIT |
| **Prerequisites** | COS 212 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

*Closed – requires departmental selection.
The module enables students to combine all their knowledge gained through out their studies to create a functional game. The course consists of extensive game design theory teaching. The students create a game by following an iterative design process, extensive documentation and in depth play testing and usability testing. The final product is a creative, innovative and complete game.

## Multimedia 310 (IMY 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Multimedia<br>BSc Information and Knowledge Systems |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed - requires departmental selection.
Human-computer Interaction. This module involves a study of human-computer interaction and human-information interaction; humans as computer and information users; and the ethical aspects relating to the creation of multimedia information products. A detailed study of the role, composition and functioning of an interface, underlying principles in the design and evaluation of interfaces, will also be undertaken.

## Multimedia 320 (IMY 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Multimedia |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed - requires departmental selection.
Trends. This module deals with technical aspects of multimedia hardware and software, digital video and audio formats and compression; and version management. A detailed study of the latest developments in mark-up languages and related technologies will also be undertaken.

## Virtual environments 700 (IMY 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module exposes students to virtual environments, ranging from fully immersive virtual reality to online virtual worlds. Starting with the notion of reality and how it is simulated, students learn about hardware, software and human factors associated with the creation and exploration of virtual environments. Students are also exposed to VE platforms and techniques, which they use to create a virtual world.

## Animation theory and practice 701 (IMY 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisite. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module provides an overview of the historic and current principles and practice of natural motion animation. Different animation techniques are covered, such as stop motion, traditional animation, and 3D animation. The student receives an opportunity to create an animated short film using a technique of their choice.

## Multimedia research project 761 (IMY 761)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BISHons Multimedia |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

*Closed module
Development and production of a multimedia product; product life-cycle management and documentation; the student submits a proposal which is evaluated and if approved, produces a working multimedia product.

## Multimedia trends 771 (IMY 771)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

History of multimedia ideas and technology; current trends in multimedia, latest technologies and future trends of multimedia.

## Hypermedia and mark-up languages 772 (IMY 772)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

A study of hypermedia systems, specifically adaptive hypermedia systems, as well as data modelling, storage and retrieval, database structures and metadata. A study of different mark-up languages and their role in multimedia products with the emphasis on data structuring, hyper linking theories and models.

## Multimedia technology 773 (IMY 773)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

In this module students will research and discuss a current topic which can change from year to year. The topic for a specific year can be obtained from the departmental website. The topic is related to the creative use of Multimedia Technologies. An understanding of the current multimedia trends is required together with the knowledge of its usage.

## Virtual environments 774 (IMY 774)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 practical per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module exposes students to virtual environments, ranging from fully immersive virtual reality to online virtual worlds. Starting with the notion of reality and how it is simulated, students learn about hardware, software and human factors associated with the creation and exploration of virtual environments. Students are also exposed to VE platforms and techniques, which they use to create a virtual world.

## Animation theory and practice 777 (IMY 777)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia<br>BIT |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module provides an overview of the historic and current principles and practice of natural motion animation. Different animation techniques are covered, such as stop motion, traditional animation, and 3D animation. The student receives an opportunity to create an animated short film using a technique of their choice.

## Human-computer interaction 779 (IMY 779)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Multimedia<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

In this module, students are exposed to research topics and methodologies within the HCI discipline. Students then apply their understanding by proposing and delivering a research paper.

## Multimedia: Coursework component 801 (IMY 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 120.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Coursework component

## Dissertation: Multimedia 890 (IMY 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIS Multimedia |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Mini-dissertation and research portfolio: Library science 896 (IMY 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 120.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Thesis: Multimedia 990 (IMY 990)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Informatics 112 (INF 112)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Business Management<br>BCom Financial Sciences<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BIS Information Science<br>BSc Extended programme - Physical Sciences<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; or STK 113 60%, STK 123 60% or STK 110 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to information systems, information systems in organisations, hardware: input, processing, output, software: systems and application software, organisation of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.

## Informatics 154 (INF 154)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |

| | |
|---|---|
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to programming.

## Informatics 164 (INF 164)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | INF 154; A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; AIM 101 or AIM 102 or AIM 111 and AIM 121 |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

Advanced programming, use of a computer-aided software engineering tool.

## Informatics 171 (INF 171)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BCom Informatics Information Systems<br>BCom Statistics<br>BIS Information Science<br>BIT<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

General systems theory, creative problem solving, soft systems methodology. The systems analyst, systems development building blocks, systems development, systems analysis methods, process modelling.

## Informatics 214 (INF 214)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BCom<br>BCom Informatics Information Systems<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIT<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Geography<br>BSc Geoinformatics<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | AIM 101 or AIM 111 and AIM 121 |
| **Contact time** | 2 lectures per week, 2 practicals per week |
| **Language of tuition** | Afrikaans and English are used in one class |

| | |
|---|---|
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

**Module content**

Database design: the relational model, structured query language (SQL), entity relationship modelling, normalisation, database development life cycle; practical introduction to database design. Databases: advanced entity relationship modelling and normalisation, object-oriented databases, database development life cycle, advanced practical database design.

## Informatics 225 (INF 225)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BCom<br>BCom Informatics Information Systems<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BSc Geography<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | INF 164 and INF 171; AIM 101 or AIM 102 or AIM 111 and AIM 121 |
| **Contact time** | 1 lecture per week, 3 practicals per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

An overview of systems infrastructure and integration.

## Informatics 261 (INF 261)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 7.00 |
| **Programmes** | BCom<br>BCom Informatics Information Systems<br>BCom Statistics<br>BIS Information Science<br>BSc Geography<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |

| | |
|---|---|
| **Prerequisites** | INF 214 |
| **Contact time** | 1 lecture per week, 1 practical per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

Database management: transaction management, concurrent processes, recovery, database administration: new developments: distributed databases, client-server databases: practical implementation of databases.

## Informatics 271 (INF 271)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BIS Information Science<br>BIT |
| **Service modules** | Faculty of Education |
| **Prerequisites** | AIM 101 or AIM 102 or AIM 111 and AIM 121, INF 163, 164 |
| **Contact time** | 1 discussion class per week, 1 lecture per week, 1 practical per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

Systems analysis. Systems design: construction; application architecture; input design; output design; interface design; internal controls; program design; object design; project management; system implementation; use of computer-aided development tools.

## Informatics 272 (INF 272)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | AIM 101 or AIM 102 or AIM 111 and AIM 121, INF 163 and INF 164, Regulation IT.3(g) |
| **Contact time** | 1 lecture per week, 2 practicals per week |

| | |
|---|---|
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

Use of computer-aided development tools; advanced programming.

## Informatics 282 (INF 282)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 3.00 |
| **Programmes** | BCom<br>BCom Financial Sciences<br>BCom Investment Management<br>BCom Statistics<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | FRK 111, FRK 121 or FRK 100 or FRK 101 |
| **Contact time** | 2 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

Computer processing of accounting information.

## Informatics 301 (INF 301)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 80.00 |
| **Programmes** | BCom Informatics Information Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | INF 214, INF 225, INF 261, INF 271 and INF 272 |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

*INF 301 is a module that combines INF 315, INF 324, INF 354 and INF 370. Students register for all these modules, but receive a calculated percentage for INF 301.
A review of current trends that are relevant to the application of information systems within a business environment. Information systems in organisations, social and ethical responsibilities, the role of the Informatician. IT end-user relationships; IT management. Advanced programming. Application of systems analysis and design in a practical project; programming; use of computer-aided development tools.

## Informatics 315 (INF 315)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BIT |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | INF 261, INF 225, INF 271 and INF 272 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

**Module content**

A review of current trends which are relevant to the application of information systems within a business environment.

## Informatics 324 (INF 324)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIS Information Science<br>BIT |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | INF 261, INF 225, INF 271 and INF 272 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

### Module content

Information systems in organisations, social and ethical responsibilities, the role of the Informatician. IT end-user relationships; IT management.

## Informatics 354 (INF 354)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BCom Informatics Information Systems<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | INF 261, INF 225, INF 271 and INF 272 |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

### Module content

Advanced programming.

## Informatics 370 (INF 370)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BCom Informatics Information Systems<br>BIT |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | INF 261, INF 225, INF 271 and INF 272 |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Year |

### Module content

Application of systems analysis and design in a practical project; programming; use of computer-aided development tools.

## Enterprise architecture 715 (INF 715)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |

| | |
|---|---|
| **Programmes** | BIT |
| **Prerequisites** | INF 788 |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Enterprise Architecture (EA) involves comprehensive business frameworks that capture the complexity of modern organisations, providing a blue-print for co-ordinating and integrating all components of an organisation. The module will illustrate all the aspects of EA, discuss the need for EA as well as various frameworks, methods and techniques of EA.

## Capita selecta 716 (INF 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module will be used to present special, relevant topics within the expertise of the department.

## Electronic commerce 782 (INF 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The analysis of the management, innovation and information systems aspects of the use of e-business technology and strategies

## Advanced database systems 785 (INF 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 other contact session per week, 1 web-based period per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

- Advanced database design
- Advanced database management
- Database architectures and languages
- Data warehousing and data marts
- Current trends

## Managing projects and end-users 787 (INF 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 web-based period per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Main emphasis will be on IS project management using a case study to get practical experience in project management.

## Information systems development 788 (INF 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 web-based period per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Study and evaluation of different systems development methodologies.

## Capita selecta 790 (INF 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 web-based period per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module will be used to present special, relevant topics within the expertise of the department.

## Knowledge acquisition and sharing 791 (INF 791)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 1 practical per week, 2 web-based periods per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

In this information age a lot of data is captured every day and recorded in databases, but the wealth of this data is kept locked in the databases because relatively little mining is performed on this data. This module introduces you to data mining in terms of:
• The data mining process - how do you mine data?
• The data mining techniques - an overview of the data mining techniques that can be used;
• Practical data mining experience - a practical project mining real industry data to find unknown patterns; and
• Product overviews - product demonstrations by data mining vendors.

## Big data science elective 801 (INF 801)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Big data science elective 802 (INF 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

**Module content**

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Research methodology 800 (INI 800)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MEng Technology and Innovation Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake independent research for a masters' dissertation. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading, individual assignments and preparation for the examination.The lecturer will act as a guide to the students to acquire the necessary knowledge and skills through self-study and practical exercises, in addition to formal lecturers.

## Research methodology 801 (INI 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Information science 110 (INL 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA Visual Studies<br>BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module is an introduction to the study field of information science and its various professions. Key concepts that will be discussed include the following: the human as information processor and user; the life-cycle of information in terms of processes, products and role-players; as well as the communication of information. The social-ethical impact of globalisation is included as a key concern, with reference to Africa.

## Information science 120 (INL 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science<br>BIS Multimedia<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Organisation and representation of information. This module provides the student with an introduction to the basic principles and processes underlying the organisation and representation of information. The process of organising information in documents and on the web, in multimedia formats, by means of document image processing and in databases are dealt with. Themes on the representation of information through the creation of metadata include various general and domain specific metadata schemas such as Dublin Core as a metadata standard for the Web, as well as various other metadata schemas.
Practical classes include basic HTML and the design of Web pages incorporating and applying what was covered in theory.

## Information science 130 (INL 130)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Personal information management. This module focuses on personal information management within an organisational context. It deals with managing information and knowledge that is peculiar to an individual and which enables him/her to perform his/her job.
Topics include: creating an environment in which the individual can manage his/her information and knowledge; the skills needed to be able to manage personal information and knowledge; information overloading which gives rise to personal information and knowledge management, as well as the manner in which individuals can switch from personal information management to personal knowledge management; personal information and knowledge management as a career.

## Information science 140 (INL 140)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA Visual Studies<br>BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Information and communication technology. This module offers a brief overview of hardware and software, telecommunications technology, LANs, WANs and intranets, the information highway, the internet and the World Wide Web, computer ethics, ICTs, e-commerce, mobile computing technology and the influence that new trends and developments have on the distribution of information.

## Information science 210 (INL 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Information Science<br>BIT<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | AIM 101 or AIM 102 or AIM 111 and 121 |
| **Contact time** | 3 lectures per week, 3 practicals per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Information seeking and retrieval. This module explores the theory and practice of effective information seeking and retrieval. It builds on supporting research paradigms such as the systems, user-centred, cognitive and socio-cognitive paradigms. The focus is on the complexities of effective information seeking and retrieval within the context of information behaviour on a personal level, as well as in the context of professional, academic or everyday information needs.

## Information science 220 (INL 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | INL 210 or LP |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Representation and organisation. Information needs to be represented and organised in a system for it to be effectively retrievable. This module deals with the representation and organisation of information on the level of individual entities (e.g. indexing), from the perspective of the users (user profiling), as well as within a document collection (taxonomies and ontologies).

## Information science 230 (INL 230)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

User studies and dissemination. This module focuses on the individual as seeker, user, reader and communicator of information. Various user groups are identified and their information use and communication patterns and requirements are analysed and investigated. This module covers methods of service provision to facilitate and enhance the use and dissemination of information in accordance with the user's needs.

## Information science 240 (INL 240)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA Visual Studies<br>BIS Information Science<br>BIS Publishing<br>BIT<br>BPolSci Political Studies |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Social and ethical impact. This module examines moral and legal regulation practices related to information in print and digital environments. Different ethical theories are identified and applied to privacy, access to information, information poverty and censorship. The interpretation and enforcement of rules and regulations are discussed.

## Information science 260 (INL 260)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Economics and politics of information. This module examines the economics and politics of information, with a special emphasis on South Africa's information sector. It aims to promote an understanding of the market and non-market qualities of information, and their consequences for the production, distribution and marketing of information goods and services. The ways in which information access and expression are regulated and the use of ICTs in crime and corruption is also addressed.

## Information science 270 (INL 270)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Indigenous knowledge and communication. This module focuses on the role and function of Indigenous Knowledge (IK) in the information and knowledge society. Various categories and contexts of IK are explored within international and local perspectives.
Issues pertaining to access and communication of IK, inter alia through Information and Communication Technology (ICT), are addressed in order to ensure sustainable development.

## Information science: Information organisation 310 (INL 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Information Science<br>BIT<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Information Organisation. The module is concerned with the organisation of information in the digital environment focusing on the structure and use of document management and workflow systems, as well as distribution channels and virtual environments. The characteristics and application of the internet, intranets, as well as portals and applications use, are considered.

## Information science: Information and knowledge management 320 (INL 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Information Science<br>BIT<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Information and Knowledge Management. This module focuses on information and knowledge management at an operational level and introduces information and knowledge management at a corporate strategic level. It deals with the management of information and knowledge, which enables the organisation to be competitive. In this module the focus is on four aspects, namely: the 21st century organisation, the external and internal stakeholders that have an interest in information products, as well as the infrastructure that should be in place in organisations to manage information products. The module concludes with a few topics relating to information management at a corporate strategic level.

## Information science: Digital repositories 340 (INL 340)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module deals with the construction and management of digital repositories. It also addresses the characteristics of the digital repository in a rapidly changing technological world and a challenging information society. Core aspects include: system design, relationships to hybrid libraries, digital collections and rights management, standards, virtual referencing and the development and evaluation of digital repositories.

## Information science: Socio-political aspects of information in global context 360 (INL 360)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA Visual Studies<br>BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module examines aspects of the information and knowledge society within local, regional and international contexts. A special focus of the module is the interaction and exchange of data, information and knowledge from communities' local knowledge system with data, information and knowledge from the global knowledge system. The module discusses the growth and role of information and communication technologies (ICTs), and their implications for development.

## Information science 370 (INL 370)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 15.00 |
| **Programmes** | BIS Information Science<br>BSc Computer Science |
| **Prerequisites** | INL 210, 220 and INL 310 or registered for INL 310 |
| **Contact time** | 1 lecture per week, 2 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Experiential learning project. This module takes the form of a project and experiential training in co-operation with industry.

## Information science: Competitive intelligence 380 (INL 380)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Information Science<br>BPolSci Political Studies<br>BSc Computer Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module provides an overview of Competitive Intelligence (CI) and focuses on the needs for CI in organisations. The ways in which organisations compete and the benefits that CI can bring to these organisations will also be covered. The growing need for CI among South African organisations will also be examined. Practical examples and case studies will be used to highlight the value of CI in organisations.

## Information and knowledge management 802 (INL 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

The module focuses on an in-depth study of new tendencies and complex concepts in the field of Information and Knowledge Management.

## Information ethics and law 803 (INL 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module focuses on the relationship between poverty and information and the effect that it has on the lives of people in South Africa; the Promotion of Access to Information Act; and the philosophical background of Intellectual Property Rights (Hegel, Marx and Lock) and how this Western concept has influenced the digital divide between the information rich and information poor.

## Information for development 804 (INL 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module focuses on human development and the importance of disseminating information effectively to developing communities. It includes aspects of participatory communication, the role of communication within the strategic management processes of the development project, elements of participatory message design as well as the role of Information Resource Centres in disseminating information.

## Information society 806 (INL 806)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

In this module the technological, social and globalisation aspects of the development of information in societies is investigated on three levels: Societies as a whole, organisations that produce information products; render information services; and the individual citizens.

## Informetrics 809 (INL 809)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

*Requires: Knowledge of Statistics - Consult the department in this regard
Informetrics investigates the quantitative aspects of information (communication) processes, particularly those using text. It incorporates the old field of Bibliometrics, and the new areas of Cybermetrics and Webometrics. Topics covered are: citation indexing, citation networks and citation matrices, bibliographic coupling, co-citation graphs, science policy applications, informetric laws and approximations.

## Competitive intelligence 810 (INL 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

"The next best thing to knowing all about your own business is to know all about the other fellow's business" - John D Rockefeller
Establishing an effective competitive intelligence program is an integral part of every enterprise that wants to survive in the new millennium. This module focuses on the competitive intelligence strategy, intelligence management, intelligence processes, the intelligence resources, competitive technology intelligence and security.

## Advanced decision-making theory 811 (INL 811)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Advanced decision-making theory within information and knowledge management is studied in depth. Processes and systems that are used for the management of information and knowledge are analysed concerning decision-making theory. Organisational sense making and scenario building are also addressed.

## Organisation and retrieval of information 812 (INL 812)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Theoretical approaches for the organisation and retrieval of information are studied including metadata, ontologies and taxonomies. Organisation of information as well as storage, access and searching of desired information as required by individuals.

## Management of information centres 813 (INL 813)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module covers a study of information centres as business organisations. The focus, therefore, is on the survival of information centres in the business environment, e.g. change management, business processes, re-engineering, strategic human resource management, the impact of technological innovations and modern business practices, focussing on information centres.

## Big data science elective 820 (INL 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Five credits of an elective module can be drawn from Information Science. A module in Research Data Management (RDM) is available as an elective. The following topics would typically be covered: Open Science and the dependency on open (big) data, The research process and the life cycle of big data (data management plans to publishing derivative data sets, licensing and legal implications); managing (curating) big vs long tail data; solving problems with research data vs the business value of big data (data-intensive decisionmaking); managing data as an asset (also data citation); issues and challenges involved in the management of big data (principles and best practices for effective big data governance); trusted data repositories; data stewardship frameworks for big data; and the data steward's toolbox.

## Dissertation: Information science 890 (INL 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIS Information Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Mini-dissertation: Information science 895 (INL 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Thesis: Information science 990 (INL 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |

| | |
|---|---|
| **Programmes** | PhD Information Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## New product development 880 (INP 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The development of new products is a very important activity within a firm. There is always a high risk of failure but the best companies manage to bring out successful new products on a continuous basis. The module introduces the processes, tools and techniques and strategies used by leading-edge companies for new-product development. It examines different stages of product development, from idea generation to market testing and includes the assessment and selection of appropriate business models. Fourth industrial revolution technologies are considered as well.

## Dissertation: Interior architecture 890 (INT 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIntArch |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Thesis: Interior architecture 990 (INT 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Interior Architecture |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Technology and innovation management 780 (INV 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

In an increasingly competitive and fast changing business world the management of technological innovation is a key function of organisations that want to prosper. It is therefore important that engineers, scientists and managers understand the fundamental principles of technology and innovation. This module addresses aspects such as the activities and tools of technology management and the processes and dynamics of innovation as important contributors to the creation of new knowledge, products and processes.

## Organisation and innovation 880 (INV 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module has been designed for master's students wishing to build substantive and methodological knowledge in two profound and related disciplines and phenomena: organisation studies and innovation studies. It focuses on providing an overview of the main concepts, theoretical perspectives and models regarding organisation, technological innovation and the relationships between different forms of organisation and technological innovation (e.g. organising for creativity; systems supporting innovation). This module further explains innovation at several levels of analysis (individuals, teams, organisations, sectors, nations). Students are expected to apply the acquired knowledge in their workplace.

## Information communication 700 (INY 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | PGDip Digital Innovation |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Informed by the participatory approach to communication this module reflects in depth on methods for the effective communication of information. In order to achieve this, the nature on information within the context on Information Science will be investigated. Thereafter, communication media will be identified and discussed and students will learn how to create a target audience profile to determine the appropriate media and content for the dissemination of information. Information and communication technologies (ICTs) and the communication of information will be investigated along with literacy and media literacy. The communication of information will form a central focus of this module. Therefore the role of traditional, interpersonal, as well as modern media will be addressed. The processes of creating meaningful and effective messages for the communication of information as well as intercultural communication will also be addressed.

## Information and knowledge management 701 (INY 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module consists of two main sections. A theoretical framework of information and knowledge management will be addressed in section one. Section two covers the enablers of information and knowledge management. These include: leadership, corporate culture, organisational learning, strategy, laws and policies, measurement and information technology.

## Research methodology 711 (INY 711)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BISHons Multimedia<br>BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Research methodology and the application thereof to resolve research problems and to create new knowledge, is a valued advantage to any student. The module is compiled with the following objectives in mind: to instruct the student in the basic principles of research and to avail them the opportunity to execute research projects in a professional manner. Students are guided from the selection of a problem to the presentation of a complete research report with practical suggestions based on a solid theoretical framework.

## Information and knowledge management (I) 713 (INY 713)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module consists of two main sections. A theoretical framework of information and knowledge management will be addressed in section one. Section two covers the enablers of information and knowledge management. These include: leadership, corporate culture, organisational learning, strategy, laws and policies, measurement and information technology.

## Organisation, retrieval and seeking of information 714 (INY 714)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |

| | |
|---|---|
| **Programmes** | BISHons Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | See departmental website |

**Module content**

Information retrieval covers the problems relating to the effective storage, access, and searching of information required by individuals.
This module will introduce students to the theory and operative requirements of information organisation and retrieval and the evaluation of information retrieval systems, as well as information seeking behaviour.

## Information ethics 715 (INY 715)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | See departmental website |

**Module content**

This module focuses on the main moral issues pertaining to information and ICT, globalisation, privacy and knowledge flow. It covers amongst others the following fields: cyber warfare and terrorism; information philosophy; information security; privacy and the right to information; digital identity management; cyber law; globalisation and the impact on society.

## Information and knowledge management (II) 716 (INY 716)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Prerequisites** | INY 713 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |

| | |
|---|---|
| **Period of presentation** | See departmental website |

**Module content**

This module offers the student the opportunity to become conversant with various knowledge management programmes as well as the development, implementation and evaluation of knowledge management strategies. Knowledge representation and the development of an Intranet will be covered. New key issues in the field of knowledge management conclude this module.

## Information retrieval 717 (INY 717)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

"Information is continuing to grow exponentially, diversifying into many forms and media. In this complex labyrinth there is a definite need for increased effort aimed at tailoring IR performance to user demands" (Ingwersen, 1992).
In this module students will study information retrieval from a systems perspective, but with the human user in mind. Best-match and Boolean systems will be studied in some detail, focussing on the different aspects of human and machine relevance. Information seeking behaviour studies that can support the enhancement of IR performance will also be covered.

## Information society 722 (INY 722)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module evaluates approaches to and concepts of the information/knowledge society. It questions the origins and political motives for the promotion of an information/knowledge society, and examines a number of relevant themes in the literature.

## Competitive intelligence (I) 726 (INY 726)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

Establishing an effective competitive intelligence programme is an integral part of every enterprise that wants to survive in the new millennium. This module focuses on the competitive nature of the business environment, the aim of competitive intelligence, Porter's Competitive Forces Model, the distinction between competitive intelligence and industrial espionage, the intelligence process as well as the tools and techniques for the development and implementation of a competitive intelligence programme.

## Competitive intelligence (II) 727 (INY 727)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Prerequisites** | INY 726 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

Competitive intelligence (CI) provides the decision maker with analysed information about the competitive environment, aimed at satisfying decision-making needs. This module focuses on the role of analysis in the intelligence cycle, applying analysis techniques to a case study, CI and corporate governance, the setting up of a CI capability in an organisation and the problems facing CI professionals in South Africa.

## Management of information centres 729 (INY 729)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

Information centres are now regarded as similar to any other type of business organisation. It is therefore important for them to be managed in the same way that other businesses are managed. This module focuses on the management of information centres within the greater business environment and highlights areas of management that can lead to the success of the information centres. These include change management, business processes, re-engineering, strategic human resources management and the impact of technological innovation in the IT environment.

## Information communication 730 (INY 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Information Science<br>BIT |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Informed by the participatory approach to communication this module reflects in depth on methods for the effective communication of information. In order to achieve this, the nature on information within the context on Information Science will be investigated. Thereafter, communication media will be identified and discussed and students will learn how to create a target audience profile to determine the appropriate media and content for the dissemination of information.
Information and communication technologies (ICTs) and the communication of information will be investigated along with literacy and media literacy. The communication of information will form a central focus of this module. Therefore the role of traditional, interpersonal, as well as modern media will be addressed. The processes of creating meaningful and effective messages for the communication of information as well as intercultural communication will also be addressed.

## Research report 734 (INY 734)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BISHons Information Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Students are expected to write a research report (5 000-7 000 words) (10 000-12 000 words) on a topic to be selected in collaboration with the lecturers.

## Multimedia 774 (INY 774)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Developmental management 801 (IOB 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## New ventures and entrepreneurship 801 (IOE 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework) |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Internal auditing 211 (IOK 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Informatics Information Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | FRK 111 and FRK 121 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Auditing |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the audit environment. Nature, objectives, history and development of internal auditing. The internal auditing profession and the role of the Institute of Internal Auditors (IIA). Ethical code and standards of internal auditors (IPPF). An organisation’s internal control environment and internal control systems. Introduction to Information Technology (IT). General controls and application controls frameworks. The internal audit process and tools and techniques used during the audit Introduction to sampling.

## Internal auditing 221 (IOK 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Informatics Information Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | IOK 211 GS |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Auditing |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to corporate governance. Relationship between internal auditing and other related disciplines and individuals. Background to external auditing. Internal and external audit approaches.The identification of weaknesses, risks and controls for the revenue and procurement systems in the system. The audit of internal control systems and the audit of financial statements.

## Internal auditing 311 (IOK 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Informatics Information Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | IOK 211 and IOK 221 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Auditing |
| **Period of presentation** | Semester 1 |

**Module content**

General and application IT controls. The identification of weaknesses, risks and controls for the inventory, bank and cash systems. Statistical sampling. The audit of internal control systems and the audit of financial statements. Internal audit and external audit reports.

## Internal auditing 321 (IOK 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom Financial Sciences<br>BCom Informatics Information Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | IOK 311 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Auditing |
| **Period of presentation** | Semester 2 |

**Module content**

The identification of weaknesses, risks and controls for the payroll system and health and safety environment. The audit of internal control systems and the audit of financial statements. Computer Assisted Audit Techniques (CAATS). Introduction to performing an operational/performance audit. Relevant legislation and other guidelines that affect the internal audit profession. Introduction to the public sector internal audit environment.

## Project financial and cost management 802 (IPF 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Engineering professionalism 410 (IPI 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

**Module content**

Requirements to maintain continued competence and to keep abreast of up-to date tools and techniques. ECSA code of conduct, Continuing Professional Development, ECSA outcomes, ECSA process and reasons for registration as CEng and PrEng. Displays understanding of the system of professional development. Accepts responsibility for own actions. Displays judgment in decision making during problem solving and design. Limits decision making to area of current competence. Reason about and make judgment on ethical aspects in case study context. Discerns boundaries of competence in problem solving and design. Case studies typical of engineering practice situations in which the graduate is likely to participate.

## Project procurement management 801 (IPJ 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Project management 780 (IPK 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

This module addresses basic project management concepts, principles and techniques. The module is aligned with both the U.S. Project Management Institute's Project Management Body of Knowledge (PMBoK) as well as PRINCE2 methodology developed in the UK. Scheduling of projects is a core element of project management and IPK780 covers project scheduling in somewhat more detail and at a more advanced level than the other topics.

The aim of the module is to develop the learner's ability to identify and solve problems in a way that display critical thinking and the application of quantitative methods. The module focuses on project initiation, planning, monitoring and control. Specifically the development of a project plan, different scheduling techniques, earned value, decision making and basic risk management. A deliverable of the module is a project plan (including project scope, WBS, schedule, risk management plan and cash flow) for a project in the learner's work environment.

## Project management 803 (IPK 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Project management 804 (IPK 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The nature of projects and project management. The project life cycle and project phases. Organisational aspects of project management. Project teams and roles. Responsibility matrixes. Processes and methodologies for planning and control: Initiating the project, Scope planning, Scope definition and the WBS, Scope verification and work authorisation. Scheduling: Stochastic PERT, CPM time-cost tradeoffs and critical chain.Resource planning and scheduling of multiple projects and scheduling of multiple projects. Cost estimating, project budgeting and project cash flow. The control process. Performance analysis: earned value and performance indices. Project closure: evaluation, reporting and termination. Project management information systems. Project closure and continuing improvement. Reasons for project successes and failures.

## Thesis: Project management 990 (IPK 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Project Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Introduction to project management 801 (IPM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Production and operations management 801 (IPP 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Project quality management 801 (IQM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MEng Project Management (Coursework)<br>MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Decision analysis and risk management 801 (IRI 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Project risk management 801 (IRM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Research project 780 (ISC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Engineering and Technology Management |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

The research project is the capstone of the MOT programme. It comprises an independent research study into an area of technology management, applying the principles learned during the programme. Although this is a research project of limited breadth and scope, it nonetheless has to comply with the requirements of scientific research on post-graduate level. The total volume of work that is to be invested in this module by an average student must be 320 hours. Normal requirements for assessment that include the use of an external examiner apply to this module.

## Mini-dissertation 898 (ISC 898)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Programmes** | MSc Engineering Management (Coursework)<br>MSc Project Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

**Module content**

The research component is the capstone of the MTM programme. It comprises an independent research study into an area of engineering, project or technology management, applying the principles learned during the programme. Although not a full master's dissertation, it is essential to produce something original and useful, both to an academic field in the respective programmes and to the public/private sector that searches for solutions. Although this is a dissertation of limited breadth and scope, it nonetheless has to comply with the requirements of scientific research.

## Systems thinking and engineering 780 (ISE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management<br>BScHons Financial Engineering |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

A company's ability to remain competitive in modern times hinges increasingly on its ability to perform systems engineering. The technology and complexity of a company's products appears to steadily increase and with it, the risks that need to be managed. This module provides specialised knowledge to apply systems engineering by understanding the tools, processes and management fundamentals.

## Systems engineering and management 801 (ISE 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Project systems engineering 802 (ISE 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Strategic management 801 (ISM 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 2 |

## Strategic project management 804 (ISM 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

## Condition-based maintenance 832 (ISM 832)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Science, technology and innovation policy 880 (ISP 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Science, Technology & Innovation (STI) Policy is considered to drive innovation and innovation is considered to be a core contributor toeconomic growth in all countries. As a result, STI policy is critical to the effective generation and utilisation of STI knowledge, whether this beundertaken for public good or private gain. In this module the student willbe given an introduction to, and the linkage between, Science and Technology, research and development, and innovation. This introduction will be followed by a brief history of innovation theory and how S&T links to both national and technological innovation systems. The range of policy instruments which can be used to stimulate science, technology andinnovation will then be reviewed, followed by the characterisation of the instruments which are presently adopted in South Africa. The student will then be presented with a range of frameworks to allow the analysis of different S&T policies and innovation systems, with particular reference to South Africa and other countries in the region.

## Strategic technology and innovation management 880 (IST 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The objective of this module is to provide students with the necessary skills to develop technology and innovation strategies for organisations. Themes include the concepts of technology and innovation strategy, processes of strategic management, formulation of technology and innovation strategies, strategy implementation, technology roadmapping, scenario development and future thinking. Appropriate case studies are used to link the theory and practice.

## Dissertation: Information systems 890 (ISY 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIT Information Systems |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Year |

## Thesis: Information Systems 990 (ISY 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Information Systems |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Year |

## Technology management 801 (ITB 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 |

## Technology management 802 (ITB 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 lectures per week, 22 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The module aims to provide students with insight into the concept of technology and the utilisation thereof in the business environment. The module provides theory and application skills on the operational level. Themes addressed are: Theory of technology, Technology forecasting and dynamics, Technology audits, Technology planning and Technology acquisition. The themes form part of the portfolio of technology management activities that organisations should be able to master in order to be competitive.

## Dissertation: Technology and innovation management 890 (ITB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Technology and Innovation Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Dissertation: Technology management 891 (ITB 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Dissertation: Technology and innovation management 895 (ITB 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Technology and Innovation Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Mini-dissertation 896 (ITB 896)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 64.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Thesis: Technology and innovation management 990 (ITB 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Technology and Innovation Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Year |

## Operations management 781 (IVV 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Engineering and Technology Management<br>BScHons Engineering and Technology Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Engineering and Technology Management |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Operations management develops the ability of students to think about the transformation processes in organisations in a global way. The emphasis is on learning how to improve operating systems significantly through maximising throughput and minimising costs. The understanding of operating systems is developed from a flow- as well as an effect-cause-effect perspective.

## Community-based project 201 (JCP 201)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BCom Informatics Information Systems<br>BSc Architecture<br>BSc Construction Management<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Quantity Surveying<br>BSc Real Estate<br>BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

This project-orientated module is a form of applied learning which is directed at specific community needs and is integrated into all undergraduate academic programmes offered by the Faculty of Engineering, Built Environment and Information Technology. The main objectives with the module are as follows:
(1) The execution of a community related project aimed at achieving a beneficial impact on a chosen section of society, preferably but not exclusively, by engagement with a section of society which is different from the student's own social background.
(2) The development of an awareness of personal, social and cultural values, an attitude to be of service, and an understanding of social issues, for the purpose of being a responsible professional.
(3) The development of important multidisciplinary and life skills, such as communication, interpersonal and leadership skills.
Assessment in the module will include all or most of the following components: evaluation and approval of project proposal, assessment of oral and/or written progress reports, peer assessment in the event of team projects, written reportback by those at which the project was aimed at, and final assessment on grounds of the submission of a portfolio and a written report.

## Community-based project 202 (JCP 202)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

This project-orientated module is a form of applied learning which is directed at specific community needs and is integrated into all undergraduate academic programmes offered by the Faculty of Engineering, Built Environment and Information Technology.
The main objectives with the module are as follows:
(1) The execution of a community-related project aimed at achieving a beneficial impact on a chosen section of society, preferably but not exclusively, by engagement with a section of society which is different from the student's own background.
(2) The development of an awareness of personal, social and cultural values, an attitude to be of service, and an understanding of social issues, for the purpose of being a responsible professional.
(3) The development of important multidisciplinary and life skills, such as communication, interpersonal and leadership skills.
Assessment in this module will include all or most of the following components: evaluation and approval of the project proposal, assessment of oral and/or written progress reports, peer assessment in the event of team projects, written report-back by those at which the project was aimed at, and final assessment on grounds of the submission of a portfolio and a written report.

## Community-based project 203 (JCP 203)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |

| | |
|---|---|
| **Period of presentation** | Year |

**Module content**

This module is integrated into all undergraduate academic programmes offered by the Faculty. Main objectives: execution of a community project aimed at achieving a beneficial impact on a section of society; awareness of personal, social and cultural values and an understanding of social issues; and development of life skills. Assessment: project proposal, written progress reports, peer assessment, assessment by community, presentation, report presented in the form of a blog.

## Professional orientation 110 (JPO 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | Pass JPO 110. Conditional entry into JPO 120: JPO 110 mark between 45% and 49% . Pass JPO 110 and JPO 120: Final combined mark for JPO 110 and JPO 120 at least 50%. |
| **Contact time** | 3 lectures per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

A project-based approach is followed to equip students wiuth academic and IT skills to succeed within the School of Engineering at UP.

## Additional Chemistry 1 111 (JPO 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and chemical reasoning skills required by CHM 171/172.

## Additional Electricity and electronics 112 (JPO 112)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by EBN 111/122.

## Additional Graphical communication 113 (JPO 113)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, conceptual understanding, drawing skills and reasoning skills required by MGC 110.

## Additional Programming 1 114 (JPO 114)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by COS 132.

## Additional Mathematical statistics 115 (JPO 115)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, conceptual understanding, problem-solving skills and reasoning skills required by WST 111.

## Additional Mathematics 1 116 (JPO 116)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and mathematical reasoning skills required by WTW 158.

## Professional orientation 120 (JPO 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | Pass JPO 110. Conditional entry into JPO 120: JPO 110 mark between 45% and 49% . Pass JPO 110 and JPO 120: Final combined mark for JPO 110 and JPO 120 at least 50%. |
| **Contact time** | 3 lectures per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

A project-based approach is followed to equip students with academic and IT skills to succeed within the School of Engineering at UP.

## Additional Chemistry 2 121 (JPO 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and chemical reasoning skills required by CHM 181.

## Additional Physics 122 (JPO 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and physical reasoning skills required by FSK 116/176.

## Additional Materials science 123 (JPO 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by NMC 113/123.

## Additional Programming 2 124 (JPO 124)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by COS 110.

## Additional Mechanics 125 (JPO 125)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by SWK 122.

## Additional Mathematics 2 126 (JPO 126)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and mathematical reasoning skills required by WTW 164.

## Additional Computers 127 (JPO 127)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by COS 222.

## Additional Physics 152 (JPO 152)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by FSK116/176.

## Additional Chemistry 1 161 (JPO 161)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week, 3 tutorials per week, Foundation Course |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | School of Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Background knowledge, problem-solving skills, conceptual understanding and reasoning skills required by CHM 171/172.

## Construction management 310 (KBS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

General functions and techniques of management.

## Construction management 320 (KBS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

The fundamentals and basic applications of project management.

## Construction management 710 (KBS 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |

| | |
|---|---|
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying<br>BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Operational management techniques, productivity, work study and effect on price determination. Construction programming techniques.

## Construction management 720 (KBS 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Human resource management. An approved certificate in first aid has to be submitted before this module will be awarded.

## Research report 785 (KBS 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Construction Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

An essay on a subject approved by the head of department has to be completed during the final year of study.

## Construction management 803 (KBS 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

## Construction management 804 (KBS 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

## Construction management 805 (KBS 805)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Project Management (Coursework)<br>MSc Project Management (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

## Dissertation: Construction management 891 (KBS 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |

| | |
|---|---|
| **Programmes** | MSc Construction Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Thesis: Construction management 990 (KBS 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Construction Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Construction entrepreneurship 740 (KEN 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Entrepreneurship, strategic management and marketing. Business ethics.

## Construction contract law 730 (KKR 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Construction law and law of delict – an overview; history of building contracts in South Africa; JBCC principal building and nominated/selected subcontract agreements: interpretation, insurance and security, execution, completion, payment, suspension and termination, dispute resolution; JBCC minor works agreement; case studies.

## Construction contract law 740 (KKR 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying |
| **Prerequisites** | KKR 730 GS |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Application and terms of CIDB endorsed standard construction contracts other than JBCC (GCC, NEC and FIDIC); case studies. Alternative dispute resolution: mediation, adjudication and arbitration; litigation - an overview; law of delict; negligence and damage to property.

## Communication management 310 (KOB 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KOB 210 or KOB 220 with a GS in the other |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Divsion of Communication Management |
| **Period of presentation** | Semester 1 |

**Module content**

Strategic communication management
Integrated Communication (IC) presupposes the alignment and subsequent implementation of the enterprise, corporate and corporate communication strategies of the organisation. The corporate positioning that results from these strategies is communicated through the organisation's unique reputation, image, identity and brand. Environmental scanning furthermore enables the organisation to identify and address issues, risks and possible crises that can influence this positioning. Current corporate governance thinking supports the principle of a symbiotic relationship between business and society by emphasising economic, environmental and social sustainability (the triple bottom line). This culminates in a new realisation of the organisation's corporate social responsibility and its role as a corporate citizen. Ethics in strategic management are highlighted and applicable research techniques are analysed.

## Communication management 320 (KOB 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KOB 210 or KOB 220 with a GS in the other, KOB 310 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Divsion of Communication Management |
| **Period of presentation** | Semester 2 |

**Module content**

Strategic relationship management
The strategic management of internal and external relationships is essential for the organisation's "licence to operate". Stakeholder theories provide a framework for managing relationships with stakeholders such as employees, investors, media and the government. The growing significance and potential impact of activism on organisational performance, justifies the management of such pressure groups through communication. Deontological and teleological ethical approaches are investigated in the strategic management of relationships. The complexity of ethical decision making in the modern business environment, as well as anti-ethics and African ethics amongst others, are also studied. Perception, social and stakeholder audits are examples of idiosyncratic research designs undertaken in strategic reputation management.

## Construction 111 (KON 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

The context of architectural technology and the relationships between technology, theory, structure and materials.  Drawing conventions.The typical city site. The construction and materials of a single storey dwelling with masonry walls and a pitched roof, from preparation for building work to substructure, retaining walls and floors.

## Construction 121 (KON 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | KON 111 GS |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Continuation of the construction and materials of a single storey dwelling. Superstructure: walls, opening, roofs, finishes and services.

## Construction 210 (KON 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | KON 111 and KON 121 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Double-storeyed buildings: reinforced concrete, steel and timber-framed structures. Offshutter concrete. Load-bearing masonry. Low-pitch roofs and waterproofing, other pitched-roof finishes. Lightweight partitioning. Glass. Joinery. Small precast elements.

## Construction 220 (KON 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | KON 210 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Soil mechanics: foundations, basement construction and waterproofing. Site structures: geotextiles and geomembranes, stairs, walls, retaining walls, fences, ramps, gabions, prefabricated retaining blocks. Built planters, lapas, braais, pavilions, decks.

## Construction 310 (KON 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | KON 210 and KON 220 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Roads: design and construction, materials and finishes, kerbing. Water features: design and construction. Street furniture. Construction equipment. Site and building services: water lines, sanitary plumbing and pipe systems above ground and indoors, underground sewer systems, electricity and gas. Electrical lighting: light, lamp types, luminaires; lighting requirements. Design application.

## Construction 320 (KON 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | KON 310 GS |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Integration of the foregoing coursework. Introduction to construction norms and standards, technical drawing practice and specifications. Cost estimates, feasibility and payability. Advanced materials: ceramics, polymers, adhesives, paint, metals, glass. Human transportation systems: types, applications. Design of a small commercial building/landscape/interior space (in DESIGN) and the preparation of its construction drawings.

## Construction project management 730 (KPB 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 9.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to project management in the building and property industry. Key processes, knowledge areas and techniques are covered.

## Commercial law 110 (KRG 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Investment Management<br>BSc Information and Knowledge Systems |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 1 |

**Module content**

General introduction.
General principles of the law of contract: introduction to the law of contract; consensus; contractual capacity; legality and physical possibility of performance; formalities; parties to the contract; conditions and related legal concepts; special terms and the interpretation of contracts; breach of contract and the termination of the contractual relationship.

## Commercial law 120 (KRG 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Investment Management<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | Examination entrance to KRG 110 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 2 |

**Module content**

Law of purchase and sale; law of lease; credit agreements; law of agency; law of security.

## Commercial law 200 (KRG 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BCom Accounting Sciences<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |

| | |
|---|---|
| **Prerequisites** | KRG 120 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mercantile Law |
| **Period of presentation** | Year |

**Module content**

Company law, law concerning close corporations, law of partnerships, labour law, law of arbitration and transport, law of insurance, law concerning negotiable documents, law of insolvency, law of succession and trusts.

## Criminology 110 (KRM 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: Fundamental criminology
A general introduction to criminology is provided. An overview of factors that contribute to crime, forensic criminology and forensic criminalistics are investigated.
Part 2: Violent crime
Various types of violent crimes receive attention in this section.

## Criminology 120 (KRM 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Information Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Law |
| **Prerequisites** | KRM 110 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: Penology
Attention is given to the roleplayers in the criminal justice system, namely the police, judiciary and corrections.
Part 2: Crime prevention and control
The nature and extent of crime, theories to explain criminal behaviour and crime prevention and control are investigated.

*The two sections will not necessarily be presented in chronological order.*

## Criminology 210 (KRM 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BSW<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KRM 110,120 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: Forensic criminalistics
The integrated nature of systematic criminal investigation is explored by demarcating the study field into the criminal tactic and technique.
Part 2: Youth misbehaviour
The nature, extent, theoretical explanations as well as prevention and control of youth misbehaviour are investigated.

*The two sections will not necessarily be presented in chronological order.*

## Criminology 220 (KRM 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BSW<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KRM 110, 120, 210 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: Victimology
Contemporary issues in victimology are explored and special attention is given to aspects such as victim-based legislation and restorative justice.
Part 2: Political offences
Political offences such as corruption, assassination and human rights violations are investigated in this section.

*The two sections will not necessarily be presented in chronological order*.

## Criminology 310 (KRM 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Law<br>BSW |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KRM 210, 220 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: Theories of crime
Theories focusing on understanding and explaining crime and criminality are investigated in this section.
Part 2: Psychocriminology
Explaining the relation between abnormal behaviour and criminality receives attention in this section.

*The two sections will not necessarily be presented in chronological order.*

## Criminology 320 (KRM 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Law<br>BSW |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | KRM 210, 220, 310 (GS) |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Social Work and Criminology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: Female crime
The historical exclusion of women in Criminology theory development and research is interrogated through an epistemological lens. Gender and racial disparity in the criminal justice system are placed firmly on the agenda.
Part 2: Contemporary criminology issues
In this section contemporary crime manifestations are examined.

*The two sections will not necessarily be presented in chronological order.*

## Construction quantities 201 (KSH 201)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BSc Construction Management |
| **Prerequisites** | BWT 110 GS, BWT 120 GS and HVH 101 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Measuring of simple buildings and simple building elements and external works. Abstracting and billing.

## Construction quantities 300 (KSH 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BSc Construction Management |
| **Prerequisites** | BWT 210 GS, BWT 220 GS, GBD 112 GS, GBD 122 GS and KSH 201 GS |

| | |
|---|---|
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Measuring of simple concrete structures, structural steelwork, plumbing and drainage, and alterations. Material lists, analysis of building costs, certificates, contract price adjustment provisions (CPAP) and final accounts.

## Construction quantities 700 (KSH 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Construction Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

**Module content**

Preliminaries and pricing thereof, different types of bills of quantities, tender documentation, economical designs, building cost estimates, analysis of building costs, calculation of professional fees. Practical contractor’s administration and internal and external cost management. Project and Construction Management Professions Act; Council for the Built Environment Act (CBE Act); Construction Industry Development Board Act (CIDB Act). Geotechnical and civil engineering works.

## Information and communications technology law 420 (KUB 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BSc Information and Knowledge Systems<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 5 practicals per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mercantile Law |
| **Period of presentation** | Semester 2 |

**Module content**

*For LLB

(a) Introduction to the study of information and communications technology law:
- The place of information and communications technology law in the legal system
- The nature and scope of information and communications technology law
- Sources of information and communications technology law
- Inception and influence of the Internet

(b) Regulation of the Internet:
- National/International
- Jurisdiction

(c) Aspects of intellectual property law and the Internet

(d) E-commerce activities and the Internet:
- Aspects of jurisdiction and signing of contracts
- Data protection and encryption
- Liability of Internet service providers

(e) Advertising and the Internet

(f) Criminal liability in information and communications technology law

(g) Constitutional aspects in information and communications technology law:
- The right to privacy/freedom of expression/information

## Landscape architecture 212 (LAN 212)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Introductory Botany and plant diversity; plant design philosophy; criteria and process for plant material selection and preparing plant material lists; plant classification; identification of genera and species.

## Landscape architecture 222 (LAN 222)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | LAN 212 GS |
| **Contact time** | 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

The role of plant geography in plant selection and the identification of plant species specific to their natural environment; practical considerations in plant selection.

### Dissertation: Landscape architecture 890 (LAN 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MLArch |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

### Thesis: Landscape architecture 990 (LAN 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

### Popular fiction 220 (LCC 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BIS Publishing |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Afrikaans |
| **Period of presentation** | Semester 2 |

**Module content**

The distinction between literary and genre fiction. Literary “formulas” and bestsellers. Various approaches to the study of popular fiction (sociological, psychological, “cultural studies” and text-based approaches to popular literature).
The focus is on various literary “types” or “formulas”: Adventure, Romance, Mystery, Science Fiction etc. as formulaic artistic constructions created for the purpose of enjoyment and pleasure against the background of larger socio-political circumstances.

## Language, life and study skills 133 (LST 133)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BCom Extended programme<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | As for BSc Four-year programme and BCom Four-year programme |
| **Contact time** | 4 discussion classes per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Natural and Agricultural Sciences Deans Office |
| **Period of presentation** | Semester 1 |

**Module content**

In this module students use different information and time management strategies, build academic vocabulary, revise basic grammar concepts and dictionary skills, examine learning styles, memory  and note-taking techniques, practise academic reading skills and explore basic research and referencing techniques, learn how to use discourse markers and construct definitions, and are introduced to paragraph writing. The work is set in the context of the students’ field of study.

## Language, life and study skills 143 (LST 143)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BCom Extended programme<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |

| | |
|---|---|
| **Prerequisites** | LST 133 |
| **Contact time** | 4 discussion classes per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Natural and Agricultural Sciences Deans Office |
| **Period of presentation** | Semester 2 |

**Module content**

In this module students learn how to interpret and use visual literacy conventions. Students write more advance paragraphs, and also learn how to structure academic writing, how to refine their use of discourse markers and referencing techniques and how to structure their own academic arguments. Students' writing is expected to be rational, clear and concise. As a final assignment all aspects of the LST 133 and LST 143 modules are combined in a research assignment. In this project, students work in writing teams to produce a chapter on a career and to present an oral presentation of aspects of the chapter. The work is set in the context of the students' field of study.

## Bulk solids storage and flow 780 (MAA 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Bulk solids systems and design 780 (MAC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Aeroelasticity 780 (MAE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Lagrange’s equation, Rayleigh–Ritz method, Modal basis analysis, Structural Dynamics, Steady and unsteady aerodynamics, Panel methods, Static and dynamic aeroelasticity, Laplace transform, Convolution, Solution of the aeroelastic equation of motion.

## Fluid-structure interaction 780 (MAH 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Design of structures subjected to fluid flow, i.e., high-rise buildings, chimney stacks, tube in heat exchangers, overhead power-line bundles, bridge piers, risers, pipe lines under sea, stays, masts, chemical-reaction towers, offshore platforms and aircraft components.

## Porous flow 420 (MAN 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Flow through porous media is relevant to applications such as internal combustion engines, thermal insulation engineering, electronics cooling, filtration, water movement in geothermal reservoirs, heat pipes, underground spreading of chemical waste, nuclear waste repository, geothermal engineering, grain storage, enhanced recovery of petroleum reservoirs and biological science. Introduction to the physical models used in the study of fluid flow and heat transfer in porous materials. Understanding of the transport mechanisms.

## Porous flow 780 (MAN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Transport through porous media has raised considerable attention in recent decades due to its relevance in a wide range of applications such as vehicle engines, thermal insulation engineering, electronics cooling, filtration, water movement in geothermal reservoirs, heat pipes, underground spreading of chemical waste, nuclear waste repository, geothermal engineering, grain storage, enhanced recovery of petroleum reservoirs and biological science. This module gives an introduction to the physical models used in the study of fluid flow and heat transfer in porous materials, and will give an understanding of the transport mechanism.

## Aircraft propulsion 780 (MAY 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Review of thermodynamic cycles applicable to aircraft propulsion with emphasis on turbocharged piston cycles and gas turbine cycles. Optimisation of gas turbine cycles, 2D and 3D turbomachinery design and fluid mechanics and loss mechanisms in gas turbines.

## Solar energy 780 (MBA 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

In this module the different solar-thermal systems will be introduced and analysed with the heat transfer and thermodynamics principles that apply. The main focus will include; sun-earth geometrical relations, solar radiation, energy requirements in buildings, energy storage, heating and cooling processes, bulk solar thermal power generation systems, life cycle costing and large scale plant specifics and quantification.

## Control systems 410 (MBB 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MVR 320 GS |
| **Contact time** | 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to control systems. Modelling of dynamic systems. Transfer functions. Block diagrams and block diagram algebra. Linearisation of non-linear systems. Disturbance signals. Steady-state accuracy. Control systems characteristics. Analysis of control systems using Laplace transformations. Root loci. Bode diagrams. Design of compensators using bode diagram and root locus design techniques. Introduction to sampled data control systems. The Z-transsorm. Implementation of controllers on a computer. Controls laboratory.

## Control Systems 780 (MBB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | Working knowledge of MATLAB/OCTAVE |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to state space methods, full state feedback design, disturbances and tracking systems, linear observers, compensator design by the separation principle, linear quadratic optimum control, Kalman filter, linear quadratic Gaussian compensator.

## Topology and shape optimisation 780 (MBT 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The topology optimisation method solves the basic engineering problem of distributing a limited amount of material in a design space. Material distribution methods, based on the use of mathematical programming and Numerical Schemes are used to determine the optimum architecture of a system and is used to identify possible shape and lay-outs of material. Applications of this optimisation method include optimisation of structural members, but can also be extended to flow and heat transfer optimisation.

## Computational fluid dynamics 732 (MBV 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Introduction to microbiology 161 (MBY 161)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Culinary Science<br>BSc Ecology<br>BSc Entomology<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Nutrition<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | MLB 111 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Microbiology and Plant Pathology |
| **Period of presentation** | Semester 2 |

**Module content**

The module will introduce the student to the field of Microbiology. Basic Microbiological aspects that will be covered include introduction into the diversity of the microbial world (bacteria, archaea, eukaryotic microorganisms and viruses), basic principles of cell structure and function, microbial nutrition and microbial growth and growth control. Applications in Microbiology will be illustrated by specific examples i.e. bioremediation, animal-microbial symbiosis, plant-microbial symbiosis and the use of microorganisms in industrial microbiology. Wastewater treatment, microbial diseases and food will be introduced using specific examples.

## Bacteriology 251 (MBY 251)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Culinary Science<br>BSc Ecology<br>BSc Entomology<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | MBY 161 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Microbiology and Plant Pathology |
| **Period of presentation** | Semester 1 |

**Module content**

Growth, replication and survival of bacteria, Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Bacterial evolution, systematic and genomics. Biodiversity; bacteria occurring in the natural environment (soil, water and air), associated with humans, animals, plants, and those of importance in foods and in the water industry.

## Mycology 261 (MBY 261)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BSc Biochemistry<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Ecology<br>BSc Entomology<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | MBY 161 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Microbiology and Plant Pathology |
| **Period of presentation** | Semester 2 |

**Module content**

Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Chemical and physiological requirements for growth and nutrient acquisition. Mating and meiosis; spore development; spore dormancy, dispersal and germination. Fungi as saprobes in soil, air, plant, aquatic and marine ecosystems; role of fungi as decomposers and in the deterioration of materials; fungi as predators and parasites; mycoses, mycetisms and mycotoxicoses; fungi as symbionts of plants, insects and animals. Applications of fungi in biotechnology.

## Composite materials 780 (MCM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Fundamental concepts of composite materials; manufacturing methods; design criteria of laminated composite materials; determining mechanical properties of composite materials: anisotropic elasticity and laminate theory, beams and columns of composite materials, plates and panels, transverse shear deformation effects, twisting and stretching shear coupling, composite shells; hygrothermal effects; strength and failure theories.

## Music technology 200 (MCS 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BMus<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Admission into relevant programme. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Music |
| **Period of presentation** | Year |

**Module content**

*Closed – requires departmental selection
A foundation of music technology tailored towards the educational needs of the musician.

## Music technology 302 (MCS 302)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BMus<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Admission into relevant programme MCS 200 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Music |
| **Period of presentation** | Year |

**Module content**

*Closed – requires departmental selection
A foundation of music technology tailored towards the educational needs of the musician.

## Capita selecta: Music 402 (MCS 402)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 40.00 |
| **Programmes** | BMus<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |

| | |
|---|---|
| **Prerequisites** | Admission into relevant programme |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Music |
| **Period of presentation** | Year |

**Module content**

*Closed – requires departmental selection
Aspects of music technology or African music.

## Non-destructive testing 780 (MCT 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Probabilty, design and management in non-destructive testing (NDT). Fundamental theory of commonly used NDT methods: Ultrasonic testing, Electromagnetic testing (MT and ACFM). Radiographic testing, Penetrant testing, Eddy current testing. Other NDT technologies, including phased array UT, time-of flight diffraction. Digital (RT and Acoustic emission. Monitoring.

## Finite element methods 780 (MEE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | A working knowledge of MATLAB/OCTAVE or FORTRAN77 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Stress and the differential equilibrium equation. Isoparametric formulation. Numerical integration. Reduced integration. Convergence, stability and accuracy. The Patch test. Membrane elements: assumed stress mixed interpolations. 3-D elements. Error estimates and mesh refinement. Sensitivity analysis.

## Advanced finite element methods 781 (MEE 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Non-linear statics: Overview of non-linear effects: geometric, material and boundary conditions. Continuum mechanics: tensors, indicial notation, deformation gradients, stress and strain measures, transformations and rotations, stress-strain relationships, constitutive models. Principles of virtual work. Solution methods: direct iteration, Newton methods, incremental/iterative procedures. Lagrange engineering strains. Large displacement finite element analysis of continua: total Lagrangian formulation. Small strain plasticity: Additive decomposition, flow rule, hardening laws, continuum and consistent tangents.

## Mechatronics 421 (MEG 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Sensors: limit switches, encoders, thermocouples, strain gauges, CCD cameras, various sensors. Actuators: electric motors, pneumatic and hydraulic actuators, shape memory alloys. Signal conditioning: component interconnection, amplifiers, analogue filters, modulators and demodulators, analogue-digital conversion, sample-and-hold circuitry, multiplexers, software and hardware implementation of digital filters and Wheatstone bridge. Control: H-Bridge and PWM motor control, stepper motors, non-linear control of hydraulic and pneumatic actuators, PLCs, SCADA systems, industrial Fieldbus, micro-processor control.

## Mechatronics 780 (MEG 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 13 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Sensors: mechanical and optical limit switches, encoders, thermocouples, strain gauges, CCD cameras, IR sensors, piezo-electric sensors, capacitive sensors, torque sensors, tactile sensors, gyroscope and ultrasonic sensors. Actuators: DC motors, stepper motors, AC motors, pneumatic actuators, hydraulic actuators, memory shape alloys. Signal conditioning: component interconnection, amplifiers, analogue filters, modulators and demodulators, analogue-digital conversion, sample-and-hold circuitry, multiplexers, software and hardware implementation of digital filters and Wheatstone bridge. Control: H-Bridge motor control, PWM motor control, control of stepper motors, non-linear control of hydraulic and pneumatic actuators, PLCs, SCADA systems, industrial Fieldbus, micro-processor control.

## Vibration-based condition monitoring 781 (MEV 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | Working knowledge of MATLAB/OCTAVE |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Vibration measurement: conventional and optical technique, digital signal processing in vibrations, vibration monitoring: diagnostics and prognostics, artificial intelligence in vibration monitoring, human vibration.

## Graphical communication 110 (MGC 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 tutorials per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Freehand sketching covering the following: perspective, isometric and orthographic drawings. Drawing conventions, graphical techniques and assembly drawings. Evaluation of drawings and error detection. True lengths of lines, projections and intersections. Practical applications of these techniques. Introduction to computer-aided drawings, including dimensioning, crosshatching and detailing. Introduction to basic manufacturing processes including primary (casting, forging and extrusion) and secondary (drilling, turning, milling, grinding, broaching and sawing) manufacturing procedures.

### Musicology 110 (MGS 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BSc Information and Knowledge Systems |
| **Prerequisites** | Admission into relevant programme |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Music |
| **Period of presentation** | Semester 1 |

**Module content**

*Requires departmental selection
*Requires knowledge of music notation.
The Classical period. A historical musicological approach to the development and contexts of Western art music through in-depth critical listening and reading of representative major composers, musical genres, styles and forms.

## Musicology 120 (MGS 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BSc Information and Knowledge Systems |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Music |
| **Period of presentation** | Semester 2 |

**Module content**

*Requires departmental selection
*Requires knowledge of music notation.

The Baroque. A historical musicological approach to the development and contexts of Western art music through in-depth critical listening and reading of representative major composers, musical genres, styles and forms.

## Heat and mass transfer 420 (MHM 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Convectiocorrelations; convection, evaporation and boiling; thermal radiation. Heat exchangers: types, regenerators and design. Mass transfer: Fick’s Law, mass diffusion, mass convection, simultaneous heat and mass transfer, porous catalysts. High mass transfer rate theory. Mass exchangers.

## Advanced heat and mass transfer 780 (MHM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Convection correlations: high speed flows, boundary layers, similarity, conservation equations, scale analysis. Thermal radiation: physics, exchange between surfaces, solar, directional characteristics, spectral characteristics, radiation through gasses. Convection, evaporation and boiling: film condensation, film evaporation, pool boiling, forced-convection boiling and condensation, flow regime maps, phase change at low pressures, heatpipes. Heat exchangers: types, regenerators, heat exchanger design. Mass transfer: Fick’s Law, mass diffusion, mass convection, simultaneous heat and mass transfer, porous catalysts. High mass transfer rate theory. Mass exchangers.

## Engineering activity and group work 320 (MIA 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | (BSS 310), (CJJ 310) or (EJJ 210) or (BJJ 210) or (MJJ 210) or (NJJ 210) or (PJJ 210) |
| **Contact time** | 1 other contact session per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Two exit learning outcomes (ELO) of ECSA are addressed and each must be passed in the same semester. ELO7: Demonstrate critical awareness of the impact of engineering activity on the social, industrial and physical environment. The history of engineering globally and in South Africa. Most important engineering projects globally and in South Africa. The impact of technology on society. Occupational and public health and safety. Occupational Health and Safety Act. Impacts on the physical environment. The personal, social, cultural values and requirements of those affected by engineering activity. The combination of social, workplace (industrial) and physical environmental factors are appropriate to the discipline of the qualification. ELO8: Demonstrate competence to work effectively on a small project as an individual, in teams and in multidisciplinary environments. Identifies and focuses on objectives. Works strategically. Executes tasks effectively. Delivers completed work on time. Effective team work: Makes individual contribution to team activity; performs critical functions; enhances work of fellow team members; benefits from support of team members; communicates effectively with team members; delivers completed work on time. Multidisciplinary work by the following: Acquires a working knowledge of co-workers' discipline; uses a systems engineering approach; communicates across disciplinary boundaries. Report and presentation on team project. Tasks require co-operation across at least one disciplinary boundary. Students acquire a working knowledge of co-workers discipline. Students communicate between disciplinary boundaries.

## Condition-based maintenance 780 (MIC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Theory and practical applications of condition based maintenance techniques. Pitfalls of the various condition based maintenance techniques. Acoustic emission, wear debris monitoring, oil analysis, thermography and non-destructive testing.

## Condition-based maintenance 781 (MIC 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

## Conditioned-based maintenance 832 (MIC 832)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

## Maintenance engineering 420 (MII 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction: Definition and objectives, statistical concepts. Mathematics of failure:
Reliability concepts, fitting distribution to failure data. Maintenance management:
Investment decisions, maintenance profit impact. Maintenance structure: Preventive, time based, condition based, corrective, design out. Data analysis: Renewable, repairable systems, Laplace trend test, analysis methodology. Optimizing maintenance strategies: Replacement/overhaul age, inspection frequencies, capital replacement, simulation. Reliability-Centred Maintenance (RCM). Maintenance systems: Components, structure, computer methods. Tribology: Friction laws, lubrication theory, contamination control.
Maintenance Practice: Systems approach, management approach, modelling.

## Reliability-based maintenance 781 (MII 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Prerequisites** | MIR 781 Reliability engineering 781 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Component reliability: Weibull analysis, Limitations of Weibull analysis – when not to use it. System reliability and availability: reliability/availability modelling, the availability block diagram (ABD), Cut sets, capacity constraints, m-out-of-n systems and storage capacity, Fault trees, Failure modes, Effects and criticality analysis (FMECA). Failure and repair rate data: Reliability engineering's red herring: "We don't have the data", Some data banks that are in fact useful, Data synthesis: the method of paired comparisons, Paper on The use of NERC-GADS data in determining standards for system design, Case study in and exercise in data synthesis.

## Dissertation: Metallurgical engineering 890 (MIN 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Thesis: Metallurgical engineering 990 (MIN 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Metallurgical Engineering<br>PhD Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Maintenance practice 780 (MIP 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Failure characteristics and analysis. Maintenance economics – Budgeting and cost control. Life cycle partnering and maintenance contracting. Legal aspects and case study. Performance measurement and benchmarking. Maintenance programming – Network analysis. Variability analysis. Maintenance strategy, plan, and protocol design – a new look at RCM. Maintenance tactic selection techniques. Introduction to condition-based maintenance. Tribology and contamination control presented with case studies. Maintenance Maturity Indexing and Variable Relationships development.

## Maintenance practice 781 (MIP 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | MIP 780 Maintenance practice 780 (recommended) |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Maintenance process modelling and configuration management. Maintenance audit systems. Systems thinking and complexity analysis as applied to the maintenance environment. Risk analysis. “Fit” analysis. Management information systems. CMMS and implementation. Maintenance Finance and Cost types. Project selection techniques. Employee competence analysis and motivation of maintenance workers. Work priority modelling.

## Maintenance logistics 782 (MIP 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Introduction to Logistics, RAM (Reliability, Maintainability, and Availability), Measures of Logistics, Inventory Systems,
Systems Engineering and Supportability Analysis: Systems Engineering Process, Supportability Analysis,
Aspects of Logistical Design: Logistics in the Design and Development Phase, Just-in-Time Systems, Facility Layout, Job Design and Work Measurement,
Logistics from the Development to the Retirement Phase: Logistics in the Production/Construction Phase, Logistics in the Utilisation and Support Phase,
Planning and Scheduling: Forecasting, Planning, Maintenance Scheduling, Project Management, Theory of Constraints,
Logistics Management: Quality Management, Supply Chain Management, Logistics Management.

## Maintenance operations 783 (MIP 783)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Understanding the Maintenance Function: Maintenance Models, Maintenance Profit Impact, Maintenance Reliability Centredness, Strategic Fundamentals,
Building a Business Case for Maintenance, Maintenance Management Systems: Philosophies, System Structure, Database Structure, Maintenance Administration, Work/Cost/Materials Control,
Maintenance Cost Management: Maintenance Cost Strategies, Maintenance Budgeting, Maintenance Cost Analysis,
Total Productive Maintenance: History, Benefits, Structure, Implementation,
Strategic Thinking in Maintenance: Principles, The role of a Maintenance Policy, Measurement,
Quality in Maintenance: Quality Principles, Total Quality Management, Maintenance Application,
Maintenance Risk: Risk Calculation, Macro Risk Management, Micro Risk Management,
World Class Maintenance: Definitions, Methods to achieve WCM.

## Reliability engineering 781 (MIR 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to probabilistic distributions, computation of system reliability, building reliability models and optimisation of system reliability; Fault Tree Analysis; Failure Modes, Effects and Criticality Analysis (FMECA), Monte Carlo Simulation; probability-based design.

## Reliability engineering 832 (MIR 832)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Dissertation: Mechanical engineering 890 (MIR 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Mechanical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Year |

## Dissertation 891 (MIR 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Mechanics |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Year |

## Thesis: Mechanical engineering 990 (MIR 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Mechanical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Year |

## Thesis: Mechanics 998 (MIR 998)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Mechanics |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Year |

## Tribology 780 (MIT 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Friction – Theory and laws of friction, friction behaviour of different materials. Lubrication and theory, hydrodynamic lubrication, elastohydrodynamic lubrication, boundary lubrication. Lubricants – wear – wear theory, wear mechanisms, particle properties. Surface modification and coverings, filtration, choice of filtration limits. Design and wear – determining wear rates, role of operational parameters, choice, role and effect of material choice, lubrication techniques. Tribological aspects of: bearing design, gear design, design of sliding elements.

## Introduction to big data science 800 (MIT 800)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |

| | |
|---|---|
| **Programmes** | MIT<br>MIT Big Data Science |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Quarter 1 |

**Module content**

This is the first and introductory module for the MIT degree in Big Data Science. Big Data and Data Science will be defined and students will be exposed to different application domains within the participating academic departments in the MIT degree. These departments include: Computer Science, Electrical, Electronic and Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, Statistics, and Health Science departments. The presentation of this module will be in the format of a two-day workshop.

## Introduction to machine and statistical learning 801 (MIT 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | First year level higher education modules in Computer Science, Mathematics and Statistics. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 1 |

**Module content**

In this module students will be exposed to different categories of machine and statistical learning algorithms that can be used to manipulate big data, identify trends from the data, modelling trends for prediction purposes as well as modelling for the detection of hidden knowledge. Students will be exposed to various machine and statistical learning algorithms/methods and they will learn how to make the right choice with regard to these. Learning, in a supervised and unsupervised mode will be covered. Furthermore students will develop a practical understanding of methods that can aid the learning process, such as, new developments in regression and classification, probabilistic graphical models, numerical Bayesian and Monte Carlo methods, neural networks, decision trees, deep learning and other computational methods. This module also includes a visualisation component focusing on the encoding of information, such as patterns, into visual objects.

## Introduction to data platforms and sources 802 (MIT 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |

| | |
|---|---|
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | First year level higher education modules in Computer Science and Statistics. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Quarter 2 |

**Module content**

Students will obtain hands-on experience on the following technologies such as: Python, Spark, Hadoop, R and SAS, Streaming, Data fusion, Distributed file systems; and Data sources such as social media and sensor data.

## Introduction to Information Ethics for Big Data Science 803 (MIT 803)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Quarter 1 |

**Module content**

The focus in this module is on Information Ethics and its place within the disciplines of Ethics and Philosophy. The following topics will be covered: Information Ethics and PAPAS (privacy, accuracy, property, access, security); Information ethics and the life cycle of big data; Information ethical dilemmas within big data in different disciplines, e.g. science, technology, engineering and mathematics (STEM), health sciences, economics and management sciences, social sciences and the humanities; and Case studies.

## Introduction to mathematical optimization for big data science 804 (MIT 804)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | First year level higher education modules in Computer Science, Mathematics and Statistics. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |

| | |
|---|---|
| **Period of presentation** | Quarter 2 |

**Module content**

In this module students will be introduced to Mathematical Optimization through gaining knowledge about the theory and algorithms to solve optimisation problems. Topics will include: Linear programming, unconstrained optimization, equality constrained optimization, general linearly and nonlinearly constrained optimization, quadratic programming, global optimization, Theory and algorithms to solve these problems.

## Big data 805 (MIT 805)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | First year level higher education modules in Computer Science. |
| **Contact time** | 10 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 2 |

**Module content**

This module focuses on tools for Big Data processing. The focus is on the 3 V- characteristics of Big Data namely volume, velocity and variety. Students will learn about the different architectures available for Big Data processing. The map-reduce algorithm will be studied in detail as well as graphical models for Big Data. The module will include a significant component of practical work (hands-on) where students will be exposed to real use cases that are or can be implemented on Big Data platforms.

## Big data management 806 (MIT 806)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | First year level higher education modules in Computer Science. |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Quarter 4 |

**Module content**

Big data management is the governance, administration and organization of large volumes of both structured and unstructured data. Aspects included in big data management are: big data as organizational asset, harnessing big data as disruptive technology for competitive advantage, big data quality and accessibility; management strategies for large and fast-growing internal and external data, big data infrastructure and platform management, and big data policy, strategy and compliance.

## Mini dissertation in big data science 807 (MIT 807)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | All the core modules must be passed |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Year |

**Module content**

Students may choose a supervisor/co-supervisor from any of the participating departments, which includes, but are not limited to: Electrical, Electronic & Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, and Faculty of Health Science departments (Computational biology, Family Medicine, Radiology). Additionally to the last mentioned, a supervisor/co-supervisor will also be allocated to all students from a department in the School of Information Technology. It is expected that a submission to a relevant journal is made during the course of the study. All the other faculty and university regulations for a master’s degree will also be applicable over and above those listed at the beginning of this paragraph.

## Big data science project 808 (MIT 808)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | All the core modules must be passed |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 1 |

**Module content**

This module provides the opportunity to students for demonstrating the application of the theoretical Big Data Science knowledge gained in the core part of this degree. Students are expected to identify and work with a collaborator who is taking ownership for the project. This collaborator can either be an industry partner or a researcher within one of the participating departments. Projects will be based on the entire big data lifecycle as discussed in this degree programme. This includes the gathering of data of a significant size as well as a final technical report describing the process followed and the deliverables. Depending on the complexity of the project, students can apply to work in groups with a maximum of two members. The proposed project will be subject to approval by the Department Computer Science.

## Research methods for big data science 809 (MIT 809)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 2 |

**Module content**

Similar to MIT 862; which has the following description: Research methodologies applicable to the IT field as preparation for the mini-dissertation for the A Stream students.

## Information and knowledge management 835 (MIT 835)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## Mini-dissertation 838 (MIT 838)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Prerequisites** | MIT 862 (for A Stream students) |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | School of Information Technology |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent reseach under the guidance of a supervisor for the A Stream students.

Please note: Only for Department of Information Sience students.

## Mini-dissertation 839 (MIT 839)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Prerequisites** | MIT 862 (for the A Stream students) |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.
Please note: only for Department of Computer Science students.

## Mini-dissertation 840 (MIT 840)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | MIT 862 (for the A Stream students) |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: All A Stream students first register for MIT 840. As soon as a supervisor has been assigned the student will be moved to the assigned module of the corresponding department. Informatics students will remain registered for MIT 840.

## Organisational behaviour and management 841 (MIT 841)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

## Computer science in perspective 842 (MIT 842)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

## Information in perspective 843 (MIT 843)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## Strategic ICT management 844 (MIT 844)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

## Life-cycle and maturity models for IT 850 (MIT 850)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

## Digital economy 851 (MIT 851)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

## ICT project management 852 (MIT 852)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

## Corporate IT systems 853 (MIT 853)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 2 |

## ICT infrastructure management 860 (MIT 860)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Semester 1 |

## IT research 862 (MIT 862)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | This module is a compulsory requirement for admission of A Stream students to MIT 840 |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 1 |

**Module content**

Research methodologies applicable to the IT field as preparation for the mini-dissertation for the A Stream students.

## Capita selecta 863 (MIT 863)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 12.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 or Semester 2 |

## IT financial management 864 (MIT 864)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

## Web trends in the library 865 (MIT 865)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Digital repositories 866 (MIT 866)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## The knowledge society and international librarianship 867 (MIT 867)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Facilitating information retrieval and information use 868 (MIT 868)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## IT systems in libraries 869 (MIT 869)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Knowledge management 872 (MIT 872)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 16 contact hours per year |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Network technologies 873 (MIT 873)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## Computer science in perspective 874 (MIT 874)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## Organisational behaviour and leadership 875 (MIT 875)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## Strategic ICT management 876 (MIT 876)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 2 |

## ICT project management 877 (MIT 877)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

## IT financial management 878 (MIT 878)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Informatics |
| **Period of presentation** | Semester 1 |

## IT Research 879 (MIT 879)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | This module is a compulsory requirement for admission of B Stream students to MIT 880 |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 2 |

**Module content**

Basic research methodology as preparation for the mini-dissertation for the B Stream students.

## Mini-dissertation 880 (MIT 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIT<br>MIT ICT Information Science |
| **Prerequisites** | MIT 879 (for B Stream students) |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Information Technology |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the B Stream students.

## Mini-dissertation 881 (MIT 881)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIT |
| **Prerequisites** | MIT 862 (for A Stream students) |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: Only for the department of Information Science students.

## Mini-dissertation 882 (MIT 882)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Programmes** | MIT |
| **Prerequisites** | MIT 862 (for A Stream students) |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

**Module content**

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: only for the Department of Computer Science students.

## Professional and technical communication 210 (MJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods. Plagiarism policies and their implications.

## Nuclear engineering 420 (MKI 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Basic nuclear physics: definitions and concepts (nuclear reaction, binding energy, cross-sections, moderator, reflector, etc.). Basic reactor physics: diffusion equation and boundary equations, group-diffusion methods, reactor kinetics. Reactor types: pressurised water reactors, boiling water reactors, gas-cooled reactors. Nuclear fuel cycle (including waste disposal). Reactor materials: fuels, moderators, coolants, reflectors, structures, systems or components. Reactor safety: biological effects of radiation, radiation shielding, principles of nuclear plant safety, also with reference to meteorology. Accidents.

## Solid mechanics 321 (MKM 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MOW 227 |
| **Contact time** | 1 practical per week, 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to continuum mechanics. Kinematics of deformation and the strain tensor. Lagrangian and Eulerian descriptions. The stress tensor and equilibrium equations. Hooke's law for isotropic media. Strong form of Boundary Value Problem (BVP) of solid mechanics. Weak form of BVP of solid mechanics. Derivation of finite element equations using weighted residuals. Development of 2D elements.

## Computational fluid dynamics 411 (MKM 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | (MTV 310), (MKM 321) |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to continuum mechanics, continuity equation, momentum equation, Navier-Stokes equation, energy equation, boundary conditions in thermal fluid systems, finite difference method, introduction to finite volume method (FVM), FVM for diffusion problems, FVM for convection-diffusion problems, introduction to pressure-velocity coupling in FVM. SIMPLE algorithm, selecting and assessing the applicability and limitations of the method, properly applying the method with commercial software, critically testing and assessing the end-results.

## Molecular and cell biology 111 (MLB 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BChD<br>BDietetics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Chemistry<br>BSc Computer Science<br>BSc Culinary Science<br>BSc Ecology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Nutrition<br>BSc Plant Science<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology<br>BVSc<br>MBChB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |
| **Prerequisites** | A candidate who has passed Mathematics with at least 60% in the Grade 12 examination |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Genetics |
| **Period of presentation** | Semester 1 |

**Module content**

Introductory study of the ultra structure, function and composition of representative cells and cell components. General principles of cell metabolism, molecular genetics, cell growth, cell division and differentiation.

## Molecular and cell biology 133 (MLB 133)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | As for BSc Four-year programme |
| **Contact time** | 2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Department of Plant and Soil Sciences |
| **Period of presentation** | Semester 1 |

**Module content**

The scientific method, the meaning of life, principles of microscopy, introduction to taxonomy  and systematics, introductory study of the structure, function and composition of akaryotes, HIV/ Aids, the immune system and other health issues, ecosystems and human interference.

## Molecular and cell biology 143 (MLB 143)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | MLB 133 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Department of Plant and Soil Sciences |
| **Period of presentation** | Semester 2 |

**Module content**

Chemistry of the cell, introduction to the structure, function and composition of prokaryotic and eukaryotic cells, energy and cellular metabolism, photosynthesis.

## Molecular and cell biology 153 (MLB 153)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |

| | |
|---|---|
| **Prerequisites** | MLB 143 |
| **Contact time** | 2 lectures per week, 2 practicals per week, 2 tutorials per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Genetics |
| **Period of presentation** | Semester 1 |

**Module content**

Cell growth and cell division, Mendelian and human genetics, principles of molecular genetics, principles of recombinant DNA technology and its application.

## Aerodynamics 780 (MLD 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Review of the fundamentals of thermodynamics. Introduction to compressible flows. Advanced topics in compressible flows: transonic flow and supersonic flow. Oblique shock waves, expansion waves, shock-expansion theory, wave interactions and wave drag. Linearized compressible-flow theory. Effects of heat and friction on gas flow. Design aspects of high speed aeroplanes and viscous effects. Fundamentals of hypersonic flow and high temperature gas dynamics. On completion of this module the student will be able to understand the fundamental phenomena associated with compressible flow and competently apply analytical theory to compressible flow problems

## Missile aerodynamics and design 781 (MLD 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | (recommended) aircraft design, aerodynamics, flight mechanics |

| | |
|---|---|
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The aerodynamic discipline of missiles or slender bodies and general configuration design concepts, submarine, airship and munition development. Slender body theory, aerodynamics of bodies, aerodynamics of low aspect ratio wings, vortices, wing body interference, downwash, the wake and wing tail interference, aerodynamic controls, drag, stability derivatives, design considerations, performance, manoeuvering flight, store carriage and separation. Prerequisites for the course are aircraft design, subsonic and supersonic aerodynamics (including the concepts of potential flow, vortex theory, thin aerofoil theory, finite wing theory, compressible gas dynamics and shock wave theory) and flight dynamics.

## Experimental methods 782 (MLD 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | (recommended) any module where experiments are frequent (such as Physics 1) |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Terminology, Data analysis, Uncertainty, Displacement, Strain, Pressure, Flow measurements Temperature measurements. Emphasis will be placed on the experimental process from calibration through to analyses. Different experimental techniques will be covered to showcase the process.

## Unmanned aircraft systems technology 783 (MLD 783)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites |

| | |
|---|---|
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Introduction to Unmanned Aerial Systems, applications and examples. System breakdown and major components. Airframe and systems. Core avionics, architecture, flight control, navigation, health monitoring. Mission systems, sensors, weapons and stores, electronic warfare. Aircraft installation and integration. Ground segment, control station, take off / launch support system, landing and recovery. Command and Control, data and video link. Logistic support system. Safety and regulatory elements.

## Avionics 784 (MLD 784)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Introduction to the functions performed by the avionics system in modern aircraft; the way in which these functions are mapped to the avionics components, starting from a presentation of the major avionics function, and the associated equipment and technologies: Human / Machine Interface, Flight Sensing (attitude, altitude, airspeed), Navigation (INS, SATNAV, Radio Nav), Flight Control and Guidance (autopilot), Radio Communication, Engine Management, Mission Sensors (radar, optronics), Health and Usage Monitoring. The main engineering challenges in Avionics System design, system integration, flight testing, safety justification and certification.

## Gas dynamics 780 (MLG 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Fundamentals of compressible flow, one dimensional flow, oblique shock and expansion waves, quasi-one-dimensional flow, differential conservation equations for invicid flows, unsteady wave motion, linearised flow, conical flow, 3D flow, transonic flow, hypersonic flow.

## Air conditioning and refrigeration 780 (MLR 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Comfort and indoor air quality. Psychometrics. System types and selection. Cooling and heating load calculations: conduction, radiation, convection, internal loads and thermal storage. Design of air handling unit, ducts, plant and reticulation. Control systems. Introduction to integrated system simulation.

## Aeronautical structures 780 (MLT 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Principles of stressed skin construction. General loads on aircraft. Static analysis of structures. Behaviour of aircraft materials. Basic Theory of elasticity. Energy methods & principles of virtual work. Stress analysis of thin-walled structures with and without thermal effects. Analysis of idealised semi-monocoque structures, boom-skin models of stiffened structures such as fuselage and wings, shear flow of idealised thin-walled sections. Fibre-reinforced composites of laminates subjected to bending and extensional stresses, thin walled composite beams. Column buckling with local instabilities, Johnson-Euler, beam columns. Plate buckling (shear, compression & bending), buckling of curved plates, skin effective width, Inter-rivet buckling, flange stability, lateral stability, crippling, inelastic buckling, buckling interaction.

## Aeronautics 420 (MLV 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MTV 310 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to aerodynamics and aeronautics. Fundamental physical quantities of flowing gas. Equations of state. Anatomy of an airplane. Atmospheriology. Basic aerodynamics. Elementary compressible flow. The Kutta-Joukowski Theorem. Introduction to viscous flow. Laminar and Turbulent Boundary Layers. Skin friction. Transition Flow Separation. Airfoil nomenclature. Lift, drag and moment coefficients. Pressure coefficients. Airfoil data. Wing properties. Circulation, downwash, and induced drag. Span efficiency. Stall. High-lift devices. Drag. Propeller theory. Elements of airplane and flight performance. Range, endurance and payload. Principles of static stability and control.

## Flight mechanics 780 (MLV 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | Working knowledge of MATLAB/OCTAVE/Python or similar |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Drag: friction, pressure, induced, interference, cooling, trim, drag estimation and reduction, piston engines, propellers, gas turbines, turbojet, turboprop and turbofan engines, propfan engines, aircraft performance, take off, climb, level flight, range, flight and manoeuvre envelopes, landing, energy methods, static stability and control: stick fixed, stick free, lateral stability and control, dihedral effect, coupling, dynamic longitudinal stability, short period oscillations, phugoid oscillations, dynamic damping, flight characteristics.

## Aircraft design 780 (MLW 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Conceptual aircraft design, the design process, sizing, airfoil and geometry considerations, thrust and wing loading, configuration layout and loft, crew and passenger considerations, propulsion, landing gear, aerodynamics, structures, weights, stability and control, performance, cost analysis, trade off studies, design proposals.

## Structural control 781 (MOI 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | MBB 780 Control systems 780 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Application of control techniques in order to actively control the dynamics of structures like beams and plates; pole placement technique, PID control, optimal control, feed-back control and feed-forward control; using tools like SIMULINK that can be used to simulate active control.

## Optimum design 420 (MOO 420)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to elements of computer-aided design. Formulation of the optimum design problem. Concepts used in optimum design. Linear and integer programming methods. Numerical methods used for unconstrained and constrained optimum design. Model reduction techniques. Application to interactive and practical design optimisation.

## Optimum design 780 (MOO 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to design and elements of computer aided design. Optimum design problem formulation. Optimum design concepts. Linear programming methods. Integer programming. Numerical methods for unconstrained and constrained optimum design. Model reduction. Interactive and practical design optimisation.

## Manufacturing and design 217 (MOW 217)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MGC 110 |

| | |
|---|---|
| **Contact time** | 3 lectures per week, 4 tutorials per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Detailed exposure to manufacturing processes including heat treatment. Detailed exposure to machine elements. Conceptual framework for design process including life cycle, ergonomics, material selection, manufacturing and safety factor considerations.

## Structural design 227 (MOW 227)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | SWK 122 |
| **Contact time** | 3 lectures per week, 4 tutorials per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Analyse statically determinate structures to obtain section forces and moments and stress distributions. Thin-walled pressure vessels. Stress and strain transformations. Introduction of stress tensor. Derivation of stress transformation equations. Eigenvalue/vector analysis for principle stresses and strains. Mohr’s circle. Failure criteria. Fatigue strength design. All analysis techniques above are applied to the open-ended design of components like beams and shafts.

## Machine design 312 (MOW 312)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MOW 217, (MOW 227) |
| **Contact time** | 3 lectures per week, 3 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Open-ended subsystem design using the following elements: Beams, shafts, bolts, bearings, rivets, welds, springs, couplings, clutches, brakes, gears and gear systems. Static and fatigue design fundamentals. Code design: Pressure vessels, structural steel design, hoisting systems and ropes, welding SANS code.

## Simulation-based design 323 (MOW 323)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | (MSD 210), MOW 227 |
| **Contact time** | 3 lectures per week, 5 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Computational dynamics analysis of mechanisms, linkages and cams. Structural computational analysis using finite element software. Systems engineering and functional analysis. Open-ended multidisciplinary design and design improvement of products and systems.

## Design project 410 (MOX 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MOW 312 GS and MOW 323 GS |
| **Contact time** | 8 tutorials per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

A comprehensive design in order to cover all the design aspects of functionality, analysis, ability to integrate, manufacturability and maintainability. Cost and reliability are included as inclusive factors.

## Design 780 (MOX 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The objective of the module is to enable the engineer to plan and control design and development projects. System engineering. All aspects, from the concept phase to phasing out of the projects as well as supporting theory are covered. Technology forecasting: explanation and application. Project viability studies: explanation and application. Applicable practicals and assignments are used to equip the student to apply the theory. Student’s conducting a techno-economic study is used to integrate the different aspects of the subject.

## Specialised design 781 (MOX 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

## Specialised design 782 (MOX 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Module content

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

# Music education 170 (MPE 170)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BMus<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Admission into relevant programme |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Music |
| **Period of presentation** | Year |

## Module content

*Closed – requires departmental selection

This module will cover a wide range of topics relevant for teaching music effectively and growing as a potential musician and music teacher. The teaching and learning experience will also include performing basic tasks in music technology that is required within a music career.

# Music education 270 (MPE 270)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Information and Knowledge Systems |
| **Prerequisites** | MPE 170 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Music |
| **Period of presentation** | Year |

## Module content

*Closed – requires departmental selection

This module will direct you to develop your own musical understanding and your understanding of teaching processes.

## Programming and information technology 213 (MPR 213)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Spreadsheet applications: Formulas and calculations, named ranges, plotting and trend lines, goal seek, linear programming, importing and exporting data, data navigation and filtering. Programming fundamentals: Names and objects, conditional and unconditional looping, branching, functions, modules, packages, reading and writing data files, graphical output (plotting). Solving simple problems using a high level programming language to develop, code and debug programs. Solving complex problems by breaking it down into a number of simple problems using concepts such as functions, modules and available packages. Programming principles are developed through solving mathematics and physics problems.

## Practical training 315 (MPY 315)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Prescribed practical training in industry during or at end of second year. Aim is exposure to engineering equipment and processes, working environment of craftsmen and personnel relations. Duration at least six weeks. Perform case study on personnel management and submit together with a satisfactory report on the practical training, to the Faculty Administration within one week of registration. Attend two (2) industry visits in the first semester and two (2) industry visits in the second semester. Attend at least six (6) guest lectures through the year.

## Practical training 415 (MPY 415)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

During or at the end of the third year of study, students in Mechanical Engineering undergo prescribed practical training in the industry. The purpose is the execution of small projects on engineering assistant level with exposure to the various relevant functions in the organisation. The duration is at least six weeks. A case study on occupational health and safety must be done in this period and submitted to the department together with a satisfactory report on the practical training within one week of registration. Students must also attend two (2) industry visits in the first semester and two (2) industry visits in the second semester as well as attend at least six (6) guest lectures through the year.

## Research project 412 (MRN 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | Finalists only |
| **Contact time** | 8 other contact sessions per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The module involves the management of the execution of a project that produces knowledge and understanding of a phenomenon, conclusions and a recommended course of action. The project is undertaken under the supervision of a staff member with the student ultimately taking responsibility for the management of and execution of the project. The student should be able to demonstrate competence in designing and conducting investigations and experiments and adherence to well defined time-lines and work breakdown structures. An acceptable process consists of but is not restricted to: (a) planning and conducting of investigations and experiments; (b) conducting of a literature search and critically evaluating material. The student should be able to demonstrate competence in engaging in independent learning through well-developed skills by: (a) reflecting on own learning and determining learning requirements and strategies; (b) sourcing and evaluating information; (c) determining learning requirements and strategies; (d) accessing, comprehending and applying knowledge acquired outside formal instruction; (e) critically challenging assumptions and embracing new thinking as well as communicating progress on a regular basis.

## Research project 422 (MRN 422)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | Finalist only, MRN 412 |
| **Contact time** | 12 other contact sessions per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The module involves the management of the execution of a project that produces knowledge and understanding of a phenomenon, conclusions and a recommended course of action. The project is undertaken under the supervision of a staff member with the student ultimately taking responsibility for the management of and execution of the project. This module follows onto MSC 412 and deals with the same topic in the same year. The student should be able to demonstrate competence in designing and conducting investigations and experiments and adherence to well defined time-lines and work breakdown structures. An acceptable process consists of but is not restricted to: (a) understanding of the stated problem, (b) developing a work breakdown structure, (c) performing the necessary analyses; (d) selecting and using appropriate equipment or software; (e) construction and instrumentation of an experimental set-up; (f) taking measurements; (g) analysing, interpreting and deriving information from data; (h) drawing conclusions based on evidence; (i) communicating the purpose, process and outcomes in a technical report, presentation and poster.

## Smart materials 780 (MSA 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Dynamics 210 (MSD 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | FSK 116 or FSK 176 and SWK 122 and WTW 256 # |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Kinetics of systems of particles, Newton’s 2nd law generalised for a system of particles, rate of change of momentum and angular momentum relations, work-energy relations, conservation laws, steady mass flow. Plane kinematics of rigid bodies, rotation, translation, general 2D motion, relative motion analysis. Moments and products of inertia. Plane kinetics of rigid bodies, equations of motion, rotation, translation, general 2D motion, work-energy relations. Vibration and time response.

## Theory of elasticity 780 (MSE 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Mechanics of elastic deformable bodies, based on the fundamental concepts of modern continuum mechanics: kinematics, balance laws, constitutive equations; classical small-deformation theory; formulation of boundary-value problems of linear elastostatics; plane problem of elastostatics; variational formulations, minimum principles.

## Fracture mechanics 780 (MSF 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Historical development; Linear Elastic Fracture Mechanics (LEFM): Stress concentrations and singularities, stress intensity factor, stability of crack propagation; Elasto-plastic fracture mechanics: crack tip plasticity, small scale yielding, measurement of Kic, J-integral; Fatigue crack growth: Paris Law; life prediction; combined mode fracture, strain energy density methods.

## Numerical thermoflow 780 (MSM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Fluid Mechanics refresher (governing equations, boundary conditions, application of inviscid, laminar and turbulent flow). Methods of weighted residuals (finite element, finite volume and difference methods). Mesh generation and boundary conditions: Types of mesh structured and unstructured mesh generation and application (inviscid flow, heat conduction etc.). Heat conductions: Governing equations, discretisation, finite approximation, solution methods (Gauss-Seidel, Tri-diagonal matrix algorithm) etc. This module is suited to postgraduate students doing research in thermofluids and who wants to use available CFD codes or who wants to write their own codes to solve fluid mechanics, heat and mass transfer problems.

## Numerical thermoflow 781 (MSM 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | MSM 780 Numerical thermoflow 780 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The Efficient Solvers: Background, muligrid theory and detailed description of the algorithm. Finite Volume method: Understand the governing equations, general form of the transport equations, Gauss's theorem and the finite volume discretisation. Iterative solution algorithm: Pressure-velocity coupling, types of grids, unsteady flows, multiple phases. Finite Volume Discretisation: Diffusion term, convection term and source term for steady flows. Convection-diffusion problems: Boundary conditions, higher order discretisation, accuracy / stability. Solution Algorithm for Pressure-Velocity coupling: SIMPLE, SIMPLER, SIMPLEC and PISO. Laminar, transitional and turbulent flow: Background and theory. Turbulence modelling and examples: Definition of turbulence, turbulence modelling approaches, turbulence models ( zero-equation models, one equation, two equation, Reynolds Stress Model (RSM), Large Eddy Simulation, wall function approach), turbulence modelling guidelines. Recent CS developments: Current state of the art in turbulence modelling etc. Viscous boundary meshes: Background and objectives, internal and external flow, turbulence modelling considerations.

## Research study 732 (MSS 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 12 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

*This is a compulsory research module.

This module allows a student to do research on a certain topic in mechanical or aeronautical engineering, as specified by a lecturer in the Department of Mechanical and Aeronautical Engineering, on an individual basis, under the supervision of that lecturer. The study should be seen as a precursor to the master's degree research that may follow the honours degree. The total volume of work that is to be invested in this module by an average student must be 320 hours. The body of knowledge studied must be of an advanced nature, at the level of the other postgraduate modules offered by the Department. Normal requirements for assessment that include the use of an external examiner apply to this module also.

## Independent study 781 (MSS 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Independent study 782 (MSS 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows a student to study a certain body of knowledge in mechanical or aeronautical engineering, as specified by a lecturer in the Department of Mechanical and Aeronautical Engineering, on an individual basis, under the supervision of that lecturer. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of an advanced nature, at the level of the other postgraduate modules offered by the Department. Normal requirements for assessment that include the use of an external examiner apply to this module also.

## Material studies 223 (MST 223)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Interior Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to materials with applications in the field of interior design: material families, basic properties and selection. Wall (partition), ceiling and floor finishes. Window treatments. Ceramics as architectural finishes. Surface theory 1 (including colour and interior paint applications).

## Material studies 313 (MST 313)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Interior Architecture |
| **Prerequisites** | TKS 212 and MST 223 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Unconventional construction materials: properties, applications.

## Material studies 323 (MST 323)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Interior Architecture |
| **Prerequisites** | MST 313 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Application of materials in artificial environments:
• Development of modern materials and processes in product design
• Joint theory
• New applications in technical textiles, polymers and other artificial materials
• Material selection and technical development in conjunction with projects in design (ONT 303) and construction (KON 320)

## Fatigue 780 (MSV 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Fatigue principles addressing both elasticity and plasticity; notch effects; variable amplitude loading conditions; multi-axial fatigue and weld fatigue.

## Fluid mechanics 780 (MSX 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Mathematical preliminaries: historical overview, scalar, vector and tensor algebra (in context of partial differential equations), Green's lemma and the Divergence theorem, Eularian/Lagrangian representations, derivative of a function, Reynolds transport theorem. Governing equations: viscous compressible and incompressible flow, derivation of conservation of mass, derivation of conservation of momentum, boundary conditions, mathematical characteristics, non-dimensionalisation. Viscous compressible and incompressible flow: derivation of conservation of mass, derivation of conservation of momentum, boundary conditions, mathematical characteristics, non-dimensionalisation.

## Advanced fluid mechanics 781 (MSX 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | MSX 780 Fluid mechanics 780 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Exact solutions: potential flow, Couette flow, Poiseuille flow and combined Couette-Poiseuille flow, laminar boundary layers (similarity solutions for flat plate flow). Stability of laminar flows: introduction, linearised stability, transition to turbulence, approximate prediction of transition. Turbulent flow: Reynolds averaged equations, two-dimensional turbulent-boundary-layer equations, velocity profiles, turbulent flow in ducts, flat plate flow, turbulence modelling.

## Structural mechanics 310 (MSY 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MOW 227, WTW 256 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Statically determinate force systems. Statically determinate stress systems. Stress-strain relations. Statically indeterminate stress systems. Torsion. Bending stress, slope and deflection. Statically indeterminate beams. Energy methods. Buckling instability. Stress and strain transformations. Experimental strain measurements. Yield criteria and stress concentration. Elementary plasticity. Fracture mechanics. Fatigue. Variation of stress and strain. Thick-walled cylinders.

## Specialised structural mechanics 781 (MSY 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

## Specialised structural mechanics 782 (MSY 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

## Experimental structural dynamics 783 (MSY 783)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | A working knowledge of MATLAB/OCTAVE |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Spatial, modal and response models of structures, frequency response functions and the relationships between spatial, modal and response models for single degree of freedom systems and multi-degree of freedom systems, modal analysis, operational modal analysis, updating finite element models.

## Dissertation: Metallurgy 890 (MTG 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Thesis: Metallurgy 990 (MTG 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Thermoflow 310 (MTV 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction: Liquids and gases, pressure, viscosity, temperature, heat. Introduction to Navier-Stokes and continuity equations. Definitions and properties of fluids, fluid statics, fluid dynamics, Bernoulli equations. Flow measurements. Dimensional analysis: force, drag, Reynolds number, force coefficient, power. Flow in pipes and channels: friction coefficients and Reynolds number, pressure drop; laminar, turbulent and transitional flow. Flow over bodies: drag and lift. Experimental techniques in fluid mechanics. Introduction to basic thermodynamic heat transfer concepts: conduction (steady state and transient heat conduction), extended surfaces, applications.

## Thermoflow 410 (MTV 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Navier-Stokes and continuity equations. Euler equations, momentum equations. Conduction in two dimensions. Similarity and dimensional analysis. Convective heat transfer: forced convection (external and internal), natural convection. Boiling and condensation. Thermal radiation. Heat exchangers: classification, Parallel flow and counterflow heat exchangers; double-pass, multi-pass and cross-flow heat exchangers; LMTD method, Effectiveness-NTU method, selection of heat exchangers. Experimental techniques in heat transfer.

## Thermal and fluid machines 420 (MTV 420)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MTV 310, (MTX 311) |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

(i) Thermodynamics: Introductory thermodynamics with reference to power cycles. Energy systems and views, transformation of energy. Nuclear power.
(ii) Steam generators: Work fluids, fire-tube boilers, water-pipe boilers, heat exchange boilers, power nuclear reactors. Feedwater. Industrial uses of steam.
(iii) Combustion technique: Types of fuels – oil, coal, gas; their combustion methods. Ash and its properties. Air pollution.
(iv) Steam engines: Turbo machine theory; types of turbines – properties and uses. Blades, rotors, sealing, balancing. Parallel operation of turbo generators in a power network.
(v) Internal combustion engines: Spark ignition and compression ignition. Applications.
(i) Classification: kinetic and positive displacement pumps and compressors. Incompressible and compressible flow. Pump, compressor and fan theory.
(ii) Equipment: functioning, properties, characteristics and use of well-known pumps and compressors.
(iii) Applications: specific speed, cavitation, water hammer. Pump connections: pipe system connections. Pumping of solids. Air-pressure systems.
(iv) Turbo machines: turbo machine theory. Impulse and reaction turbines. Analytical analysis. Characteristics: applications; integration of hydroturbines with power systems.

## Specialised thermoflow 780 (MTV 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

## Specialised thermoflow 781 (MTV 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module allows the Head of the Department of Mechanical and Aeronautical Engineering to arrange a short course on a specialized nature in mechanical or aeronautical engineering, typically (but not limited to) a course presented by a visiting academic. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of a specialized and advanced nature, at the level of the other postgraduate modules offered by the Department.

## Thermodynamics 221 (MTX 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | FSK 116 or FSK 176 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Application overview. Concepts: system, control volume, property, state, process, cycles, mass, volume, density, pressure, pure substances, property tables, ideal gases. Work and heat. Internal energy, enthalpy, specific heat capacity. First Law of Thermodynamics for system and control volume. Conservation of mass. Processes: Adiabatic, isentropic, compressible and incompressible gases. Second Law of Thermodynamics for system and control volume. Entropy and enthalpy. Third Law of Thermodynamics. Introduction to vapour power, cooling and gas cycles. Experimental techniques in thermodynamics.

## Thermodynamics 311 (MTX 311)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | MTX 221 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Third Law of Thermodynamics, availability and useful work. Ideal and real gases. Compressible flow: conservation laws, characteristics of compressible flow, normal shock waves, nozzles and diffusers. Power cycles: classification, internal combustion engine cycles (Otto and Diesel), vapour power cycles (Brayton, Rankine), refrigeration cycles (Reversed Carnot cycle, Reversed Brayton cycle, ammonia absorption cycle) and heat pump cycles. Mixtures of gases: perfect gas mixture, water/air mixtures and processes (psychrometry). Heating and cooling load calculations, basic refrigeration and air-conditioning systems. Combustion: fuels, air-fuel ratios, heat of formation, combustion in internal combustion engines.

## Thermodynamics 780 (MTX 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Advanced thermodynamics and energy systems 781 (MTX 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Fundamental concepts of thermodynamics, total flow exergy, restricted dead state and unconstrained equilibrium state, heat transfer, fluid flow and chemical irreversibilities, thermodynamic optimisation, irreversibility distribution ratio, lost exergy, application of entropy generation minimisation (EGM) technique to the fundamentals of power generation, solar power, wind power, and low temperature refrigeration.

## Reactor coolant flow and heat transfer 782 (MUA 782)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering |
| **Prerequisites** | MUA 783 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Design of reactor coolant system, heat sources in reactor systems, heat transmission principles, heat transmission in systems with internal sources, temperature distribution along path of reactor coolant flow, heat transfer characteristics of fluids, heat transfer to boiling liquids, heat transfer characteristics of gasses.

## Reactor engineering science 783 (MUA 783)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Atomic structure, nuclear energy and nuclear forces, nuclear fission, nuclear reactions and radiation, energy removal, nuclear reactor systems, radiation protection, radiation shielding, meteorology, reactor safety analysis.

## Reactor physics 784 (MUA 784)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering |

| | |
|---|---|
| **Prerequisites** | MUA 783 Reactor engineering science 783# |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Probability concepts and nuclear cross sections, multiplication factor and neutron flux, slowing-down process in the infinite medium, diffusion theory the homogeneous one-velocity reactor, Fermi age theory: the homogeneous multi-velocity reactor, transport theory, reflected reactors, reactor kinetics, heterogeneous reactors, control-rod theory.

## Reactor materials engineering 785 (MUA 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering |
| **Prerequisites** | MUA 783 Reactor engineering science 783# |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Overview of the functions of the various classes of nuclear materials, elastic deformation, yielding and use of texture in nuclear components, atomic processes in plastic deformation and radiation damage, strength of engineering materials.

## Reactor materials engineering 786 (MUA 786)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering |
| **Prerequisites** | MUA 785 Reactor materials engineering 785 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Creep deformation, fracture processes and metallurgical fracture mechanics, fatigue fracture in nuclear materials, fabrication processes of nuclear materials.

## Reactor stress analysis 787 (MUA 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | MUA 783 Reactor engineering science 783 |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

General considerations, simple tension, bending in straight beams, torsion, plane stress and strain, strain energy, experimental stress analysis, rotational symmetry, stresses in flat plates, thermal stresses, beams on elastic foundations, buckling, design considerations.

## Fossil fuel power stations 420 (MUU 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

This module contains a comprehensive study of all mechanical systems and processes of a fossil fuel power station. Analysis of steam cycles, combined cycle power generation, fuels and combustion, the draught group, steam generators and turbines, condenser, feedwater and circulating water systems, coal and ash handling, compressor plant, water treatment, the importance of HVAC, control and instrumentation, control philosophies and environmental considerations.

## Fossil fuel power stations 781 (MUU 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 13 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

This module contains a comprehensive study of all mechanical systems and processes of a fossil fuel power station. The module will include the analysis of steam cycles, combined cycle power generation, fuels and combustion, combustion mechanisms, combustion equipment and firing methods, the draught group, steam generators, steam turbines, condenser, feed water and circulating water systems, coal handling, ash handling, compressor plant, water treatment, the importance of HVAC, control and instrumentation, control philosophies and environmental considerations.

## Vehicle engineering 420 (MVE 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Tyres: Construction, forces and moments, side force generation, rolling resistance, dynamic characteristics, tractive effort, slip, soft soil characteristics. Vehicle performance: equations of motion, supply and demand, forces acting on the vehicle, prediction of top speed, acceleration, braking, gradient ability and fuel consumption. Vehicle suspension systems: suspension concepts, kinematics, dynamic characteristics. Ride comfort: springs, dampers, suspension models, human response to vibration. Handling: steering systems, low-speed handling, steady-state handling, dynamic handling, under/oversteer, handling tests.

## Vehicle dynamics 780 (MVI 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Tyres: Characteristics and tyre models used in simulation of ride comfort and handling. Road inputs: Classification of roads. Road profiles. Road roughness. Suspension components: springs, dampers. Controllable suspension systems. Modelling aspects. Human reaction: Human response to vibration. Driver models. Human reaction times. Vertical vehicle dynamics (ride comfort): Vibration levels in a vehicle. Simulation of ride comfort. Effect of seat characteristics on vibration levels. Test and evaluation procedures. Lateral vehicle dynamics (handling): Simulation of steady state and dynamic handling. Rollover propensity. Test procedures. Computer applications: Application of computer codes in the analysis of vehicle dynamics.

## Fluid machines 780 (MVM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Vibration and noise 320 (MVR 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE |
| **Prerequisites** | (MSD 210) |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to vibration: basic concepts, classification, modelling elements. Single degree of freedom systems: undamped and damped free vibration, undamped and damped harmonic motion, non-periodic excitation, numerical integration. Multidegree of freedom systems: discretisation, eigenproblem, co-ordinate coupling. Vibration control: balancing, isolation, absorbers. Vibration and sound measurement: signal analysis, modal testing, vibration monitoring. Continuum systems: string, bar, rod. Sound and noise: metrics, measurement, legislation.

## Manufacturing systems 311 (MVS 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week, 3 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Basic knowledge of conventional manufacturing processes like casting, forming, machining and joining. Modern manufacturing of plastic products, powder metallurgy, micro-electronic manufacturing and non-traditional machining. Quality control by work-holding devices, measurement, inspection and testing and determination of process capability. Manufacturing automation, rapid prototyping and free form fabrication. Manufacturing systems design concepts like Jobshop, Flowshop, Leanshop with linked cells, Projectshop and continuous processing.

## Vehicle manufacturing 780 (MVV 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 |

## Numerical methods 420 (MWN 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Mechanical Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Solution of systems of linear algebraic equations. Both iterative and direct methods are treated. Solutions are applied to both small and large scale systems. Solutions of systems of nonlinear equations. Eigenvalue problems. Numerical approximation strategies. Numerical integration and differentiation. Numerical solutions to initial-value problems for ordinary differential equations, boundary-value problems for ordinary differential equations and partial-differential equations.

## Numerical methods 780 (MWN 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mechanical Engineering<br>BScHons Applied Science Mechanics<br>BScHons Applied Sciences Mechanics: Physical Asset Management |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Solving systems of linear algebraic equations using direct and iterative methods from small to large scale systems. Numerical solutions of nonlinear systems of equations. Solving eigenvalue problems. Numerical approximation strategies. Numerical differentiation. Numerical Integration. Numerical solutions to initial-value problems for ordinary differential equations. Numerical solutions to boundary-value problems for ordinary differential equations. Numerical solutions to partial-differential equations.

## Research methodology 780 (MWX 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The independent study of research of research methodology. The study necessary to complete and submit the literature review for an MEng dissertation.

## Nano and micro heat transfer 781 (MWX 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 21 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The applications of transport processes pose new challenges in emerging areas like electronic cooling, Micro-Electro-Mechanical Systems (MEMS) and micro biological sciences. This involves devices where heat, species and fluid flows are involved within very small dimensions. Topics covered: Statistical thermodynamics, quantum mechanics, thermal properties of molecules, kinetic theory, micro/nanofluidics; thermal transport in solid micro/nanostructures, electron and phonon scattering, size effects, quantum conductance, electronic band theory, tunneling, nonequilibrium heat conduction, analysis of solid state devices such as thermoelectric refrigeration and optoelectronics; nanoscale thermal radiation and radiative properties of nanomaterials, radiation temperature and entropy, surface electromagnetic waves, near-field radiation for energy conversion devices.

## Dissertation: Mining engineering 890 (MYI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

## Thesis: Mining engineering 990 (MYI 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

### Thesis: Mining 990 (MYL 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Mining |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

### Introduction to isiNdebele Grammar – Capita selecta 110 (NDE 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in IsiNdebele |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

For speakers of isiNdebele as home language or first or second additional language.
Aspects of the grammar of isiNdebele such as an introduction to the word categories; an introduction to the structure, meaning and use of the noun, the adjective, the relative, the possessive; the verb; writing and spelling rules; dictionaries and dictionary use; grammatical analysis.

### isiNdebele 210 (NDE 210)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | AFT 121 and NDE 110 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in IsiNdebele |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

Aspects of the grammar of isiNdebele such as a continuation of the study of the word categories; grammatical analysis; the structure, meaning and use of the pronoun and the enumerative; an introduction to isiNdebele speech sounds/phonetics.

## isiNdebele 310 (NDE 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | NDE 210, AFT 220 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in IsiNdebele |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

Aspects of the grammar of isiNdebele such as a continuation of the study of the word categories; grammatical analysis; more intensive study of the structure, meaning and use of the noun (specifically derived nouns) and verb (specifically moods and verbal extensions); an introduction to the sound changes/phonology of isiNdebele.

## Electrochemistry 310 (NEC 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Kinetics and thermodynamics of electrochemical reactions of metallurgical importance. Use of equilibrium diagrams to identify possible reactions products. Use of polarisation diagrams to describe reaction kinetics. Application of these principles to metallurgical examples, including corrosion, leaching and electrometallurgy. Influence of substrate composition, electrolyte composition, impurities, reaction products and agitation on kinetics.

## Electrometallurgy 700 (NEL 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | Geen voorvereistes. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

**Module content**

At the end of the module, students should be able to conceptualise and design new electrometallurgical processes and improve the operation of existing processes through an understanding of the basic principles of the thermodynamics and kinetics of electrochemistry, measurement techniques used in electrochemistry, and considering the principles of electrochemical reactor design, different electrode and cell configurations, role of additives to electrolytes, role of impurities in the electrowinning process, the steps involved in electrocrystallization processes and present practices used for the electrowinning of metals such as copper, nickel, cobalt, zinc, manganese and gold.

## Excursions 320 (NEX 320)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NMP 310) |
| **Contact time** | 1 lecture per week, 6 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Students attend and participate in five half-day excursions to metallurgical operations. Assessment is based on written reports and oral presentations. The excursions include visits to hydrometallurgical, pyrometallurgical, minerals processing and materials processing plants.

## Fabrication engineering 700 (NFE 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BEngHons Welding Engineering<br>BScHons Applied Science Metallurgy: Welding Technology<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module looks at quality assurance and control in welded fabrication and manufacture, and introduces various standards and codes of manufacture used in the welding industry. Measurement, control and recording in welding, the principle of fitness for purpose, as well as health and safety issues are addressed. Control of residual stresses and distortion during welding, non-destructive testing, repair welding, and the economics of welding are considered. This module also examines plant facilities, welding jigs and fixtures. Special emphasis is placed on the design and implementation of welding procedure specifications, procedure qualification records and quality control plans. A number of case studies are examined.

## Physical metallurgy 700 (NFM 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |

| | |
|---|---|
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The module deals with the basic understanding of phase transformations in alloys, and its relationship with microstructure and mechanical properties of alloys. Included are transformation processes such as solidification; nucleation, growth and coarsening of precipitates; the use of carbides and intermetallic compounds in steels; static and dynamic re-crystallisation; grain growth and the use of grain boundary engineering; the martensite, bainite and pearlite transformations; thermomechanical processing and some elements of quantitative metallography. The course is practice orientated; the current best fundamental understanding of these transformation processes covered, and its role in engineering application demonstrated. The course is fully documented on CD-ROM from the latest literature and is largely intended for that research student who is embarking on a physical metallurgical research project.

## Basic physical metallurgy 701 (NFM 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module serves as a bridge into full post graduate studies in physical and mechanical metallurgy for students who do not have a formal first degree in these subjects. The following topics are covered in this module: phases in alloys, diffusion, solidification, the precipitation of second phases in alloys and the recrystallisation and grain growth of single phase alloys, aluminium and its alloys, copper and its alloys, nickel base alloys, the iron-carbon phase diagram, the heat treatment of steels, dislocations and the deformation of metals, engineering strength of metals and alloys, creep deformation, introduction to fracture mechanics and fatigue and failure analysis. This module will, therefore, enable the student to understand the fundamentals that govern alloy design, heat treatment, physical and mechanical properties and behaviour of materials during heat treatment and under stress and will enable the correct selection of alloys for a particular use, the prescription of heat treatments and further mechanical processing of these alloys to achieve the required metallurgical and mechanical properties.

## Heat treatment 700 (NHB 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The emphasis is on the practice of the heat treatment of steels, covering the following topics: introduction and fundamental aspects of the Fe-C system; alloying elements; tempering of martensite; pearlite and bainite formation, hardenability; annealing, normalizing, hardening and tempering; stress relieving, use of CCT and TTT diagrams, HSLA steels, tool steels; stainless steels, heat treatment furnaces and their atmospheres, induction hardening, carburisation, nitriding, mechanical testing, non-destructive examination and heat treatment, hydrogen embrittlement, temper embrittlement, quantitative metallography for quality control, heat treatment for fracture toughness and heat treatment case studies. The course is partly available on CD-ROM with up-to-date references to the latest literature.

## Hydrometallurgy 322 (NHM 322)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NPT 220) and (NEC 310) |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Merits of hydrometallurgy relative to other extraction methods. Unit processes in hydrometallurgy. Chemical principles of hydrometallurgy. Chemistry of important metals and lixiviants. Application of chemical principles to: leaching; purification and upgrading of leach solutions (precipitation, solvent extraction, ion exchange, activated carbon); product recovery from solution (precipitation, reduction). Relevant analytical methods.

## Hydrometallurgy 412 (NHM 412)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NHM 322) |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Extraction routes and the extractive metallurgy of metals such as gold, copper, zinc, manganese, nickel, cobalt, uranium and the platinum group elements, from ores and secondary sources. Application of thermodynamics and reaction kinetics (including laboratory kinetic data) in understanding and optimisation of extraction routes, and sizing of reactors. Environmental impact of processing routes.

## Hydrometallurgy 700 (NHM 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The aim with this course is to enable the students to understand the design and operation of hydrometallurgical processes for the beneficiation of minerals and metals. The theoretical basis of the solution chemistry underlying hydrometallurgical processes, the purification and concentration options available, and the metal recovery processes such as precipitation, hydrogen reduction, and electrowinning are reviewed. This is then followed by the consideration of the engineering aspects and the technical application of hydrometallurgical processes for a number of ores relevant to South Africa.

## Basic extractive metallurgy 701 (NHM 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers the fundamental principles of hydrometallurgy and minerals processing.  In the minerals processing part of the module, students are given perspective on the scope of and functions in mineral processing, different unit operations and processing options for different deposits.  Themes are comminution, classification, concentration, and solid-liquid separation.  In the hydrometallurgy portion the merits and limitations of hydrometallurgy when compared with other metallurgical processes (e.g. pyrometallurgy) are considered; and different feed materials for hydrometallurgical processes; different unit processes in hydrometallurgy; fundamental thermodynamic and kinetic concepts as used in leaching; different leach reactors and their applications; solution purification and metal recovery processes; selecting a suitable flowsheet for a given feed material to produce a final metal product are discussed.

## Dissertation 890 (NIN 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Metallurgical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Dissertation 891 (NIN 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Year |

## Professional and technical communication 210 (NJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods.

## Corrosion 700 (NKR 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The aim with this course is to facilitate the development of the students in corrosion engineering by considering the electrochemical fundamentals of corrosion processes as well as their experimental and practical implications for corrosion diagnosis and control. The practical manifestations of the broad types of corrosion are reviewed and the skills of the students to utilise corrosion control methodologies such as chemical and electrochemical control, protective coatings and material selection to control corrosion are developed.

## Research project 700 (NLO 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |

| | |
|---|---|
| **Programmes** | BEngHons Metallurgical Engineering<br>BEngHons Welding Engineering<br>BScHons Applied Science Metallurgy: Welding Technology<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The refereed literature on a specific topic (normally related to subsequent research towards a master's degree) is studied and summarised in a written report.  The important skills are finding appropriate papers, reading and comprehending these, and using the information in the paper to construct your own view on the research topic.  There are no formal contact sessions.  The first part of this module involves definition of a research topic (to be approved by the head of the department), development of a literature survey and compilation of a detailed research proposal. The second part of the module involves generation, presentation and critical interpretation of a project plan/results, and compilation of a written report and an oral presentation. The written document must be submitted at the end of October, with an oral presentation of 20-30 minutes in the week following submission of the survey.

## Materials science 113 (NMC 113)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Computer Engineering<br>BEng Electrical Engineering<br>BEng Electronic Engineering<br>BEng Metallurgical Engineering<br>BEng Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to materials: the family of materials, atomic structure and types of bonding, crystal types and space arrangement of atoms, directions and planes in crystals, defects in crystals, diffusion in solids. Mechanical properties of materials: stress and strain, mechanical testing (strength, ductility, hardness, toughness, fatigue, creep), plastic deformation, solid-solution hardening, recrystallisation.
Polymeric materials: polymerisation and industrial methods, types of polymeric materials and their properties. Corrosion of metals: mechanisms and types of corrosion, corrosion rates, corrosion control. The heat treatment of steel: Fe-C phase diagram, equilibrium cooling, hardening and tempering of steel, stainless steel. Composite materials: Introduction, fibre reinforced polymeric composites, concrete, asphalt, wood.

## Materials science 123 (NMC 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering ENGAGE<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to materials: the family of materials, atomic structure and types of bonding, crystal types and space arrangement of atoms, directions and planes in crystals, defects in crystals, diffusion in solids. Mechanical properties of materials: stress and strain, mechanical testing (strength, ductility, hardness, toughness, fatigue, creep), plastic deformation, solid-solution hardening, recrystallisation.
Polymeric materials: polymerisation and industrial methods, types of polymeric materials and their properties. Corrosion of metals: mechanisms and types of corrosion, corrosion rates, corrosion control. The heat treatment of steel: Fe-C phase diagram, equilibrium cooling, hardening and tempering of steel, stainless steel. Composite materials: Introduction, fibre reinforced polymeric composites, concrete, asphalt, wood.

## Materials science 223 (NMC 223)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | NMC 113 or NMC 123 |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Phase diagrams, phases and solid solutions. The heat treatment of steel (phase equilibria, the diffusion-controlled and martensitic transformations of austenite, hardening and tempering, hardenability, the application of IT and CCT diagrams, heat treatments). Steel types and classification. Cast irons (white, grey, malleable and spherical graphite irons). Stainless steels (ferritic, martensitic, austenitic and duplex types).

## Materials science 313 (NMC 313)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NMC 223) |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Binary and ternary phase diagrams. Diffusion in alloys (steady-state and nonsteady-state, solid solutions, grain boundaries, homogenisation). Solidification (pure metals and alloys; ingots, castings and welds; segregation, porosity and eutectic solidification). Metallographic and analytical techniques (diffraction, electron microscopy). Precipitation and solid-solution strengthening (principles, and applications to aluminium, magnesium, copper and nickel-base alloys).

## Mechanical metallurgy 320 (NMM 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NMC 223) |
| **Contact time** | 3 lectures per week, 4 practicals per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Dislocations and deformation (defects in crystalline materials, movement and elastic energy of dislocations, different crystal lattices, origin of and strengthening by dislocations). Strength of engineering materials (tensile testing, plastic deformation of single crystals and polycrystalline materials, hardness, residual stress). Creep deformation (primary and secondary creep, stress and temperature dependence, creep rupture). Introduction to fracture mechanics (Griffith criterion, stress intensity, fracture toughness, fatigue). Failure analysis. Hot and cold rolling of metals.

## Mechanical metallurgy 700 (NMM 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

We cover the interaction between the internal structure of metals – on the atomic and microscopic scales – and their mechanical properties. Practically important topics such as elastic and plastic stress analysis, dislocations and deformation, room and high temperature deformation processes, mechanical property/microstructure relationships for low and medium Carbon steels and for micro-alloyed and HSLA steels, fatigue processes, stress corrosion cracking, creep deformation processes and fracture mechanics are covered in depth, and illustrated with case studies.  The course is largely available on  CD-ROM  with references to the latest literature.

## Minerals processing 310 (NMP 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 4 practicals per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Minerals processing in perspective (economic importance, economic nature of mineral deposits, mineral properties and analysis, mineral processing functions). Liberation analysis (importance and measurement of liberation; particle size analysis). Comminution (theories and principles, crushers, grinding mills). Screening and classification (industrial screening, cyclones). Concentration processes (gravity concentration, dense medium concentration). Froth flotation.

## Minerals processing 411 (NMP 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NMP 310) |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The sizing, application and efficiency determination of the most commonly used unit operations covering crushing, screening, classification, milling, gravity concentration, dense medium separation, magnetic separation and thickening.

## Minerals processing 700 (NMP 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Principles and advanced theory of comminution, classification and density separation are covered.

## Applied theory of sampling for minerals processing 701 (NMP 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers both the theory and practice of sampling, primarily with respect to the minerals processing industry. As sampling is statistical in nature, basic statistics relevant to sampling theory will be considered. The module will then focus on the theory of sampling with specific reference to managing large and small scale variability. The effect of interpolation errors, periodic errors and increment weighting errors will be considered under large scale variability. Under small scale variability the determination and management of various errors that result in small scale variability will be covered, as well as the compilation of sampling protocols that can minimise these errors. The module will also examine the evaluation of dry and wet sampling equipment with respect to the different bias generators, as well as the implementation of sampling protocols in practice. Ore types covered during the course include coal, iron ore, gold and platinum.

## Research methodology 320 (NNM 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to scientific research. Planning and preparation of a research project. Different research methods.

## Research methodology 820 (NNM 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |

| | |
|---|---|
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

## Nuclear reactor materials 700 (NNR 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

In this module the mechanical behaviour of metals and alloys at room and high temperature is addressed but with special emphasis on nuclear materials used in commercial power reactors. In particular these materials' behaviour under deformation, creep, fracture, fatigue and also corrosion in irradiation conditions for in-core materials as well as their behaviour under the unique environmental conditions for out-of-core materials is covered.

## Process design 421 (NOP 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NHM 322), (NMM 320), (NPM 321), (NVM 321) |
| **Contact time** | 1 lecture per week, 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Philosophy of design and the design process; phases of plant design and their interrelationships. Principles of project planning and management. Unit and process design, simulation, economic evaluation and optimising as applicable to the metallurgical industry. Execution of a process design project, submission of a report, oral presentations and construction of a scale model.

## Metallurgical analysis 700 (NPA 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 24 Hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The aim is to solve metallurgical problems with the aid of hi-tech analytical techniques. These different analytical techniques are given in modular form and the respective metallurgical area of specialisation will dictate the combination of three techniques to suit the requirements of the research student. Specialisation areas like Physical Metallurgy, Welding Metallurgy, Hydro Metallurgy, Pyro Metallurgy and Minerals Processing are covered and any other combination can be requested by the study leaders after consultation with the course leader. The techniques included are TEM, SEM, Auger Spectroscopy (AES), X-ray Photo-electron Spectroscopy (XPS), Glow Discharge Optical emission Spectroscopy (GDOES), X-ray Diffraction (XRD), X-ray fluorescence (XRF), Gleeble hot working simulations and Dilatometry. Lectures cover the theory of these techniques in depth and the theory is illustrated with industrial case studies.

## Process metallurgy and control 412 (NPB 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NPM 321) |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Elements of metallurgical process control (principles, selection of proportional-integral controller, identification of controlled and manipulated variables and disturbances). Transient and steady-state heat transfer in metallurgy (formation of freeze layers, heating and cooling of components). Principles of reaction kinetics in pyrometallurgy (types and identification of rate-determining steps, quantification of overall reaction rate).

## Pyrometallurgy 321 (NPM 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | NPT 220 |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Overview of pyrometallurgical process routes, types of reactions, and reactor designs. Review of relevant thermodynamic principles (equilibrium constants, Henrian and Raoultian activities and activity coefficients). Slag basicity and viscosity. Energy and reductants. Overview of pyrometallurgical separation principles (vapour-phase, solid-state and liquid-liquid routes). Examples of pyrometallurgical separation processes (ironmaking and steelmaking, sulphide smelting and converting, ferroalloys).

## Pyrometallurgy 700 (NPM 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

We aim to provide you with practice in using fundamental principles to analyse pyrometallurgical processes – to be able to go from understanding to process improvement. To this end, the necessary fundamentals of reaction equilibria (including activity descriptions), reaction kinetics, and mass and energy balances are reviewed. Practical examples illustrate the use of these principles. In the final block, we analyse a number of practical processes in more detail. Throughout, the emphasis is on quantification.

## Basic pyrometallurgy 701 (NPM 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

In this module you will develop the skills required to analyse the equilibria of pyrometallurgical processes. Solving such a problem requires skills in thermodynamic analysis, and knowledge of the typical processes (and the conditions within these processes) which are used to extract and refine metals like iron (steel), copper, titanium, chromium, manganese, and aluminium.  The aim is to enable you to analyse a current or proposed process with regards to feasibility, and to propose processing conditions (e.g. temperature, slag composition) which will achieve the required equilibrium state.  This also applies to refractory systems, where the primary aim will be to evaluate whether a given refractory material is suitable for a given application, or the impact of certain impurities on the refractory material.

## Process thermodynamics 220 (NPT 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (CHM 171) or (CHM 172) |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The first, second and third laws of thermodynamics, enthalpy and heat capacity. The criteria for equilibrium, Gibbs free energy, chemical potential, partial molar Gibbs free energy, activity, activity coefficient and the equilibrium constant. Solution thermodynamics of ideal and non-ideal solutions, as well as solution models. Ellingham, Kellogg and Pourbaix diagrams. The thermodynamic principles are applied to metallurgical processes. Applications also include stoichiometry and mass balance problems, as well as the calculation of energy balances.

## Metals processing and welding 410 (NPW 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | (NMC 312) and (NMM 320) |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Liquid metal processing. Sheet metal processing. Welding processes. Surface processing and hard facing. Processing for fatigue resistance; fatigue of welded structures. Soldering and brazing. Metallurgy of welding and the heat-affected zone. Welding of carbon steels, cast irons and non-ferrous alloys. Metallurgy and welding of stainless steels. Welding codes, specifications, quality assurance.

## Metals processing 411 (NPW 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NMC 313), (NMM 320) |
| **Contact time** | 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to welding and joining processes. Welding of carbon steels, stainless steels, aluminium and aluminium alloys. Development and qualification of welding procedure specifications. Liquid metal processing (casting processes, solidification of castings and mould design). Deformation processing (forging, extrusion and rolling), sheet metal processing and surface processing. The identification and prevention of defects.

## Industrial training 316 (NPY 316)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

*Attendance module only
During or at the end of the second year of study, students in Metallurgical Engineering undergo at least six weeks of prescribed training in industry. A satisfactory report on the practical training must be submitted to the Faculty Administration within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the Dean.

## Industrial training 416 (NPY 416)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

*Attendance module only
During or at the end of the third year of study, students in Metallurgical Engineering undergo at least six weeks of prescribed training in the industry. A satisfactory report on the practical training must be submitted to the department within one week of registration. In exceptional circumstances the prescribed minimum period can be reduced, as approved by the Chairman of the School of Engineering.

## Literature survey 412 (NSC 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | (NHM 322), (NMM 320), (NPM 321), (NVM 321) |
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Literature search (using electronic databases of publications, formulating search strategies). Hypothesis formulation and preliminary experimental planning (identifying research question and stating hypothesis, proposing critical experiments, evaluating feasibility of possible experimental approaches). Literature survey (critical evaluation of published information, synthesising available information into a coherent argument, written and oral reporting). Final experimental planning (formulation of experiments with attention to calibration, uncertainty, reliability and safety).

## Project 422 (NSC 422)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | NSC 411 or NSC 412 |
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Execution of a research project: experimentation (with attention to safety, reliability, calibration and reproducibility); analysis of results to yield data (with statistical analysis of uncertainty); interpretation of data (to test the stated hypothesis); written reporting of results (with updated literature survey, description of experimental approach, data obtained, conclusions, and scientific and industrial implications); oral and poster presentations.

## Froth flotation 700 (NSF 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Fundamentals of sulphide and coal flotation are covered, including the chemistry of sulphide mineral flotation; natural and induced hydrophobicity; physical and chemical interactions in coal flotation; review of sulphydryl and oxydryl collectors and their absorption mechanisms; the role of activators/depressants and pH regulators as well as an investigation of frothers and froth stability, with reference to recent industrial developments. Aspects of flotation practice are addressed: Experimental methods for laboratory and plant trials; basic and complex flotation circuits with examples from recent developments; control in flotation plants: reagents/conditioning. Finally, relevant interfacial surface chemistry is covered: the role of water in flotation; mechanisms and thermodynamics of collector activity.

## Welding metallurgy 700 (NSW 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BEngHons Welding Engineering<br>BScHons Applied Science Metallurgy: Welding Technology<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module examines the basic physical metallurgy and heat treatment of various metals and alloys, and the application of various mechanical testing techniques, microstructural analysis and corrosion testing to characterise metals and alloys. The structure and properties of welds in carbon steels, stainless steels, cast irons, copper and copper alloys, nickel and nickel alloys, aluminium and aluminium alloys and other materials (Ti, Mg, Ta and Zr) are discussed. Defects are discussed and various techniques to avoid the formation of these defects in welds are considered.

## Refractory materials 321 (NVM 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | (NPT 220) and NPM 321 # |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Classification, requirements and properties of refractory materials. Manufacturing principles. Specification and testing of refractory materials. The main refractory systems, i.e silica, aluminosilicates, alumina, magnesia, magnesia-chrome, magnesia-carbon, doloma, zircon, zirconia, silicon carbide and graphite, and their applications. Principles of ternary phase diagrams and their application in refractory systems, and interactions between slag, metal and refractory materials.

## Refractory materials 700 (NVM 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

The objective is to convey a fundamental understanding of the principles that are involved in the manufacture, selection and use of refractories. Relevant thermodynamic principles are reviewed, with emphasis on the thermodynamic properties of oxide materials, metals and slags, and how these affect refractory performance. Phase diagram use in refractory selection and prediction of slag-metal-refractory interactions is covered. A section on manufacture covers the types of raw materials, design and formulation, handling, manufacturing routes, and quality control (including practical mineralogy). Finally, design properties of refractories for the ferrous, cement, aluminium, copper, platinum and ferro-alloy industries are reviewed.

## Mathematical modelling of metallurgical processes and materials 780 (NWM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 Contact hours |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module covers both the theory and practice of mathematical modelling applied to metallurgical processes and materials. The module applies the theory mastered in prior learning such as mathematics, physics, thermodynamics, fluid mechnanics, heat transfer, etc. to create mathematical representations of processes and materials. A range of modelling techniques is addressed in the module, such as solution models of solid and liquid mixtures, mass and energy balances, steady state process models, dynamic process models, heat transfer models, computational fluid dynamics models, multiphysics models and technical-economic models. The created models are then applied to solve problems encountered in research and industry.

## Welding processes 700 (NWP 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BEngHons Welding Engineering<br>BScHons Applied Science Metallurgy: Welding Technology<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module examines arc physics, electrotechnics as applied to weld power sources, and power source design. The fundamental principles, applications, consumables and process variables of various arc welding processes, oxy-gas welding techniques, resistance welding processes, power beam processes and solid-state welding techniques are considered. Brazing and soldering, cutting, surfacing and metal spraying techniques are discussed. The module also looks at the welding of plastics, ceramics and composites, and at the mechanisation and use of robotics in the welding and joining industries. Practical training is included in this module.

## Design of welded structures 701 (NWP 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEngHons Metallurgical Engineering<br>BEngHons Welding Engineering<br>BScHons Applied Science Metallurgy: Welding Technology<br>BScHons Applied Science Metallurgy |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 48 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Materials Science and Metallurgical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

This module examines welded joint design, the basics of weld design and the role of fracture mechanics in joint design. The behaviour of welded structures under different types of loading are considered, with special focus on the design of welded structures with predominantly static loading and the design of dynamically loaded welded structures. The design of welded pressure equipment, aluminium alloy structures and reinforcing-steel welded joints is considered.

## Business management 114 (OBS 114)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Econometrics<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIT<br>BSW<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSocSci Heritage and Cultural Tourism<br>BSocSci Industrial Sociology and Labour Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | May not be included in the same curriculum as OBS 155 |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to business management as a science; the environment in which the enterprise operates; the field of business, the mission and goals of an enterprise; management and entrepreneurship. Responsible leadership and the role of a business in society. The choice of a form of enterprise; the choice of products and/or services; profit and cost planning for different sizes of operating units; the choice of location; the nature of production processes and the layout of the plant or operating unit.
Introduction to and overview of general management, especially regarding the five management tasks: strategic management; contemporary developments and management issues; financial management; marketing and public relations. Introduction to and overview of the value chain model; management of the input; management of the purchasing function; management of the transformation process with specific reference to production and operations management; human resources management and information management; corporate governance and black economic empowerment (BEE).

## Business management 124 (OBS 124)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BIT<br>BSW<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSocSci Heritage and Cultural Tourism<br>BSocSci Industrial Sociology and Labour Studies |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | Admission to the examination in OBS 114 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 2 |

**Module content**

The nature and development of entrepreneurship; the individual entrepreneur and characteristics of South African entrepreneurs. Creativity and innovation, opportunity finding and exploitation. The business plan and resource requirements are explored. Getting started (business start up). Exploring different routes to entrepreneurship: entering a family business, buying a franchise, home-based business and the business buyout. This semester also covers how entrepreneurs can network and find support in their environments. Case studies of successful entrepreneurs - also South African entrepreneurs - are studied.

## Business management 210 (OBS 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | OBS 114 or 124 with admission to the examination in the other |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 1 |

**Module content**

Logistics management
The role of logistics in an enterprise; definition and scope of customer service; electronic and other logistics information systems; inventory management; materials management with special reference to Japanese systems; management of the supply chain. Methods of transport and transport costs; types and costs of warehousing; electronic aids in materials handling; cost and price determination of purchases; organising for logistics management; methods for improving logistics performance.

## Business management 220 (OBS 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | OBS 114 or 124 with admission to the examination in the other |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 2 |

**Module content**

Project management: Introduction
Project management concepts; needs identification; the project, the project manager and the project team; types of project organisations; project communication and documentation.
Planning and control: planning, scheduling and schedule control of projects; resource considerations and allocations; cost planning and performance evaluation.

## Business management 310 (OBS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Supply Chain Management<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | OBS 114 or 124 with admission to the examination in the other |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 1 |

**Module content**

Human resource management and development
The environment in which human resource management takes place; job analysis; strategic human resource planning; equal employment opportunities; planning and management of training; development and careers; functioning in a global environment.
Negotiation and collective bargaining
The nature of negotiation; preparation for negotiation; negotiating for purposes of climate creation; persuasive communication; handling conflict and aggression; specialised negotiation and collective bargaining in the South African context.

## Business management 320 (OBS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Business Management<br>BCom Entrepreneurship<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | OBS 114 or 124 with admission to the examination in the other |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

Strategic management analysis and formulation
Basic concepts; formulation of mission; policy and objectives; external evaluation of the business environment; internal evaluation of the enterprise; including intellectual assets; the formulation and development of a strategic plan.
Strategic management implementation
The role of management in strategy implementation; budgets as instrument in the implementation process; leading processes of change within enterprises; supporting policies, procedures and information systems for implementation in the various functional areas; evaluation and control of implementation.

## International business management 359 (OBS 359)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom Business Management<br>BCom Entrepreneurship<br>BCom Marketing Management<br>BCom Supply Chain Management<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | OBS 114 or OBS 124 with admission to the examination in the other |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to international management
International business management; the process of internationalisation; growth in international trade and investment; the evolution of multinational enterprises; management perspectives on international trade and international trade theories; international trade regulation; economic integration; the formation of trading blocks, and free-trade areas.
The international business environment
The cultural environment of international business; the political and legal environments as well as the economic environment of international business; the international monetary system; the foreign exchange market; and international capital markets.

## International business management 369 (OBS 369)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BCom Business Management<br>BCom Entrepreneurship<br>BCom Supply Chain Management<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Admission to the exam in OBS 359 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Business Management |
| **Period of presentation** | Semester 2 |

**Module content**

International financial management
Purpose, scope and principles of international financial management; international cashflow management; foreign exchange risk and foreign exchange risk management; international investment and financing decisions; import and export management; import and export financing, and international purchasing and sourcing.
International management, leadership and market entry
International management and leadership; dimensions of strategic international human resource management; international market entry and introduction to international marketing strategy, and future perspectives on Southern Africa as an emerging market.

## Theory of development communication 880 (OKT 880)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module focuses on human development and the principle of participatory communication. It examines communication theory and processes especially with regard to communication and social change.
The student should be able to work effectively with others in establishing participative development communication principles, collect, analyse and critically evaluate existing literature on development communication, and demonstrate that communication forms an integral part of community development practices.

## Management of development communication 881 (OKT 881)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module will be offered from a management perspective and will examine the role of development within the strategic management processes of an organisation. It will include the evaluation of development projects to suit the strategic objectives of the organisation and how to manage communication within a development project.

## Practice of development communication 882 (OKT 882)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

The focus of this module is the practical side of development communication. It includes: methods to research the target audience, action programmes for communication campaigns in communities and the different channels that can be used for the dissemination of development messages.
It also contains a component in which a development message must be designed by taking into account target group, appropriate channel and distribution.

## Information centres and development communication 883 (OKT 883)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 8 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

This module will focus on the role of information centres in disseminating development information. Centres that will be studied as possible distribution points will include community libraries, telecentres and multi-purpose community centres.

## Mini-dissertation: Development communication 895 (OKT 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 90.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

A report (80-100 pages) on an approved research project. Coursework.

## Design communication 120 (OKU 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Quarter 3: Introduction to basic computer aided design.
Quarter 4: Introduction to the theory of structures: Forces, moments, stresses, strains, Young's Modulus, Structural components: beams, columns and trusses.

## Design communication 313 (OKU 313)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 studio hours per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Advanced graphic and presentation techniques.

## History of the environment 122 (OMG 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to the vocabulary of the built environment as developed over the history of human settlement. Concise history of the development of the built environment from early settlement to modern cities. The role and responsibilities of the built environment professional in engaging with built environment heritage in the form of cultural and natural landscapes.

## History of the environment 310 (OMG 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

History of the environment of African societies between the tropics within global context until the present.

## History of the environment 320 (OMG 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |

| | |
|---|---|
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

History of the environment of Southern African societies from the old Stone Age until the present.

## Environmental theory 110 (OML 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Introductory contextualisation of twentieth century artefacts within the framework of history from Antiquity to Modernity. Building types as artefacts of material culture. Approaches and guidelines to the study of history of the environment. Understanding of the process of endemic construction and its monumentalisation, settlement and urbanisation of various ages and environments. An interdisciplinary investigation of living spaces as shapers of social interaction. The history of the environment of the Mediterranean Antique, Bronze Age, Classical and Biblical societies.

## Environmental studies 120 (OML 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

The history of the environment of and the link between North-Europe and the Mediterranean area, the Arabic peninsula and the Indies, from the fall of Jerusalem up until the fall of Constantinople in 1453 AD. Tao, Shinto and the landscape of the Far East.

## Environmental theory 210 (OML 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

The history of the environment and the link between North-Europe and a newly discovered world from the time of the circumnavigation of the southernmost Cape Point of Africa till the Industiral Revolution.

## Environmental studies 220 (OML 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

History of the environment of Western societies and their dominions from the Industrial Revolution up to the intellectual questioning of Modernism. Southern African housing typologies and Western artefacts as manifestation of socio-political realities since 1488 AD.

## Environmental studies 310 (OML 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Normative positions: Normative positions that guide design thinking: Surface features, broad inclinations and differentiating features. Problems of substantiation. Theory and practise.
Theory of design disciplines: A hermeneutic appraisal of contemporary philosophical directions defining the current intellectual context in which the design disciplines are practised and appraised. Contextualising culture, philosophy and science as the ecosystem of the designer.
Housing studies: Contemporary theory, approaches and projects in housing. Developing a personal approach.

## Environmental studies 320 (OML 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | OML 310 GS |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

The relationship between global intellectual movements and the local debate. Appraising the state of current design production and the establishment of identity through design. Presentation is programme specific.

## Design 100 (ONT 100)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

Introduction to design and integration with supporting modules. Design principles, skills and techniques. Small-scale design projects and environmental influences (physical, social, cultural, historical), space requirements and creative interpretation. Acquisition of skills in design communication through imagination, intuition and conceptual thinking. Relation of internal to external space. Anthropometry and ergonomics; visual literacy (visual media, analysis and interpretation) and criticism. The designer as visual thinker. Perception; ideograms. Development of a vocabulary to describe and illustrate the discipline of design. Pertinent theory that informs and supports the design process.

## Design 200 (ONT 200)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | AAL 110, KON 111, KON 121, OML 110, OML 120 and ONT 100 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

The process and product of design through the integration of supporting modules. Spatial design as response to tectonic and contextual influences. The production of space and the reading of place as central concerns in the design disciplines. The design of residential and simple public spaces and buildings with the emphasis on planning, plan-making, structure and economy as design determinants. Skills: programming, site analysis, time management, advanced graphic and reprographic techniques.
Pertinent theory that informs and supports the design process in architecture.

## Design 202 (ONT 202)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | AAL 110, KON 111, KON 121, OML 110, OML 120 and ONT 100 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

The process and product of design through the integration of supporting modules. Site planning and design; design determinants. Exploration of meaning and integrity in landscape design. Skills: programming, site analysis, creative design, time management, advanced graphic techniques, reprographic techniques. Pertinent theory that informs and supports the design process in landscape architecture.

## Design 203 (ONT 203)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Interior Architecture |
| **Prerequisites** | AAL 110, KON 111, KON 121, OML 110, OML 120 and ONT 100 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

The process and product of design through the integration of supporting modules. Spatial design as response to user. Design of inclusive environments, reuse of architectural space, planning and form-giving processes, production and identity as design determinants. The influence of perception, ergonomics and the tectonics on space making. Scenographic, product, exhibition or installation design. Skills: programming, architectural space analysis, time management, advanced graphic and reprographic techniques.
Pertinent theory that informs and supports the design process in interior architecture.

## Design 300 (ONT 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | KON 210, KON 220, OML 210, OML 220 and ONT 200 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

Semester 1
The process of design through the integration of supporting modules. The design of spaces and buildings with the emphasis on lateral thinking and ritual. Skills: technology-backed reprographic techniques, competitions and exhibitions, decision making and time planning.
Semester 2
The product of design through the integration of supporting modules. The design of a mixed-use project in an urban context with a complex program developed to construction drawings in KON 320. Statutory requirements, feasibility and payability studies.

## Design 302 (ONT 302)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | KON 210, KON 220, OML 210, OML 220 and ONT 202 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

Semester 1
The process of design through the integration of supporting modules. Understanding and investigating urban form, urban ecology and site ecology. Site planning: exploration of complexities at neighbourhood and regional scale including ecological, economic and social planning aspects. Design: framework and master planning at regional context. Skills: technology-backed reprographic techniques, competitions and exhibitions, decision making and time planning.
Semester 2
The product of design through the integration of supporting modules. Exploration of detail urban ecology, economic and social aspects, and historic and cultural environments. Site planning: Interdisciplinary problem solving with emphasis on site design and sustainable and appropriate technologies. Design: complex detail design and sketch plans developed to construction drawings in KON 320.

## Design 303 (ONT 303)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 60.00 |
| **Programmes** | BSc Interior Architecture |

| | |
|---|---|
| **Prerequisites** | KON 210, KON 220,OML 210, OML 220 and ONT 203 |
| **Contact time** | 17 studio hours per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

Semester 1
The process of design through the integration of supporting modules. The design of spaces with the emphasis on lateral thinking and ritual through adaptive reuse. Skills: technology-backed reprographic techniques, competitions and exhibitions, decision making and time management.
Semester 2
The product of design through the integration of supporting modules. The design of a commercial project in an existing architectural envelope in an urban context with a complex program developed to construction drawings in KON 320. Corporate identity, statutory requirements, feasibility and payability studies, tenant mix.

## Public administration 112 (PAD 112)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Humanities |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Public Management and Administration |
| **Period of presentation** | Semester 1 |

**Module content**

This module in public administration is designed specifically to assist students in understanding the role of public administration in a modern state, the unique characteristics of public administration, the schools and approaches in public administration and introducing the various generic administrative functions. The discipline of public administration has developed rapidly and by implication, has changed and shifted its paradigm over the years. The purpose of this module is to introduce public administration to the student as a field of study that makes a significant contribution to the effective administration and management of government institutions.

## Public administration 122 (PAD 122)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BIS Information Science |
| **Service modules** | Faculty of Humanities |

| | |
|---|---|
| **Prerequisites** | PAD 112 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | School of Public Management and Administration |
| **Period of presentation** | Semester 2 |

**Module content**

This module in public administration will introduce the constitutional framework pertaining to public administration. The South African system of government, the functions, role and powers of the executive, legislative and judicial branches of government as well as the functioning of the three spheres of government will be discussed. The module will enable the student to understand how and where public administration is practiced.

## Mine ventilation engineering 410 (PEE 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | MTV 310, Finalists only |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Mine ventilation methods; primary and secondary ventilation methods, ventilation strategies for coal and hard rock mining environments including base metal mines.  Mine development ventilation methods, mine air control, different types of fans including fan performances and air dilution calculations.  Refrigeration: Elementary refrigeration principles, including concepts and methods, chilled water systems, including cooling distribution methods.  Elementary mine ventilation planning, basic planning parameters and elementary mine ventilation economics and the impact of incorrect design and applications on safety and health.  Mine gases, their origin and gas/coal dust explosions.  Aspects of the Mine Health and Safety act are also dealt with.

## People management 883 (PEM 883)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MEng Engineering Management (Coursework)<br>MSc Engineering Management (Coursework) |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 16 lectures per week, 2 web-based periods per week, 3 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 2 |

## People management 884 (PEM 884)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | MEng Technology and Innovation Management (Coursework)<br>MSc Technology and Innovation Management (Coursework) |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 web-based period per week, 16 lectures per week, 3 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Human Resource Management |
| **Period of presentation** | Semester 1 |

**Module content**

While the cliché “Our company’s most important asset is our people” is often used, the aim of the PEM 884 module is to bring life to this statement, equipping managers in the technology environment to manage people in a way that enhances both their value and humanity. The module centres around challenges in the technology environment for the 21st century, considering how organisational behaviour and human resource management processes can be used in mastering these. The module includes aspects such as managing individuals, teams and organisations with regard to various dimensions of behaviour including: individual diversity, emotional intelligence, motivation and team performance, group dynamics in managing teams, communication, leadership, power and politics, organisational culture, organisational change and stress, labour relations and human resource processes.

## Financial mine valuation 780 (PFZ 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Slope stability 781 (PHS 781)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## First course in physics 114 (PHY 114)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Chemistry<br>BSc Computer Science<br>BSc Engineering and Environmental Geology<br>BSc Geography<br>BSc Geology<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | A candidate must have passed Mathematics and Physical Science with at least 60% in the Grade 12 examination |
| **Contact time** | 1 discussion class per week, 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 1 |

**Module content**

SI-units. Significant figures. Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young-interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle, continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

## First course in physics 124 (PHY 124)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Chemistry<br>BSc Computer Science<br>BSc Extended programme - Physical Sciences<br>BSc Geography<br>BSc Geology<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | WTW 114 GS and PHY 114 GS |
| **Contact time** | 1 discussion class per week, 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 2 |

**Module content**

Simple harmonic motion and pendulums. Coulomb’s law. Electric field: dipoles, Gauss’ law.Electric potential. Capacitance. Electric currents: resistance, resistivity, Ohm’s law, energy, power, emf, RC-circuits. Magnetic Field: Hall-effect, Bio-Savart. Faraday’s and Lenz’s laws. Oscillations: LR-circuits. Alternating current: RLC-circuits, power, transformers. Introductory concepts to modern physics. Nuclear physics: Radioactivity.

## Physics 133 (PHY 133)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | As for BSc Four-year programme |
| **Contact time** | 2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 1 |

**Module content**

Heat: temperature and scales, work, energy and heat, calorimetry, specific heat, expansion, heat transfer. Measurements: SI-units, measuring error and uncertainty, (graphs), significant figures, mathematical modelling.One-dimensional kinematics. Geometrical optics: reflection, refraction, dispersion, mirrors, thin lenses.

## Physics 143 (PHY 143)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | PHY 133 |
| **Contact time** | 2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 2 |

**Module content**

Vectors. Kinematics of a point: relative motion, projectile, circular motion. Dynamics: Newton’s laws, friction. Work: point masses, ideal gas law, springs, power. Energy: kinetic energy, potential energy, conservative forces, spring, conservation of mechanical energy. Hydrostatics and dynamics: density, pressure, Archimedes' law, continuity, Bernouli.

## Physics 153 (PHY 153)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | PHY 143 |
| **Contact time** | 2 discussion classes per week, 2 practicals per week, 3 lectures per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 1 |

**Module content**

System of particles: centre of mass, Newton's laws. Rotation: torque, conservation of momentum, impulse and collision, conservation of angular momentum, equilibrium, centre of gravity. Oscillations. Waves: sound, intensity, superposition, interference, standing waves, resonance, beats, Doppler effect. Physical optics: Young-interference, coherence, thin layers, diffraction, gratings, polarisation.

## Electronics, electromagnetism and quantum mechanics 356 (PHY 356)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 36.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Education |
| **Prerequisites** | PHY 255 GS and PHY 263 GS and WTW 211 GS and WTW 218 GS and WTW 248 GS |
| **Contact time** | 1 practical per week, 2 discussion classes per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 1 |

**Module content**

Electronics (14 lectures)
Thévenin and Norton equivalent circuits, superposition principle, RC, LC and LRC circuits. Semiconductor diode. Bipolar transistor. Operational amplifiers. Computer controlled instrumentation.
Electromagnetism (21 lectures)
Electrostatics: Coulomb’s law, divergence and curl of E, Gauss’ law, Laplace’s equation, image charge problems, multipole expansion.
Magnetostatics: Lorenz force, Biot-Savart law, divergence and curl of magnetic field strength, Ampère’s law, magnetic vector potential, multipole expansion, boundary conditions.
Electrodynamics: Electromotive force, electromagnetic induction, Maxwell’s equations, wave equation.
Electric and magnetic fields in matter: Polarisation, electric displacement and Gauss’s law in dielectrics, linear dielectrics. Magnetisation (diamagnets, paramagnets, ferromagnets), auxiliary field H and Ampère’s law in magnetised materials, linear and nonlinear media.
Quantum mechanics (28 lectures)
The Schrödinger equation, the statistical interpretation of the wave function, momentum, the uncertainty principle, the time-independent Schrödinger equation, stationary states, the infinite square well potential, the harmonic oscillator, the free particle, the Delta-Function potential, the finite square well potential, Hilbert spaces, observables, eigen functions of a Hermitian operator, Dirac notation, the Schrödinger equation in spherical coordinates, the hydrogen atom, angular momentum spin.

## Statistical mechanics, solid state physics and modelling 364 (PHY 364)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 36.00 |
| **Programmes** | BSc Computer Science |

| | |
|---|---|
| **Service modules** | Faculty of Education |
| **Prerequisites** | PHY 356 and WTW 211 and WTW 218 and WTW 248 GS |
| **Contact time** | 2 discussion classes per week, 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Physics |
| **Period of presentation** | Semester 2 |

**Module content**

Statistical mechanics (28 lectures)
Isolated systems in thermodynamical equilibrium. Systems in equilibrium with a heat bath: the canonical ensemble, Gibbs' entropic formula, classical statistical mechanics, energy equipartition theorem, thermodynamic potentials, paramagnetism.
The classical limit of perfect gases: non-distinguishable character of quantum particles, the equation of state of the classical ideal gas. Quantum perfect gases: Black body radiation, the grand canonical ensemble, Fermi-Dirac distribution, the free electron gas in metals, the Bose-Einstein distribution, Bose-Einstein condensation.
Solid state physics (28 lectures)
Crystal structures, the reciprocal lattice, x-ray diffraction, lattice vibration, the Debye model, characteristics of solids, the free electron model, Pauli paramagnetism, electronic heat capacity, the relaxation time, electrical conduction, the classical Hall effect, thermal conduction in metals, failures of the free electron model, the independent electron model, band theory of solids.
Computational Physics and modelling. Assessment will be done through a portfolio of project reports. The topics for the projects will be selected from various sub-disciplines of Physics.

## Professional and technical communication 210 (PJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods.

## Practice management 320 (PJS 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture<br>BSc Interior Architecture<br>BSc Landscape Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

The structure of the built environment in South Africa; basic principles and techniques of project management and financial management; methodology of measuring; building cost estimates; feasibility studies; economic design; contract administration; valuation of buildings.

## Basic mine ventilation engineering 701 (PKB 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Airflow and fans 711 (PKB 711)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Heat and refrigeration 712 (PKB 712)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

### Mineral economics 320 (PME 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The objective is for the student to understand fundamental economic theory pertaining to the mineral and mining industry and its overall effects on the broader South African economy.  The student will be able to interpret and understand company annual results.  The student should be able to understand and apply the SAMREC/SAMVAL code during the evaluation and classification of resources and reserves.  The student should understand the effect of supply and demand pertaining to the mineral and mining industry (micro and macro economic factors).  To understand the unique aspects related to marketing of minerals with reference to the cyclic nature of the industry.  Apply economic and engineering reasoning to specific problems in the minerals and mining industry so as to analyse and interpret the opportunities and threats facing this industry.  To understand and apply the fundamentals of technical mine valuation, including mineral rights, prospecting methods, sampling, mass and mineral content of ore as well as management and control factors.  The latter include controlling and managing of widths, stoping width versus tramming and milling width, ore dilution, mine call factor and cut-off grade.

## Property investment 701 (PMN 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

**Module content**

The nature and scope of real estate investment, objectives of property developers, participants in the property investment process, the investment decision process, investment criteria, investment time horizons, decision making approaches.

## Property investment 720 (PMN 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 6.00 |
| **Programmes** | BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 or Semester 2 |

### Module content

The nature and scope of real estate investment, objectives of property developers, participants in the property investment process, the investment decision process, investment criteria, investment time horizons, decision making approaches

## Property Investment 820 (PMN 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Programmes** | MSc Real Estate Retail property (Coursework)<br>MSc Real Estate (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

## Introduction to mining 210 (PMY 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Contact time** | 2 lectures per week, 2 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

### Module content

Introduction: Mining in South Africa: Overview of mining and history in South Africa, Minerals and mining. Surface mining: Surface mining methods, Surface mining planning, Rock breaking, Rock loading and transport. Underground hard rock mining: A mine in outline, explanation of underground mining terms, basic mine layouts, shafts, development, stoping methods, compressed air, water and electrical reticulation. Underground coal mining: planning and development, rock breaking: stoping and tunnelling. Mine environmental engineering: ventilation practice, airflow, fans, gases, heat, psychometry. Mine strata control: strata control in deep and shallow underground mines, strata control in coal mines.

## Surface mining and geotechnics 311 (PMY 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | PMY 210 |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Surface mining methods: Introduction, classification of ore reserves and terminology. Earth moving: Loading shovels and methods, haulage trucks, productivity and tires, introduction to bucket wheel excavators, conveyor systems and in-pit crushers, in-pit crushing-conveying system, application of draglines and terminology. Introduction to mine planning, mine development phases, block modelling, methods of sequencing, stripping ratios and breakeven ratios. Introduction to mining environment, rehabilitation and closure, integrated environmental management, environmental impact studies, water management and rehabilitation planning and costing. Geotechnics include understanding discontinuities in rock mass, stereo nets, cohesion and friction. Rock behaviour pertaining to excavations, understanding plane, circular and wedge failures, Rock slope safety factors. Slope stabilisation, neutral line theory, effects of water in a slope, monitoring of slopes and instruments available for slope stability monitoring, Risk concepts pertaining to slopes and a case study is discussed.   Aspects of the Mine Health and Safety Act are also dealt with.

## Mining 320 (PMY 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PMY 311, PPY 220 |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Mining 320 provides an overview of mining by covering the following subject-matter: history of mining in South Africa, underground mining systems, and a brief overview of mine environmental control and mine strata control.   Then the module covers general mine layouts, mine plan reading, mine surveying, electricity supply, transport systems, water management systems, and mine fires. This feat is achieved through the study of various mining methods and case studies.

## Mining 410 (PMY 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PRX 321, PME 320, PMY 320, Finalists only |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Specific mining techniques. Shafts: Types, methods and equipment for sinking; economic considerations. Tunneling: Design, development techniques and equipment. Design and construction of large excavation. Design, construction, reinforcing and repair of ore passes. Fires in gold and coal mines: Causes, prevention, detection, combating and insurance. Flooding: Water sources, results, dangers, sealing and control.

## Mine operational risk management 423 (PMY 423)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | Finalists only |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Selected topics in operational risk management; Introduction and context; Risk management concepts, words, and models; Risk assessment principles; Human factors; Leading practice; Layered risk management (including identification, assessment and control); Scoping risk assessment; Integrating outcomes into the business; ORM journey tool; Line management and OR; Safety and mineral Statistical Structures and Codes; Legal aspects.

## Underground mining methods 701 (PMY 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

PMY 701 provides an overview of mining by covering the following subject matter: history of mining in South Africa, surface-mining methods, underground mining methods, and a brief overview of mine environmental control and mine strata control. Then the module covers general mine layouts, mine plan reading, mine surveying, electricity supply, transport systems, water management systems, and mine fires. Specific mining techniques. Shafts: Types, methods and equipment for sinking; economic considerations. Tunneling: Design, development techniques and equipment. Design and construction of large excavation. Design, construction, reinforcing and repair of ore passes. Fires in gold and coal mines: Causes, prevention, detection, combating and insurance. Flooding: Water sources, results, dangers, sealing and control.

## Surface-mining 703 (PMY 703)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Mining methods for open pits and strip mine operations. Basic mine planning, scheduling and economic cut-off limits with regards to waste stripping and ore grade. Continuous and discontinuous operations: Selection and management of truck-based loading and transport systems. Selection and management of conveyor-based loading and transport systems. Dragline selection, operation, management and strip mining practices. Slope stability in surface mines, plane, wedge and circular/non-circular failures.

## Mine design and research 422 (PMZ 422)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 42.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PMY 410, PSZ 410, PEE 410. PNB 400, Finalists only |
| **Contact time** | 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

This module entails the completion of an engineering project from concept to delivery. The student must demonstrate mastery of a mining engineering project. The module focuses on the formulation of a mining engineering problem, the development of appropriate extraction methodologies, project planning and management and then completion of a technical project of a given nature, scope and complexity.
Students are required to design a mine at the conceptual business case level. Students are given a surface plan and borehole data from which they have to design a mine in teams of 3 – 5 students. They have access to a mining engineer in industry to assist with advice. The design has to incorporate a market analysis, layout design, working method, surface layout, environmental impacts and financial analysis. The design is submitted in book form and each team member has to do a presentation of the design.

## Advanced design: Mining 780 (PMZ 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Industrial excursions 300 (PNB 300)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

The mining industry requires that students are exposed to the mining industry by visiting a collection of mines with the purpose of familiarising them with current trends in mining practice and mining methods.  This module hopes to provide a “snapshot” of the mining industry as it is at the time of the tour. This tour requires attendance and participation in five one-day visits to mines.  The excursions are organised during the first semester of the third year, and take place during the July recess at the end of the semester.  Students must, before the second semester commences, submit a group report on the visits during the second semester.

## Industrial excursions 400 (PNB 400)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PNB 300, Finalists only |
| **Contact time** | 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

**Module content**

Attendance of and participation in industrial excursions organised during the year, including a ten-day excursion tour at the end of the first semester. Submission of reports and assignments as required.

## Practical development feasibility 700 (POU 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 2.00 |
| **Programmes** | BScHons Construction Management<br>BScHons Quantity Surveying<br>BScHons Real Estate<br>BScHons Real Estate Retail Property |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 and Semester 2 |

## Practical development feasibility 720 (POU 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 2.00 |
| **Prerequisites** | PRE000000544 Ebit Plan 12242014-12242016 |
| **Contact time** | 3 days excursion |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

The feasibility of a project is investigated by groups comprising students of the various fields of study in the built environment.
The projects are presented to a panel of judges comprising practitioners.

## Open-pit mining 783 (POY 783)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Experiential training 220 (PPY 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The student needs to undergo practical mine training for a period of at least 6 weeks to be exposed to the mining environment, a report on this vacation work will be expected as per department guideline, in English only.

## Experiential training 320 (PPY 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

The mining industry requires students to become exposed to mining by working on mines during the December recess period at the end of the second academic year.  The student is required to work for a minimum period of six weeks on a mine, and then compile a report on the work completed for submission at a prescribed date in the first semester of the third academic year.

## Project management 802 (PRB 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Dissertation: Project management 890 (PRB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Essay: Project management 892 (PRB 892)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Construction Economics |
| **Period of presentation** | Year |

## Explosives engineering 321 (PRX 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | MTX 221 |
| **Contact time** | 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Explosive engineering: The importance of improved safety standards, cost effectiveness and productivity has driven technical mining personnel to examine all facets of their operations. Increasingly, it has been realized that an efficient drilling and blasting program will impact positively throughout the mining operation, from loading to maintenance, hauling to crushing, ground support to scaling and grade control to recover with an invariable increase in the overall profitability through technical advanced projects. Through the safe, efficient and innovative use of explosives for rock breaking the mining engineer will make a positive contribution to the overall mining operation.  Due to the nature of the topics discussed in this module, a number of case studies are used to emphasise the safe handling, application and destruction of explosives.  The Mine Health and Safety Act is dealt with and the Explosives Act receives specific attention.

## Explosives engineering 701 (PRX 701)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

History of explosives, types of explosives: primary and secondary explosives, thermodynamics of detonation, strength of explosives. Methods and techniques, explosive initiating systems, application of explosives in rock breaking; the effects of geology and drilling. Surface and underground blasting, controlled blasting, vibration control, air blast. Ethics and regulatory compliance. Equipment and calculations.

## Rock breaking: Drilling and explosives 784 (PRX 784)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Mining Engineering |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

## Advanced explosive engineering 785 (PRX 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Types of commercial explosives. Properties of explosives. Explosive initiating systems, application of explosives in rock breaking; Surface and underground blast designs and specialised blast designs; the effects of geology on blast results. Fragmentation, blasting and environmental control. Blast assessment. Ethics and regulatory compliance. Safety in blasting.

## Introduction to project 321 (PSC 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PNB 300 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Reporting technical information: typical report structure, literature survey, data presentation (tables, graphs, diagrams), referencing, presenting results, conclusions, and recommendations. Identification of a suitable subject for the Final Year Project. Planning of project execution.

## Project 411 (PSC 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 10.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | PSC 321, Finalists only |

| | |
|---|---|
| **Contact time** | 1 tutorial per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The project involves the execution of an analytical and/or experimental research project under guidance of a lecturer. During the second semester of the third year of study students must select a suitable research topic, to be approved by the head of department. Data for the approved project will be collected during the practical training period during the summer recess at the end of the third year of study. A comprehensive and detailed project report must be compiled and submitted for evaluation at a prescribed date in the first semester of the fourth year. The student must also prepare a presentation of the project for an oral examination at the end of the semester.

## Research project 700 (PSS 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Mining Engineering<br>BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

**Module content**

*This is a compulsory research module.

## Strata control 410 (PSZ 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | SWK 210, PMY 320, Finalists only |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Three dimensional stress and strain tensors and linear elasticity. The state of stress in the earth's crust. Rock material and rock mass failure criteria. The response of the rock mass to underground excavations, energy release rate and excess shear stress. Mining induced seismicity, rock bursts and measures to minimise mining induced seismicity so as to improve SHE. Elementary mine layout design, pillar design and underground excavation support and their effects on SHE. Stress analysis of mining layouts and mine layout optimisation.

## Basic rock mechanics 703 (PSZ 703)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BScHons Applied Science Mining |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Strata control: Hard-rock mining 786 (PSZ 786)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Strata control: Hard-rock service excavations 787 (PSZ 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in Afrikaans |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 |

## Strata control: Collieries 788 (PSZ 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEngHons Mining Engineering |
| **Prerequisites** | (SWK 210) |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Rock support pillars 790 (PSZ 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | Self study |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

## Publishing: Introduction to publishing 110 (PUB 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed – requires departmental selection.
Introduction to publishing. This module will focus on an introductory overview of publishing: the historical development of publishing; the publishing value chain; business and legal issues relating to the publishing industry; and the broader macro-context.

## Publishing 120 (PUB 120)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 12.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed - requires departmental selection.
The Book Publishing Environment. This module provides a basic introduction to the book publishing environment. The following aspects are highlighted: the concept "publishing"; different publishing industries and environments; contexts of book publishing; the publishing value chain; processes, tasks and role-players involved in book publishing; different sectors of the book publishing industry; different types of publishing houses; external role-players; initiatives; strategies; current trends and issues.

## Publishing 210 (PUB 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Multimedia<br>BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed - requires departmental selection.
Copy-editing. This module offers an introduction to copy-editing as a phase in the publishing process. Topics covered are the role of the copy-editor in the publishing value chain; the levels of editing; the responsibilities of the copy-editor towards the manuscript, the author and the publishing house; the responsibilities and skills of the proof-reader; typical problems in texts; proof-reading and copy-editing symbols and the mark-up of texts; as well as legal and ethical aspects of editing. Learners are also equipped with practical skills in proofreading and copy-editing both digital and print-based texts.

## Publishing 220 (PUB 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BIS Publishing |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed - requires departmental selection.
The Visual and Production Dimensions of Publishing. This module offers a theoretical positioning of graphic design, reproduction and printing within the publishing process, as well as practical applications thereof. The following topics are addressed in the theoretical positioning: graphic design practice; the historical development of the relationship between reproduction and printing innovations and graphic design styles; the use of visual elements in publications; the management role of the editor in this phase.
During the practical component learners are introduced to selected applications of DTP software and the practical aspects of the production phase.

## Publishing 310 (PUB 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed - requires departmental selection.
Publishing in the Digital Environment. The first part of this module focuses on the study of publications in the digital environment. Differences between paper-based and digital texts are studied. Publication formats in the digital arena are discussed by focusing on topics such as multimedia, hyper fiction, e-books, etc., as well as distribution channels such as intranets and portals. The influence of the digital environment on publications and publication processes is the main focus of the second part, focusing on understanding the nature and management of the e-publishing environment and digital publishing technologies such as HTML, SGML, XML and PDF.

## Publishing 311 (PUB 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Publishing |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

*Closed - requires department selection.
Commissioning. This module offers an introduction to the commissioning phase of the book publishing process. The process of manuscript commissioning is studied within the dual contexts of the South African publishing environment and the internal environment of the publishing house.
Topics covered include: market research; list building; the management of both the manuscript development and production phases; costing a project; scheduling and contracts. Learners demonstrate their understanding of commissioning through case studies, role-plays and the creation of a manuscript proposal.

## Publishing 320 (PUB 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

*Closed – requires departmental selection.
Management in the Publishing Environment. This module offers an introduction to publishing as a business. Topics covered include business models in the publishing industry, the organisational structures of publishing houses, and the application of marketing in a publishing context.

## Publishing 321 (PUB 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week, 3 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

*Closed - requires department selection.
Publishing in the Magazine and Corporate Environment. This module offers an introduction to the publishing value chain as applied to magazines and corporate publications; the magazine and corporate publishing environment (including kinds of magazines and corporate publications, readership, market segmentation); commissioning writing for magazines and corporate publications; production processes; sales and marketing; and distribution.

## Advanced e-publishing 712 (PUB 712)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

The aim of this module is to further familiarise students with the development, economics and delivery of electronic publications. Students develop strong e-production skills through hands-on implementation of publication workflows for various electronic publications. Students also implement a business plan for the distribution and marketing of these publications.

## Publishing management: Management and finance 722 (PUB 722)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module focuses on the theory and practice of publishing management. Issues addressed include the following: personal skills; general management skills; financial skills; new product development; costing; editorial issues.

## Publishing management: Organisation and processes 723 (PUB 723)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module focuses on the theory and practice of publishing management. Issues addressed include the following: human resources; legal skills; project management; sales and marketing; communication skills; logistics; leadership.

## Research project 1: The South African publishing environment 724 (PUB 724)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module is research-based. The focus is on developments and trends impacting on the value chain and supply chain of the local book industry.
The overall objective of the module is to generate research that can contribute to information on the shape and size of this cultural industry.

## Research project 2: The international publishing environment 725 (PUB 725)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 lecture per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module is research-based. The focus is on global developments and trends impacting on book publishing as a cultural industry. The research parameters will be determined yearly by a selection of relevant global practices impacting on local developments and trends.

## Editorial practice: Advanced copy-editing and editorial project management 728 (PUB 728)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

One of the central role players in the publishing value chain is the copy-editor, whose tasks range from copy-editing and proofreading manuscripts, to developing budgets and schedules, and managing entire publishing projects through production. This module builds on students’ knowledge of and skills in editorial practice, including advanced copyediting, editorial and production project management. The module also focuses on theory of editorial practice, including editorial approaches and policies.

## Editorial practice: List building and acquisition of rights 729 (PUB 729)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |

| | |
|---|---|
| **Period of presentation** | Semester 1 and Semester 2 |

**Module content**

At the heart of the publishing value chain lies the commissioning editor or publisher, whose tasks range from commissioning new titles and nurturing authors, through to managing entire publishing lists and making rights acquisitions. This module builds on students' knowledge of and skills in commissioning and acquisitions, with a particular focus on strategic and financial aspects of publishing list building, and acquisition policies and procedures.

## Advanced electronic publishing 730 (PUB 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

The aim of this module is to further familiarise students with the development, economics and delivery of electronic publications. Students develop strong e-production skills through hands-on implementation of publication workflows for various electronic publications. Students also implement a business plan for the distribution and marketing of these publications.

## Trends in publishing 731 (PUB 731)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 1 |

**Module content**

This module is research-based. The focus is on developments and trends impacting on the value chain and supply chain of the local book industry.
The overall objective of the module is to generate research that can contribute to information on the shape and size of this cultural industry.

## Book history 732 (PUB 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 15.00 |
| **Programmes** | BISHons Publishing |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Semester 2 |

**Module content**

This module provides an introduction to the history of the book, examining key themes of book production, distribution, authorship and reading. Attention is also given to the development of a textual and print culture in South Africa.

## Publishing: Coursework component 801 (PUB 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 120.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 discussion classes per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

## Dissertation: Publishing 890 (PUB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MIS Publishing |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

A comprehensive report on an aspect of Publishing.

## Mini-dissertation: Publishing 895 (PUB 895)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 120.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Information Science |

| | |
|---|---|
| **Period of presentation** | Year |

## Thesis: Publishing 990 (PUB 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Publishing |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

A comprehensive and advanced report on an approved project. Expert, highly specialised and interdisciplinary research within Publishing.

## Workshop practice 121 (PWP 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mining Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance modules only
The modules are presented during the first year of study and, subject to departmental arrangements, can be attended either during July or December holiday periods. The duration will be a minimum of two weeks, during which time the student will receive training in a mine as well as a mine workshop. Training will include the following maintenance aspects: rotary and percussion drills, transport equipment, hoists and hoist ropes, electrical motors, conveyor belts and pumps. A satisfactory report must be submitted within two weeks after the commencement of lectures of the following semester.

## Plant science 312 (PWT 312)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | LAN 212 and LAN 222 |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 1 |

**Module content**

Plant community studies and conservation within the context of urban open space; implications and management of weeds and invaders, red-data lists and rare and endangered species.
Technical aspects regarding the establishment of plants and the maintenance thereof. Approaches to the establishment of planting in complex urban environments.

## Plant science 322 (PWT 322)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Landscape Architecture |
| **Prerequisites** | PWT 312 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

**Module content**

Ecological principles for planting in reclamation and resettlement. Environmental legislation with reference to environmental management and monitoring.

## Dissertation: Mining engineering 890 (PYI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Mining Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

## Dissertation 891 (PYI 891)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Mining |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Mining Engineering |
| **Period of presentation** | Year |

## Social research: Introductory methodology 210 (RES 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BCom Human Resource Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 1 |

**Module content**

The module introduces methods of inquiry in the social sciences and humanities. The purpose of this module is to introduce students to the research process in order to equip them with the necessary competence to:
• identify social problems, formulate research questions and hypotheses;
• have a basic understanding of writing the literature review and research proposal;
• know and select relevant methods of inquiry;
• be aware of the necessity of conducting ethically sound research; and
• interpret and present data graphically.

## Project component (Capita selecta) 700 (RFP 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Programmes** | BScHons Applied Science Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 seminar per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

A capita selecta of the various modules related to the research field that the student is advised to follow by the research field coordinator. Research fields:

- Environment potential
- Human settlements and urbanism
- Heritage and cultural landscapes

## Research field project 710 (RFP 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 711 (RFP 711)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 712 (RFP 712)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 713 (RFP 713)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 3 |

## Research field project 720 (RFP 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 721 (RFP 721)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 722 (RFP 722)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BLArchHons |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 723 (RFP 723)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 730 (RFP 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 731 (RFP 731)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 732 (RFP 732)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field project 733 (RFP 733)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Programmes** | BIArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research project 740 (RFP 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 4 |

## Research project 741 (RFP 741)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 practicals per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

## Research project 742 (RFP 742)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 4 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Semester 2 |

## Research project 743 (RFP 743)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 1 |

## Research project 750 (RFP 750)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 7 practicals per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Quarter 4 |

## Theory component (Capita selecta) 700 (RFS 700)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 30.00 |
| **Programmes** | BScHons Applied Science Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

**Module content**

A capita selecta from one of the following departmental research fields:
- Environment potential
- Human settlements and urbanism
- Heritage and cultural landscapes

## Research field studies 710 (RFS 710)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field studies 720 (RFS 720)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BLArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field studies 730 (RFS 730)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BIArchHons |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Theory component 740 (RFS 740)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Consult the department |

## Research field studies 890 (RFS 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 35.00 |
| **Programmes** | MSc Applied Science Architecture (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 seminars per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Architecture |
| **Period of presentation** | Year |

## Computer science 800 (RKW 800)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 120.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

## Dissertation: Computer science 890 (RKW 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Computer Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Computer Science |
| **Period of presentation** | Year |

## Thesis: Computer science 990 (RKW 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Computer Science |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

## Civil building materials 321 (SBM 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | SGM 221 |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The behaviour, properties and application of cement and concrete products, structural steel, fibre reinforcing, polimers, masonry work and bituminuous materials.

## Civil engineering measurement techniques 221 (SBZ 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SWK 210) |
| **Contact time** | 1 practical per week, 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Measurement instruments and measurement techniques used in engineering applications. Theory of the Wheatstone bridge and the application of strain gauges to measurement instruments. Accuracy, precision, resolution, hysteresis and linearity. Load cells, pressure sensors, displacement transducers, stress cells and inclinometers. Adjustment and use of plane table, level, compass and theodolite. Elementary site survey and levelling. Definition of survey. Coordinate systems and bearing. Method of determining levels. Tachometry.

## Civil engineering construction management 420 (SBZ 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SVC 412) |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Planning, needs assessment and performance indicators for contracts. Civil Engineering Project: client, consultant and contractors expectations and responsibilities. Tender process, construction process, application of OHS Act and Mine, Health and Safety Act, conditions of contract and claims, insurances, engineering economics, programming, costing, 1509001: quality management systems, life cycle concepts, maintenance cycle, maintenance management.

## Computer applications in civil engineering 420 (SCA 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SHC 410), (SIN 411), (SIN 413), (SGM 323), (SVC 412) |
| **Contact time** | 2 practicals per week, 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

In this module commercially available computer packages will be used to develop models based on Finite Elements, Finite Differences and other approaches. Limitations and simple checks to ensure consistency of commonly used design software packages will be illustrated. Basic principles and techniques will be discussed and the effect of aspects such as meshing, element choice, boundary conditions and material properties will be investigated. Applications within the various fields of Civil Engineering will be considered. Results obtained from models will be compared to actual experimental results. This module will contain groupwork and multi-disciplinary problems will be solved.

## Detailed design 420 (SDO 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SHC 410), (SIN 411), (SIN 413), (SGM 323), (SVC 412) |
| **Contact time** | 1 practical per week, 1 tutorial per week, 5 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

The module focuses on design applications. The student is exposed to the application of the classic disciplines of structures, geotechnical, hydraulics and transportation in detail design. Supervisors select the most valuable application in each discipline. Typical examples include the following:
• Structures: Multi storey buildings with reinforced concrete frames and slabs
• Hydraulics: Pump lines and stations
• Geotechnical: Slimes dams
• Transportation: Traffic impact studies, pavement design and analysis
The applications selected for each discipline may vary from year to year.

## Introduction to Sepedi grammar - Capita Selecta 111 (SEP 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in Sepedi |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

*For speakers of Sepedi as home language or first or second additional language.
Aspects of the grammar of Sepedi such as an introduction to the word categories; an introduction to the structure, meaning and use of the noun, the adjective, the relative, the possessive; the verb; writing and spelling rules; dictionaries and dictionary use; grammatical analysis.

## Sepedi grammar – Capita selecta 211 (SEP 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | SEP 111, AFT 121 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in Sepedi |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

Aspects of the grammar of Sepedi such as a continuation of the study of the word categories; grammatical analysis; the structure, meaning and use of the pronoun and the enumerative; an introduction to Sepedi speech sounds/phonetics.

## Sepedi 310 (SEP 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | SEP 210, SEP 220 will be required for students who completed SEP 110, SEP 120 at year level 1 and SEP 211, AFT 220 will be required for students who completed SEP 111, AFT 121 at year level 1 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | English, Afrikaans and Sepedi are used |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

Sepedi grammar - Capita selecta
Aspects of the grammar of Sepedi such as a continuation of the study of the word categories; grammatical analysis; more intensive study of the structure, meaning and use of the noun (specifically derived nouns) and verb (specifically moods and verbal extensions); an introduction to the sound changes / phonology of Sepedi. The acquisition and inculcation of advanced communicative skills within a larger number of social, occupational and educational situations. Awareness of the nature and function of language structures is heightened further. Attention is also paid to cultural phenomena.

## Environmental geotechnology 421 (SEV 421)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Regulatory framework, site investigation, site restoration, and waste disposal. Site characterization methods. Waste types and properties. Subsurface contaminant transport. Multiphase fluid flow. Design of waste containment and waste disposal systems. Review of remedial alternatives with emphasis on in situ technologies. Case histories. Integrated environmental management processes. Environmental legislation in South Africa. Environmental impact, environmental auditing and risk analysis. ISO 140000: what it entails and how it is applied. Community participation.

## Pavement design 793 (SGC 793)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Transportation Engineering<br>BScHons Applied Science Transportation Planning |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Design philosophy in First and Third World environments; characterising and use of pavement materials; drainage; systems approach to layout, geometric and pavement design; stresses and strains in pavements; mechanistic design methods and elasto-plastic behaviour; economic analysis; designing pavements for streets, gravel and paved roads, runways, and industrial areas. Report writing.

## Concrete technology 794 (SGC 794)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Properties of concrete and concrete mixes. Characteristics of Portland cement and supplementary cementitious materials. Aggregates, admixtures and practical design of mixes. Manufacture, curing and testing, including non-destructive methods. Statistical approach to quality control. Time-dependent behaviour and durability of concrete. The principles for appropriate selection of materials and techniques for repair, maintenance and strengthening of civil engineering structures. Investigation and diagnosis. Corrosion of reinforcement. Alkali-aggregate reaction, sulphate attack. Physical degradation. Repair materials. Protective systems. Systems for repair.

## Road rehabilitation technology 797 (SGC 797)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Transportation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Development of road management systems and application to existing street and road networks. Evaluation of, and measurements on existing facilities. Maintenance management. Recycling of materials. Design methods for upgrading, re-construction and strengthening of the existing road infrastructure. Prerequisite: Pavement Design SGC 793.

## Dissertation 890 (SGI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Geotechnical Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Pavement materials and design 221 (SGM 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | GLY 256 GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Geological origin. Soil tests and classification systems. Compaction, stabilisation. Bitumen and tar. Introduction to pavements. Overview of road building materials. Pavement design principles and methods.

## Soil mechanics 311 (SGM 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BSc Engineering and Environmental Geology<br>BSc Geology |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | (SWK 210) |
| **Contact time** | 1 practical per week, 2 tutorials per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to soil mechanics. Introduction to clay mineralogy. Mass, volume relationships and phases of soil. Groundwater flow and permeability. Effective stress principles. Suction pressures in saturated as well as partially saturated soil. The Mohr circle and stresses at a point. The Mohr-Coulomb strength theory and the stress-strain properties of soil. The Boussinesq theory. Consolidation theory and soil settlement.

## Geotechnical engineering 323 (SGM 323)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BSc Engineering and Environmental Geology |
| **Prerequisites** | (SGM 311) |
| **Contact time** | 1 practical per week, 2 discussion classes per week, 3 lectures per week |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Application of consolidation theory. Bearing capacity of soil and foundation design, Terzaghi and general methods. Horizontal stresses in soil and design of retaining structures, Rankine and Couloumb’s methods. Slope stability including Bishop’s method of slices. Introduction to site investigation.

## Basic soil mechanics 785 (SGM 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

Introduction to soil mechanics, classification of soil characteristics, seepage and permeability, stress and strain in saturated and partially saturated soils, Mohr’s circle applications.

## Basic pavements and transportation 787 (SGM 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Applied Science Transportation Planning |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

Pavements: The geological cycle and origin of road building materials, soil testing and classification systems, compaction, stabilization, bitumen, introduction to pavements, principles of pavement design and management.
Transportation: Introduction to traffic analysis techniques, capacity and level of service concepts, traffic signal design, road geometric design, transport demand models and road safety engineering.

## Advanced geotechnical design 780 (SGS 780)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Geotechnical laboratory testing 785 (SGS 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## In situ soil testing and monitoring 786 (SGS 786)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Analytical soil mechanics 787 (SGS 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BScHons Applied Science Geotechnics |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Solution of confined and unconfined seepage problems using the methods of fragments, finite differences and finite elements. Numerical solutions of consolidation problems and secondary compression. Slope stability analysis methods. The point estimate method. Monte Carlo simulation.

## Theoretical soil mechanics 788 (SGS 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BScHons Applied Science Geotechnics |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Introduction to critical state soil mechanics. Stress and strain invariants. Stress paths. State boundary surfaces including Roscoe and Hvorslev surfaces. Cam clay model. Application of geotechnical constitutive models in finite element analysis.

## Specialised geotechnical testing 789 (SGS 789)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BScHons Applied Science Geotechnics |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Test procedures and interpretation of; Standard Penetration Test (SPT), Cone Penetration Test (CPT), Piezocone (CPTU) and seismic methods. Theory, application and interpretation of advanced geotechnical laboratory tests. Laboratory Instrumentation and calibration. Stress and strain conditions for laboratory tests. Triaxial stress space, stress paths. Triaxial tests, direct shear tests, oedometer test and Rowe cell test.

## Hydraulics 310 (SHC 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SWK 210) |
| **Contact time** | 1 discussion class per week, 1 practical per week, 4 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Fluid properties and fundamental principles of applied hydrostatic, hydrostatic forces on bodies, buoyancy and stability of bodies. Kinematics, flow rate measurement and velocity determination. Pipe flow and real fluids. Basic principles of water purification and water treatment.

## Hydraulics 321 (SHC 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SHC 310) |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Pipe network analyses and municipal services. Components of water distribution networks. Pump selection and water hammer analyses. Free surface flows and model analyses.

## Hydraulics 410 (SHC 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SHC 310), SHC 321GS |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Sediment transportation, hydraulic structures, bridges and culvert hydraulics, stormwater handling. Hydrology, flood hydrology, creation of runoff records and the simulation of surface water resources, creation of stochastic sequences and the reliability analysis of surface water resources.

## Flood hydrology 792 (SHC 792)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Water Resources Engineering<br>BScHons Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

This course entails the calculation of design flows for different return periods, using the statistical, deterministic – and empirical methods.  Dambreak analysis is included in this course as well as channel and level pool routing.

## Hydraulic design 793 (SHC 793)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

This course covers the hydraulic aspects associated with the design of hydraulic structures for dams, road drainage, and other conveyance systems. The hydraulic considerations for the selection and design of energy dissipation structures are assessed in this course.

## Free surface flow 794 (SHC 794)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

This course entails the calculation of design flows for different return periods, using the statistical, deterministic – and empirical methods. Dambreak analysis is included in this course as well as channel and level pool routing.

## Pipe flow 795 (SHC 795)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Water Resources Engineering<br>BScHons Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

The focus in this course will be on the practical aspects of pipeline design. The theoretical background to pipeline hydraulics will be covered and practical examples will be assessed. The following specific aspects such as pipeline hydraulics included dynamic pressures, pipeline component selection and design, pipeline installation and the testing and operation of pipelines will be covered in this course.

## Water resource analysis and management 796 (SHC 796)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

In this course students will be familiarized with the background and procedures used in the creation of flow records and the use of the WRSM2005 model. Surface water systems will be analysed and gross yields will be determined. In the second part of the course the theory and procedures required for the yield determination of surface water resources will be discussed.

## Basic statistical methods 797 (SHC 797)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Applied Science Geotechnics<br>BScHons Applied Science Transportation Planning<br>BScHons Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

Basic mathematical methods. Algebra. Matrices and matrix algebra. Series expansions. Differentiation and integration. Probability theory. Graphic analysis. Discrete and continuous probability distributions. Moments and expectation. Statistical sampling and experimental design. Parameter estimation. Confidence intervals. Hypothesis testing. Regression analysis.

## Applied statistical methods and optimisation 798 (SHC 798)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BEngHons Transportation Engineering<br>BEngHons Water Resources Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

The course will apply some of the basics theories and methodologies in statistics and operations research to solve common civil engineering problems. The course seeks to demonstrate the use and application in the civil engineering field. Each of the applications seeks to determine how best to design and operate a system, usually under conditions requiring the allocation of scarce resources. Emphasis will be on the applications of these methods in common civil engineering practice. Some of the applications will include; optimum network design, maximum flow problem, project scheduling, queuing theory, probabilistic analysis, Markov chain applications, etc.

## Advanced hydrology 886 (SHC 886)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Pump systems 785 (SHW 785)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

## Basic hydraulics 788 (SHW 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 28 Contact hours |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

This course covers the basic hydraulic principles and their application.  Themes covered include: fluid characteristics, fluid kinematics, pipe flow, pipe networks, introduction to pumps and pump stations, free surface flow, flow measurement, hydraulic assessment of hydraulic structures, storm water drainage and culvert systems and flood hydrology.

## Timber design 310 (SIB 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | SIN 223 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Self-weight, imposed and wind loads. Principles of limit-states design. Timber as a structural material, design of tension, compression and bending members (laterally braced and unbraced), beam columns, trusses and bracing.

## Basic structural analysis 790 (SIC 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Applied Science Structure |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

Virtual work and influence lines, analysis of statically indeterminate structures (two and three-dimensional), slope-deflection, superposition, stiffness and flexibility methods, matrix and computer methods, plastic analysis of portal frames.

## Basic structural design 793 (SIC 793)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BScHons Applied Science Structure |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

This course comprises two sections: reinforced concrete design and structural steel design.
Reinforced concrete design covers the design of beams; behaviour and design of slabs; design of slender columns and columns subjected to bi-axial bending; design of simple and combined footings; staircase design; and an introduction to prestressed concrete.
Structural steel design covers the characteristics of steel; design of structural steel members including elements in bending, and bending combined with tension and compression; design of portal frames; composite construction and the bending resistance of composite sections; and plastic design.

## Civil engineering economics 310 (SIE 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to engineering economics: Basic guidelines, assessment of alternative investment possibilities. Equal annual cash flow, current value, internal rate of return, cost benefit relationship.
Economic evaluation of projects: Influence of depreciation on the economics of projects, determination of income tax implications of decisions, economic analysis of multiple alternatives, the influence of inflation on the economics of projects, application of the theory of probability for economics studies, economic studies on the replacement of equipment.

## Numerical methods and finite element applications for Civil Engineers 790 (SIK 790)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BEngHons Structural Engineering<br>BEngHons Transportation Engineering<br>BEngHons Water Resources Engineering |
| **Contact time** | 40 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

In the first part of this course, numerical procedures and some underlying theory for solving systems of equations, eigenvalue problems, integration, approximation and boundary value problems will be discussed. The second part of the course covers general finite element theory, discretization aspects related to geometry, nodes and numbering, element type and shape, interpolation functions, formulation of element characteristic matrices and vectors for elasticity problems, assembly and solution of the finite element equations, modelling procedures and results processing. The student will use Finite Element software to apply the theory that was covered in the course for solving typical Civil Engineering problems.

## Structural analysis 223 (SIN 223)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | WTW 161, WTW 168 and SWK 210 |
| **Contact time** | 1 tutorial per week, 2 practicals per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Statically indeterminate beams. Euler buckling of columns with different boundary conditions. Virtual work. Analysis of statically indeterminate structures using the methods of super-position, slope-deflection and moment distribution (with sway and support displacement).

## Structural analysis 311 (SIN 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | SIN 223 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis of symmetrical structures using slope-deflection equations or moment-distribution; three dimensional structures and grillages; plastic analysis of frames; matrix methods; influence lines.

## Structural concrete 325 (SIN 325)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | SIN 223 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Properties of reinforced concrete. Principles of limit states design. Analysis and design of sections in flexure and in compression combined with flexure. Design for shear and torsion. Bond and anchorage. Serviceability requirements: Detailing and span-effective depth ratios. Design of footings and short columns.

Behaviour and design of beams, slabs (solid, ribbed and waffle slabs, flat plates and flat slabs), columns (slender columns and biaxial bending), footings (simple and combined footings) and stairs. Introduction to the design of prestressed concrete flexural members.

## Steel design 411 (SIN 411)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | (SIN 323) |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis and design composite steel beam and concrete slab construction, Moment connections, Elastic and plastic design of portal, industrial and building structures.

## Reinforced concrete design 413 (SIN 413)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | (SIN 324) |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Behaviour and design of beams, slabs (solid, ribbed and waffle slabs, flat plates and flat slabs), columns (slender columns and biaxial bending), footings (simple and combined footings) and stairs. Introduction to the design of prestressed concrete flexural members.

## Structural steel 415 (SIN 415)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SIN 323) (SIN 325) |
| **Contact time** | 1 practical per week, 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Stability of beams. Material properties. Analysis and limit states design of tension, compression and flexural members, and beam-columns. Design of trusses, simple framed structures and connections. Analysis and design composite steel beam and concrete slab construction, Moment connections, Elastic and plastic design of portal, industrial and building structures.

## Steel design 776 (SIN 776)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Introduction to structural reliability, tension elements, buckling of plates in compression elements, compression elements, beams and plate girders, plastic analysis and design of structures and structural elements, connections, composite design and steel-framed structures.

## Structural mechanics 777 (SIN 777)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Structural Engineering<br>BScHons Applied Science Structure |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Continuum mechanics. Classical and numerical (finite difference and finite element) solutions for plane and plate structures. Plasticity and failure criteria. Elastic stability. Non-linear analysis.

## Reinforced concrete design 778 (SIN 778)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Material properties. Behaviour and analysis of reinforced concrete members for flexure, axial loads, flexure plus axial load and shear. Cracking and deflection (short- and long-term) of flexural members. Plasticity in flexural members. Braced and unbraced slender columns.

## Timber design 779 (SIN 779)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Timber properties, grading, treatment, structural form, element design and bracing of structures. Analysis of I-beams, composite beams, frames and connections. Research project.

## Structural design (Special) 788 (SIN 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

## Structural analysis 790 (SIN 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Stiffness and flexibility methods for plane, grid and three-dimensional structures.In-plane stability of beam-columns and frames; effective lengths and lateral torsional instability of beams. Dynamics: free and forced, undamped and damped framed systems and mass matrices and natural frequencies.

## Pre-stressed concrete design 791 (SIN 791)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Structural Engineering<br>BScHons Applied Science Structure |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Material properties; prestressing systems; flexural design; losses; effects of continuity; shear; deflections; anchorage; cracking; prestressed concrete slabs and detailing.

## Dissertation: Structural engineering 890 (SIN 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Structural Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Mini-dissertation 896 (SIN 896)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 64.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Thesis: Civil engineering 990 (SIR 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Civil<br>PhD Civil Engineering |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Industry-based learning 700 (SIT 700)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 52.00 |
| **Programmes** | BIT |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | School of Information Technology |
| **Period of presentation** | Semester 2 |

## Thesis: Information technology 990 (SIT 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Information Technology |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Informatics |
| **Period of presentation** | Year |

**Module content**

Please note: All PhD students first register for SIT 990. As soon as a supervisor has been assigned the student will be moved to the assigned module of the corresponding department. Informatics students will remain registered for SIT 990.

## Thesis: Information technology 991 (SIT 991)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Information Technology |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Information Science |
| **Period of presentation** | Year |

**Module content**

Please note: Only for the Department of Information Science students.

## Thesis: Information technology 992 (SIT 992)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Information Technology |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Computer Science |
| **Period of presentation** | Year |

**Module content**

Please note: Only for Department of Computer Science students.

## Professional and technical communication 210 (SJJ 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week, 2 other contact sessions per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Communicate effectively, both orally and in writing, with engineering audiences and the community at large. Written communication as evidenced by: uses appropriate structure, use of modern or electronic communication methods; style and language for purpose and audience; uses effective graphical support; applies methods of providing information for use by others involved in engineering activity; meets the requirements of the target audience. Effective oral communication as evidenced by appropriate structure, style and language; appropriate visual materials; delivers fluently; meets the requirements of the intended audience. Audiences range from engineering peers, management and lay persons, using appropriate academic or professional discourse. Typed reports range from short (300-1 000 word plus tables diagrams) to long (10 000-15 000 words plus tables, diagrams, references and appendices), covering material at exit level. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, as well as subject-specific methods.

## Construction contract law 811 (SKB 811)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 10.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 20 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 1 |

## Introduction to structures 110 (SKE 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Design; basics (forces, moments, equilibrium, reactions, stress, strain); materials; loads; pin-jointed trusses; tension members.

## Structures 120 (SKE 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying |
| **Prerequisites** | SKE 110 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Beams (shear force and bending moment, bending and shear stresses, design of standard beams in steel, concrete and timber, section properties, lateral restraint); compression members; combined axial and bending; deflection.

## Reinforced concrete structures 210 (SKE 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |

| | |
|---|---|
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying |
| **Prerequisites** | SKE 120 GS |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Properties of reinforced concrete; construction methods; slabs; beams; columns; foundations; retaining walls; placement of reinforcement in the various structural members; basic concepts of prestressed concrete.

## Civil engineering services 220 (SKE 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 9.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Water reticulation; sewerage reticulation; stormwater reticulation; roads.

## Psychology 110 (SLK 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Audiology<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BA Speech-Language Pathology<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BOccTher<br>BPhysio<br>BSW<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Human Physiology, Genetics and Psychology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 1 |

**Module content**

This module is a general orientation to Psychology. An introduction is given to various theoretical approaches in Psychology, and the development of Psychology as a science is discussed. Selected themes from everyday life are explored and integrated with psychological principles. This module focuses on major personality theories. An introduction is given to various paradigmatic approaches in Psychology.

## Psychology 120 (SLK 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Audiology<br>BA Extended programme<br>BA Fine Arts<br>BA Languages<br>BA Law<br>BA Speech-Language Pathology<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Information Science<br>BNurs<br>BOccTher<br>BSW<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Human Physiology, Genetics and Psychology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 2 |

**Module content**

This module introduces the student to a basic knowledge and understanding of the biological basis of human behaviour. The module addresses the key concepts and terminology related to the biological subsystem, the rules and principles guiding biological psychology, and identification of the interrelatedness of different biological systems and subsystems. In this module various cognitive processes are studied, including perception, memory, thinking, intelligence and creativity. Illustrations are given of various thinking processes, such as problem solving, critical, analytic and integrative thinking.

## Psychology 210 (SLK 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Audiology<br>BA Languages<br>BA Law<br>BA Speech-Language Pathology<br>BOccTher<br>BPhysio<br>BSW<br>BSc Human Physiology, Genetics and Psychology |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | SLK 110, SLK 120(GS) |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 1 |

**Module content**

In this module human development from conception through adolescence to adulthood is discussed with reference to various psychological theories. Incorporated are the developmental changes related to cognitive, physical, emotional and social functioning of the individual and the context of work in adulthood. Traditional and contemporary theories of human development explaining and describing these stages are studied in order to address the key issues related to both childhood and adulthood.

## Psychology 220 (SLK 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Audiology<br>BA Languages<br>BA Law<br>BA Speech-Language Pathology<br>BSW<br>BSc Human Physiology, Genetics and Psychology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | SLK 110, SLK 120(GS) and (RES 210 recommended) |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 2 |

**Module content**

This module is a social-psychological perspective on interpersonal and group processes. Themes that are covered include communication, pro-social behaviour, social influence and persuasion, political transformation, violence, and group behaviour.

## Psychology 310 (SLK 310)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Audiology<br>BA Law<br>BA Speech-Language Pathology<br>BSW<br>BSc Human Physiology, Genetics and Psychology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | SLK 210(GS), SLK 220(GS) |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 1 |

**Module content**

Identification of abnormal behaviour in children based on knowledge of normal childhood development; introduction to the study of various models pertaining to abnormal behaviour; understanding and application of basic concepts in child psychopathology. This module also provides an introduction to psychopathology and symptomatology of adult abnormal behaviour. Terminology, definitions of abnormal behaviour, problems in diagnosis, labelling, and myths regarding abnormal behaviour are discussed. Neurosis as a specific mental disorder is studied critically from a multidimensional perspective, including intrapsychic, interpersonal and social-cultural explanations.

## Psychology 320 (SLK 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Law<br>BSW |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | SLK 210 GS, SLK 220 GS, (RES 320 recommended) |
| **Contact time** | 2 discussion classes per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Psychology |
| **Period of presentation** | Semester 2 |

**Module content**

This module deals with a community psychological perspective on human behaviour and psychological interventions and also critically explores the contribution of various perspectives in psychology. The module focuses on themes such as definitions of key concepts, principles and aims of community psychology, and the role of the community psychologist as well as the impact of earlier thought frameworks on contemporary perspectives. The implications of these ideas for practical initiatives focussed on mental health in communities, are discussed. The module further focuses on critical psychology. Critical psychology is an orientation towards psychology that is critical towards the assumptions and practices of psychology as it is practiced in the mainstream. It attempts to address power issues as they manifest in the practice of mainstream psychology. The focus is on examining how the practice and theories of mainstream psychology contribute to these power issues impacting on marginalised groups.

## Sociology 110 (SOC 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BIS Information Science<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: The individual and society
An introduction to sociology, the classical sociological paradigm and the principles of sociological research.

Part 2: *The making of the South African order*

This section explores key factors involved in the making and shaping of the contemporary South African social order and considers the sociological implications thereof. Students will be introduced to the political economy of South Africa, with an emphasis on the nature of South Africa's industrialisation, the process of proletarianisation and the introduction of the migration labour system. In addition, the racial state, the foundations of its social project, and the spatial form of its 20th century racial modernity will be considered.

## Sociology 120 (SOC 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BIS Information Science<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP<br>BTh<br>LLB |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Law |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: The sociology of institutions
An introduction to the social dynamics of institutions such as the family, the state, the economy, religion, education, and civil society, with specific focus on Southern Africa.

Part 2: Social stratification: Race, class and gender
The nature and dynamics of social stratification and inequality will be explored. Race, gender and class are the foci of the section. The South African reality in this regard is highlighted.

## Sociology 210 (SOC 210)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | SOC 110(GS), SOC 120(GS) |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: *Sociology of work: Globalisation*
The contemporary process of globalisation at a world level impacts on the process of change and economic development. This section will discuss processes and debates associated with economic globalisation and the global dominance of finance capital in the late 20th and early 21st century. We will review contemporary debates associated with these issues.

Part 2: *Gender, family and households*

This section focuses on theories and issues relevant to the understanding of households, families and gender. It addresses thematics such as dynamic family structures, poverty, the survival strategies of poor households, gender-based violence and the ways in which the aforementioned affect family life and forms as well as children and youth in particular. A special emphasis is placed on exploring these issues in a Southern African context.

## Sociology 220 (SOC 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | SOC 110, SOC 120(GS) |

| | |
|---|---|
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: *Demography, health and society*
This section explores the dynamic relationship between demography and health, with examples drawn from South African and international case studies. The substantial increase in world population during the past century compounds key issues faced by contemporary societies. Interplay between demographic processes, such as morbidity, mortality, fertility and mobility, impact on the size of a population. In turn, these are to an extent shaped by the structure of a population as well as the cultural context of a society. Central to this are concerns around health and disease.

Part 2: *Cultural Sociology*

This section explores themes in cultural sociology, with an emphasis on the ways in which meaning is constructed in everyday life by individuals as well as collectives, on the one hand, and the intersection between culture and institutional forms and social structure on the other. Students will be introduced to the work of some of the key thinkers in the field, and will be provided with the opportunity to write an independent essay on a theme in cultural sociology.

## Sociology 310 (SOC 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Law<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | SOC 120, SOC 210(GS), SOC 220(GS) |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 1 |

**Module content**

Part 1: *Social theory*

This section focuses on contemporary social theory, in order to extend and broaden students' understanding of social theory beyond the classical canon. Students will be introduced to key conceptual vocabularies, theoretical paradigms and contemporary bodies of work in social theory. In addition, the way in which scholars who work on South Africa have drawn on social theory to inform and enrich their work is emphasized.

Part 2: Labour studies

The section addresses sociological approaches to the workplace. It will critically assess labour market policy and examine issues such as management practice, employment and unemployment, and discrimination and flexibility in the labour market in South Africa.

## Sociology 320 (SOC 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Law<br>BPolSci International Studies<br>BPolSci Political Studies<br>BSW<br>BSocSci Industrial Sociology and Labour Studies<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | SOC 210, SOC 220(GS) |
| **Contact time** | 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Sociology |
| **Period of presentation** | Semester 2 |

**Module content**

Part 1: *Rural and urban sociology*

This section considers the relationship between the rural and urban, against the backdrop of the emergence and development of both capitalism in its various guises and globalisation within the twentieth and twenty-first centuries in the global North and South. Questions on the nature of social interaction in communities, changing ways of relating, inequality and livelihoods, collective action, local cultures and modernities are considered.

Part 2: *Sociology of religion*

This section looks at religion and secularism in social context. Specific emphasis is placed on religion and secularism as forces for social change.

## Practical training 410 (SPY 410)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

*Attendance module only
During or at the end of the third year of study, students in civil engineering undergo at least 6 weeks of prescribed training in the industry. A satisfactory report on the practical training must be submitted to the Student Administration within one week of registration.

## Dissertation: Town and regional planning 890 (SSB 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MTRP |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Year |

## Thesis: Town and regional planning 990 (SSB 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Programmes** | PhD Town and Regional Planning |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Year |

## Research project 412 (SSC 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |

| | |
|---|---|
| **Prerequisites** | (SHC 321) (SIN 323) (SIN 324) (SGM 323) (SBM 321) (SVC 323) |
| **Contact time** | 2 tutorials per week, 6 practicals per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

In the first semester, two full days of the week must be used by final-year students for the execution of an analytical and/or experimental research project.

## Civil research 780 (SSC 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Geotechnical Engineering<br>BEngHons Structural Engineering<br>BEngHons Transportation Engineering<br>BEngHons Water Resources Engineering<br>BScHons Applied Science Geotechnics<br>BScHons Applied Science Structure<br>BScHons Applied Science Transportation Planning<br>BScHons Applied Science Water Resources |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

*This is a compulsory module.

The course will require all honours students to conduct research in an appropriate field of civil engineering, linked to the main discipline in which the student specializes for their honours degree.

## Mini-dissertation 890 (SSC 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 64.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Mini-dissertation: Transportation engineering 898 (SSC 898)

| | |
|---|---|
| **Qualification** | Postgraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Infrastructure management 790 (SSI 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Structural Engineering<br>BEngHons Transportation Engineering<br>BEngHons Water Resources Engineering<br>BScHons Applied Science Structure<br>BScHons Applied Science Transportation Planning<br>BScHons Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

This module will cover the following topics: Asset Management principles, Maintenance Management principles, Maintenance strategies and philosophies, Condition based Maintenance, Reliability Centred Maintenance (RCM), Resource Management, Maintenance Management Systems, Total Productive Maintenance (TPM) and Risk Management. Maintenance management of the following disciplines will be studied in detail: Road infrastructure, Railway infrastructure, Airport infrastructure, Buildings and other structures, Water resources and water supply.

## Guided special studies 882 (SSI 882)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

## Dissertation 890 (SST 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MSc Applied Science Geotechnics<br>MSc Applied Science Structures<br>MSc Applied Science Transportation Planning<br>MSc Applied Science Water Resources |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Mini-dissertation 896 (SST 896)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 64.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

## Statistics 110 (STK 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 13.00 |

| | |
|---|---|
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Accounting Sciences<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BConSci Clothing Retail Management<br>BConSci Food Retail Management<br>BConSci Hospitality Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Computer Science<br>BSc Construction Management<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BSc Quantity Surveying<br>BSc Real Estate<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | At least 5 (60-69%) in Mathematics in the Grade 12 examination. Candidates who do not qualify for STK 110 must register for STK 113 and STK 123 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Descriptive statistics:
Sampling and the collection of data; frequency distributions and graphical representations. Descriptive measures of location and dispersion.
Probability and inference:
Introductory probability theory and theoretical distributions. Sampling distributions. Estimation theory and hypothesis testing of sampling averages and proportions (one and two-sample cases). Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

### Statistics 120 (STK 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 13.00 |
| **Programmes** | BAdmin Public Management and International Relations<br>BCom<br>BCom Agribusiness Management<br>BCom Business Management<br>BCom Economics<br>BCom Entrepreneurship<br>BCom Financial Sciences<br>BCom Human Resource Management<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Marketing Management<br>BCom Statistics<br>BCom Supply Chain Management<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Computer Science<br>BSc Geoinformatics<br>BSc Information and Knowledge Systems<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Philosophy, Politics and Economics<br>BTRP |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | STK 110 GS or both STK 113 GS and STK 123 GS or both WST 133 and WST 143 or STK 133 and STK 143 |
| **Contact time** | 1 practical per week, 1 tutorial per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Multivariate statistics:
Analysis of variance, categorical data analysis, distribution-free methods, curve fitting, regression and correlation, the analysis of time series and indices.
Statistical and economic applications of quantitative techniques:
Systems of linear equations: drafting, matrices, solving and application. Optimisation; linear functions (two and more independent variables), non-linear functions (one and two independent variables). Marginal and total functions. Stochastic and deterministic variables in statistical and economic context: producers' and consumers' surplus, distribution functions, probability distributions, probability density functions. Identification, use, evaluation, interpretation of statistical computer packages and statistical techniques.
This module is also presented as an anti-semester bilingual module.

## Statistics 161 (STK 161)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | STK 110 GS or both STK 113 GS and STK 123 GS |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Statistics |
| **Period of presentation** | Quarter 3 |

**Module content**

*Offered by the Department of Statistics
Multivariate statistics analysis of variance; categorical data analysis; distribution-free methods; curve fitting, regression and correlation; the analysis of time series and indices. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.
This module is also presented as an anti-semester bilingual module.

## Statistics 210 (STK 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Economics<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BSc Information and Knowledge Systems<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | STK 110, STK 120 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Counting techniques. Probability theory: Sample spaces, events, rules of probability, conditional probabilities, independent events and Bayes’ theorem. Probability distributions and probability densities: cumulative distribution functions, marginal distributions, joint distributions, conditional distributions and independence. Expected values: Moments, Chebyshev’s theorem, moment-generating functions, product moments, moments of linear combinations of random variables and conditional expectations. Transformation techniques of random variables. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

## Statistics 220 (STK 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BCom<br>BCom Agribusiness Management<br>BCom Economics<br>BCom Informatics Information Systems<br>BCom Investment Management<br>BCom Law<br>BCom Statistics<br>BSc Information and Knowledge Systems<br>BScAgric Agricultural Economics and Agribusiness Management<br>BSocSci Philosophy, Politics and Economics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |

| | |
|---|---|
| **Prerequisites** | STK 210 GS |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Special probability distributions: the discrete uniform distribution, Bernoulli distribution, binomial distribution, negative binomial and geometric distribution, the hypergeometric distribution, Poisson distribution and multinomial distribution. Special probability densities: Uniform distribution, gamma, exponential and chi-square distributions, the beta distribution, the normal distribution and the bivariate normal distribution. Functions of random variables. Sampling distributions, point estimation, interval estimation and hypothesis testing. Regression Analysis. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

## Statistics 310 (STK 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 25.00 |
| **Programmes** | BCom<br>BCom Economics<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Statistics<br>BScAgric Agricultural Economics and Agribusiness Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | STK 210, STK 220 |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Regression analysis: simple and multiple regression; nonlinear regression; correlation and the use of dummy variables. Multivariate distributions: normal, multinomial and poisson distribution. Linear combinations of normal variables. Analysis of variance and covariance. Regression analysis extensions: heteroscedasticity, serial correlation and lag structures. Applications of matrices, differentiation and integration in the economic and management sciences. Evaluation of simple economic models. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

## Statistics 320 (STK 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 25.00 |
| **Programmes** | BCom<br>BCom Economics<br>BCom Informatics Information Systems<br>BCom Law<br>BCom Statistics<br>BScAgric Agricultural Economics and Agribusiness Management |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Humanities<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | STK 210, STK 220. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Only one of the modules WST 321 or STK 320 may be included in any study programme. Stationary and non-stationary univariate time series. Properties of autoregressive moving average (ARMA) and autoregressive integrated moving average (ARIMA) processes. Identification, estimation and diagnostic testing of a time series model. Forecasting. Multivariate time series. Practical statistical modelling and analysis using statistical computer packages. Categorical data analysis. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques. Student seminars.

## Statistics elective 801 (STK 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | As determined by the Department of Statistics. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Statistics elective 802 (STK 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Prerequisites** | As determined by the Department of Statistics. |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Theory of structures 211 (STU 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to structural engineering concepts like design, analysis, sizing and planning of structures. Introduction to Newton’s laws, equilibrium, free body diagrams. The application of equilibrium in solving reactions of statically determinate structures. The principles of determinacy and stability of structures. The application of Newton’s laws in determining the internal forces in common structural systems like cable structures, trusses, frames and beams. The fundamental principles of weight and forces and how forces are transmitted through structural members and load tracing.

## Theory of structures 221 (STU 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | STU 211 GS |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to material science in structural engineering. Concepts like stress, strain, elasticity, stress-strain diagrams, elasticity modules, strength and deformation as applied in structural engineering. Cross-sectional properties of structural elements. Types of stresses, and their transmission in structural elements. Introduction to the relationship between stress and strain (deflection) in beams by Coulomb's theory. Introduction to the analysis of compressive structural elements by means of Euler’s theory.

## Theory of structures 311 (STU 311)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | STU 211 and STU 221 |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

1. Concrete Structures.
• Loads on concrete structures, Limit-states design principles.
• Bending, shear and punching: Design of beams, slabs and footings.
• Compression members: Design of columns.
2. Load bearing brickwork.
• Limit-states design principles. Effective length and width of compression members.

## Theory of structures 321 (STU 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Architecture |
| **Prerequisites** | STU 311 GS |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

1. Timber structures
• Loads on typical timber structures, Limit-states design principles
• Bending, shear and deflection: Design of flexural members without and with axial loads
• Tension members: Tension members in roof trusses
• Compression members: Design of compression members in trusses and as support members for trusses
• Bracing systems
2. Steel Structures
• Loads on typical steel structures, Limit-states design principles
• Bending, shear and deflection: Design of flexural members without and with axial loads
• Tension members: Tension members in roof trusses
• Compression members: Design of compression members in trusses and as support members for trusses
• Bracing systems

## Surveying 220 (SUR 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Geography<br>BSc Geoinformatics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 114 GS/WTW 134 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 2 |

**Module content**

Adjustment and use of following instruments: Plane table, level, compass and theodolite. Elementary site surveying and leveling, tachometry. Definition of survey. Co-ordinate systems and bearing. Connections and polars. Methods of determining points. Elevation. Tachometry.

## Transportation engineering 323 (SVC 323)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | BES 220 |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |

| | |
|---|---|
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to transportation engineering; vehicle performance and motion; traffic analysis techniques; traffic data collection; capacity and level of service analysis; railway engineering; airport capacity; geometric road design; cross-section, horizontal and vertical alignment; urban streets; layout considerations and intersection design; traffic control; traffic safety.

## Infrastructure planning 412 (SVC 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | (SIE 310/BIE 310) (SVC 323) |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the basic concepts of urban and regional planning. The planning process, policy and institutional framework in which planning functions in SA. The interaction and co-operation of land and space, economy, politics and social aspects related to space in decision making. Interventions for sustainable development planning and design; definitions and rationale for land-use management and the strategic integrated development planning process. Infrastructure system evaluation, risk assessment, feasibility and decision analysis. Life cycle costing of infrastructure. Demand and supply analysis. Demand forecasting models.

## Transportation planning 789 (SVC 789)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

### Module content

A research term paper will be prepared.

Introduction to transport planning processes and institutions in S.A. Introduction to contemporary issues in land use/transport planning (including in urban transport; rural transport; air transport; energy and environment). Social, economic, and political impacts and dependencies of transport. Project evaluation, discounting, inflation, engineering economic studies. Benefit - cost analysis. Risk and sensitivity analysis. Social accounting for transport projects.

## Transportation studies 790 (SVC 790)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Transportation Engineering<br>BScHons Applied Science Transportation Planning |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

### Module content

A research term paper will be prepared.

Basic transportation relationships, land use, data collection and surveys. Four step transportation model, trip generation, trip distribution, modal split, trip assignment, advanced modelling approaches. Introduction to discrete choice models, econometrics, and stated preference analysis. Role of transport modelling in developmental context.

## Transportation special 791 (SVC 791)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Basic transportation relationships, land use, data collection and surveys. Four step transportation model, trip generation, trip distribution, modal split, trip assignment, advanced modelling approaches. Introduction to discrete choice models, econometrics, and stated preference analysis. Role of transport modelling in developmental context.

## Traffic engineering 792 (SVC 792)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Programmes** | BEngHons Transportation Engineering<br>BScHons Applied Science Transportation Planning |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Part 1: Traffic flow theory: Traffic and vehicle characteristics. Traffic flow studies. Traffic interactions. Traffic flow analysis and queuing theory. Traffic flow models. Traffic control theory. Part 2: Traffic studies and facility design: Transportation and land use. Traffic impact studies. Site planning and design. Determination of demand. Traffic control investigations. Intersection design. Internal circulation. Parking areas.

## Dissertation 890 (SVI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Transportation Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Mini-dissertation 896 (SVI 896)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 64.00 |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

## Multimodal transport 788 (SVV 788)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

The role of public transport in cities; theory and principles of public transport network design, scheduling and operations; terminals; public transport modes; costs, fares and subsidies; contemporary issues and approaches to public transport restructuring and formalisation in South Africa, including Bus Rapid Transit (BRT). Planning and designing for non-motorised transport, including pedestrians, bicyclists, and animal-drawn transport.

## Geometric design and safety 791 (SVV 791)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 24.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 Contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

**Module content**

A research term paper will be prepared.

Rural/Peri-urban road networks: transportation policy, standards and safety, environmental quality, capacity, design, interchanges. Urban street networks: functional classes, town planning considerations, capacities, environment, safety, standards design, evaluation of road networks.
Traffic safety in global and national content, Road Safety Engineering and the assessment and interpretation of accident information, reactive and proactive identification of remedial measures, traffic safety strategies: 3E model and Haddon matrix.

## Mechanics 122 (SWK 122)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Engineering and Environmental Geology<br>BSc Geology<br>BSc Meteorology |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WTW 158 |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Equivalent force systems, resultants. Newton's laws, units. Forces acting on particles. Rigid bodies: principle of transmissibility, resultant of parallel forces. Vector moments and scalar moments. Relationship between scalar- and vector moments. Couples. Equivalent force systems on rigid bodies. Resultants of forces on rigid bodies. Equilibrium in two and three dimensions. Hooke's law. Trusses and frameworks. Centroids and second moments of area. Beams: distributed forces, shear force, bending moment, method of sections, relationship between load, shear force and bending moment.

## Strength of materials 210 (SWK 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Engineering and Environmental Geology<br>BSc Geology |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | Faculty of Engineering, Built Environment and Information Technology: SWK 122 and WTW 164 OR SWK 122, WTW 161 and WTW 168. Faculty of Natural and Agricultural Sciences: SWK 122 and WTW 124 OR SWK 122, WTW 126 and WTW 128. |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Stresses, strains and the mechanical properties of materials: Normal stress and shear stress, tension and compression, equilibrium in shear, factor of safety, design, shear strain, stress/strain diagram, Hooke’s Law, Poisson’s Ratio and the shear stress/strain diagram. Axial loads: Elastic deformation, displacements, statically determinate and indeterminate structures and thermal effects. Torsion: Torsion of circular bars and power transmission bending of straight members and composite beams. Transverse shear: Shear in straight members and shear flow. Combined loads: Thin walled pressure vessels and stresses as a result of combined loads. Stress transformation: Plane stress transformation, principle stresses, maximum values and stress variation in prismatic beams. Strain transformation: Plane strain transformation, principle strains, maximum values, strain gauges and rosettes and the relationship between E, G and ?. Design of beams from section characteristics. Deflection of beams: The elastic curve, integration method, Macaulay’s method and superposition.

## Statics 211 (SWK 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | SWK 122 |
| **Contact time** | 1 practical per week, 2 lectures per week, 3 tutorials per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 1 |

**Module content**

Centroids: centroids of lines, surfaces and volumes. Constraints and statical determinancy. Space trusses. Bending moments and cables: distributed loads, parabolic and uniform cables. Liquid statics: buoyancy. Elasticity: stress-strain, stiffness, elastic moduli relations, torsion. Deflection of beams: deriviation of differential equations, bending stresses. Friction: friction surfaces, wedges, screws, belt, bearings and rolling resistance. Work and energy, virtual work. Vibration.

## Workshop practice 121 (SWP 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BEng Civil Engineering<br>BEng Civil Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance module only

The module is offered at the end of the first year of study and lasts at least eight days during which the students receive training in the following workshops: formwork, scaffolding, masonry, welding and structural steel.

## Textiles: Utilities, fibres and yarns 212 (TKS 212)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 14.00 |
| **Programmes** | BConSci Clothing Retail Management<br>BSc Interior Architecture |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Consumer Science |
| **Period of presentation** | Semester 1 |

**Module content**

Utility aspects: basic components of textiles, consumer decision making, utility aspects that include durability, comfort, maintenance, health/safety/protection and aesthetic aspects. Fibres and yarns: Fibre structure and performance including textile chemistry, fibre morphology and formation, fibre properties, classification and identification. Yarn structure and performance (including spun yarns, filament yarns, compound and novelty yarns).

## Site analysis and assessment 110 (TPA 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis and assessment of sites for planning purposes. Covers the analysis of context and natural (e.g. climate, geology), man-made (e.g. zoning, potential land value, land use and activity), and sensory elements (e.g. genius loci) of a site to determine the appropriate use of a site as well as the character of future development. Skills and techniques to communicate the analysis and assessment graphically.

## Settlement analysis and assessment 120 (TPA 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Theoretical component: South African cities in a global economic and national context; a framework for settlement analysis; overview and discussion of important demographic, social, economic, environmental and local government features of selected South African cities. Practical component: basic writing and presentation skills for planners; field methods; participatory methods; surveys; secondary sources; settlement analysis in a political context; analysis of a suburb in the Pretoria area.

## Plan and policy analysis and assessment 210 (TPA 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Analysis and assessment of plans and policy frameworks from a planning and development perspective. Analysis and assessment of substantive and communicative content. Deconstruction of text, norms and values, planning and development approaches. The role of planners and the democratisation of planning.

## Introduction to development planning 210 (TPD 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to development problems, perspectives on and concepts of development. Approaches to development planning and development studies. Application of development proposals from local to national levels. International and local perspectives and case studies. Critical evaluation of development initiatives, and aspects such as culture, gender, diversity and sustainability. Role players in the development process

## Municipal development planning 220 (TPD 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Theories and processes of strategic, forward, and integrated development planning; origins and intentions of these concepts; international and local perspectives and case studies; policy framework for development planning in the South African context; role players in development planning processes, with specific reference to the role of the planner and the community; introduction to the concept, theory, aims, processes and practise of participatory planning.

## Regional development planning 310 (TPD 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Theory and practice of regional development planning; strategic regional development analysis and thinking; preparation and implementation of regional development frameworks, and plans and strategies on supranational, national, provincial and metropolitan levels.

## Rural development planning 320 (TPD 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Rural development in historical, political, ideological, social, economical, geographical and institutional context; theoretical perspectives on and approaches to rural development; case studies of rural development planning and plans in different developmental contexts; preparation, implementation and evaluation of rural development frameworks, strategies and plans.

## Integrated development planning 820 (TPD 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to development and development planning theories; the integrated development planning process; legal, institutional and policy frameworks in which integrated planning functions in South Africa; implementation of integrated development plans; case studies of integrated development planning; simulations of integrated development planning exercises.

## Research methodology 410 (TPE 410)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Defining research; research paradigms; research ethics; research problems/questions; literature reviews; research design; selected qualitative and quantitative methods for data collection, analysis and interpretation; reporting research; formulation of a research proposal.

## Research report 420 (TPE 420)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BTRP |
| **Prerequisites** | TPE 410 |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

Contextualisation of a research problem/question; literature review; research design and methods; undertake empirical research in line with an approved research proposal; collection, analysis and interpretation of data; writing up of research findings.

## Research methodology 810 (TPE 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Defining research; research paradigms; research ethics; research problems/questions; literature reviews; research design; selected qualitative and quantitative methods for data collection, analysis and interpretation; reporting research; formulation of a research proposal.

## Mini-dissertation 820 (TPE 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 60.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | TPE 810 |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Contextualisation of a research problem/question; literature review; research design and methods; undertake empirical research in line with an approved research proposal; collection, analysis and interpretation of data; writing up of research findings.

## Planning and settlement histories before the Industrial Revolution 110 (TPH 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |

| | |
|---|---|
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

An in-depth analysis of city building and urban and regional planning in pre-modern times. The influence on settlement design and planning within the social, political and economic context of the Pre-historic; Classic (Roman and Greek); Feudal and Mercantile eras. Aspects such as visions of ideal cities, settlement patterns, the treatment of public space, the development of the edge of the settlement, functional zones and segregation are covered. Attention is given to the function, role, character, practice and beneficiaries of planning and the role of planners.

## Planning and settlement histories since the Industrial Revolution 120 (TPH 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

An in-depth analysis of city building and urban and regional planning in modern and post-modern times with special emphasis on the South African situation. The influence on settlement design and planning within the social, political and economic context of Industrial and Post-industrial eras. Aspects such as visions of ideal cities, settlement patterns, the treatment of public space, the development of the edge of the settlement, functional zones and segregation are covered. Attention is given to the function, role, character, practice and beneficiaries of planning and the role of planners.

## Planning interventions: Precinct scale 451 (TPI 451)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

The drafting of urban development and design frameworks to ensure development or redevelopment of urban areas in a relevant, social and environmentally accountable way. Specific focus on rehabilitation of declining city centres, fast growing edge cities, and underdeveloped parts of urban areas. Critique on and improvements of current practice; simulated planning exercise.

## Planning interventions: Peri-urban and rural scale 452 (TPI 452)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to planning and management of small towns, rural settlements, and peri-urban/rural districts; examples of planning interventions in rural areas; approaches to rural development, techniques and methods for planning in rural areas. Critique on and improvements on current practice; simulated planning exercise.

## Planning interventions: Metropolitan scale 453 (TPI 453)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to planning at metropolitan level; examples of planning interventions at metropolitan level; approaches to and examples of the delivery of housing, infrastructure and facilities; tensions in resource allocation and prioritising of development in metropolitan areas; institutional requirements and implications of planning and management of metropolitan development; critiques and improvements on current practice; simulated planning exercise.

## Planning interventions: Supranational, national and provincial scale 454 (TPI 454)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to planning at provincial, national and supranational scale. Approaches to planning and development of regions and provinces. Past and present examples of planning on each of these scales. Planners' roles in planning exercises at these scales; institutional requirements and implications of planning at these scales. Critiques and improvements on current practice; simulated planning exercise.

## Metropolitan and urban area-based interventions 811 (TPI 811)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Scope, nature and rationale of metropolitan and urban area-based interventions; unique problems in metropolitan areas, for example inner city decay, fringe development, housing, services backlog, the dysfunctional apartheid cityscape and dependency on private transport; types of intervention (inter alia institutional, spatial, economic and social) in order to accomplish restructuring and development in metropolitan areas in South Africa in a relevant, social and environmentally accountable way; policy and legislation regarding urban restructuring and development in South Africa; international and local case studies; impact of globalisation on South African metropolitan areas and major cities; simulated metropolitan and urban area-based intervention exercise.

## Regional interventions 821 (TPI 821)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |

| | |
|---|---|
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Scope, nature and rationale of regional interventions on both a supra-national and subnational scale; approaches to planning and development on continental, macro-regional, provincial and district scales; types of intervention (inter alia institutional, spatial, economic and social) in order to accomplish restructuring and development in regions in a relevant, social and environmentally accountable way, past and present examples of planning on each of these scales; planners’ roles in planning exercises at these scales; critiques and improvements on current practice; rural urban linkages and their significance for regional interventions; debates around the way in which problems facing rural settlements (such as the absence of an economic base and necessary infrastructure, lack of access to land and conflicting demands on natural resources) in regions can be addressed; international and local case studies; simulated regional intervention exercise.

## Principles of settlement design 120 (TPS 120)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to the goals and principles of settlement design. Characteristics and measures as well as the design elements of a good living-environment; settlement design within both urban and rural contexts.
Aspects that will be covered include settlement structure (open space and movement systems), sense, symbolism and legibility, accessibility, diversity and opportunity, sustainability, safety, justice and equity.

## Settlement design concepts 210 (TPS 210)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

The skills and techniques to design a layout of a new settlement or part of an existing settlement. It includes design for the provision of housing for both high and low income groups, as well as commercial and social facilities, open space systems, transportation systems and services. Design sustainable and equitable areas. Site analysis and assessment; development of alternative concepts; the detail design including the division of erven, infrastructure network, land development control and design guidelines.

## Settlement establishment planning and housing delivery 220 (TPS 220)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Institutional and legal frameworks in which settlement establishment and housing provision takes place; user and site requirements; housing typologies and densities; engineering services; role players; financing; simulated exercise; the detail design including the division of erven, infrastructure network, land development control and design guidelines.

## Spatial concepts 310 (TPS 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Spatial concepts regarding the development and planning of settlements. Morphological development processes such as decentralisation, counter urbanisation, residential infill and succession, urban sprawl. Spatial structuring elements, e.g. corridors, nodes, compact cities, mixed use.

## Transport planning 321 (TPS 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Quarter 3 |

**Module content**

Environmental, economic and social impact of transport; transport planning process; introduction to transport studies and evaluation; public transport; functional road hierarchy; geometric road layout; road reserve dimensions; parking; preparation of a layout plan

## Municipal services provision 322 (TPS 322)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Quarter 4 |

**Module content**

Water supply; sanitation; storm water disposal; energy supply; public lighting; solid waste removal; preparation of a layout plan.

## Sustainable settlement planning and design 810 (TPS 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Normative principles for sustainable settlement planning and design; design theory; planning and design processes; simulated urban and rural settlement planning and design exercise.

## Introduction to urban design 820 (TPS 820)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Theory of urban design and its relation to town and regional planning; urban design principles for well-performing settlements; urban design process; urban design frameworks and precinct plans; simulated urban design exercise at neighbourhood level.

## Theory and practice of land-use management 211 (TPU 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Theoretical component: A brief history of land use management in South Africa; rationale for land use management; principles of good land use management in the context of transformation and development imperatives in post-apartheid South Africa, global environmental change, new economic geography, procedural, substantive and intergenerational justice and development economics; critique of land use management; ethics of land use management; the characteristics of an appropriate land use management system that advances transformation, sustainability, resilience, equity, inclusiveness and integration in South Africa; the link between land use management and strategic spatial planning; international and South African examples of land use management systems; the future of land use management. Practical component: Generic components of land use and land development applications and procedures including township establishment in terms of current legislation; practical exercises in the preparation, submission, processing and evaluation of land use management applications; policy preparation in terms of land use management systems that advance equity, resilience, inclusiveness, sustainability and integration; appeals; introduction to Environmental Impact Studies (EIAs)

## Urban land development economics 221 (TPU 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

The economics of settlements, including aspects such as economic advantages, transformation, equity, integration and inclusiveness; locational choices of urban land uses; density and intensity of development; the effects of densities, location and transportation economics on land values; implications of zoning; implications for sustainability and risk reduction; the cost of urban growth, whether by densification or sprawl. The functioning of the property market, e.g. how the property market works for the urban poor; key role players and decision-making in the property market; the role of urban planning as well as local government and their financial viability in the property market.

## Land use management and land development 810 (TPU 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |

| | |
|---|---|
| **Period of presentation** | Semester 1 |

**Module content**

A brief history of land use management in South Africa; rationale for land use management; principles of good land use management in the context of transformation and development imperatives in post-apartheid South Africa, global environmental change, new economic geography, procedural, substantive and intergenerational justice and development economics; critique of land use management; ethics of land use management; the characteristics of an appropriate land use management system that advances transformation, sustainability, resilience, equity, inclusiveness and integration in South Africa; the link between land use management and strategic spatial planning; international and South African examples of land use management systems; the future of land use management. Generic components of land use and land development applications and procedures; practical exercises in the preparation, submission, processing and evaluation of land use management applications; policy preparation in terms of land use management systems that advance the principles of effective, efficient and sustainable land use management; appeals; introduction to Environmental Impact Studies (EIAs).

## Institutional and legal structures for planning 310 (TPW 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Overview of South African institutional and legal structures for planning and development, on national and provincial scale. Relevant legislation and policies that influence planning. Specific reference to the legal frameworks guiding land development, the environment, municipal management and development, housing, transport, water, and Human Rights.

## Institutional and legal structures for planning 810 (TPW 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |

| | |
|---|---|
| **Period of presentation** | Semester 1 |

**Module content**

Overview of South African institutional and legal structures for planning and development, on national and provincial scale. Relevant legislation and policies that influence planning. Specific reference to the legal frameworks guiding land development, the environment, municipal management and development, housing, transport, water, and Human Rights.

## Site surveying 213 (TRN 213)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Geography Geoinformatics and Meteorology |
| **Period of presentation** | Semester 1 |

**Module content**

General surveying; instruments, their handling and adjusting; surveying systems and simple calculations; determining of levels; setting out of the works; tacheometry and plotting; scales, planimetry; areas and volumes; construction surveying; aerial photography.

## Introduction to planning 110 (TRP 110)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Definitions of planning; rationale for planning; focus areas of planning; planning processes; planners’ roles and work places; the institutional framework for planning; planning legislation; values and ethics of planners; the future of planning.

## Town and regional planning 311 (TRP 311)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 8.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the basic concepts of urban and regional planning. The planning process, policy and institutional framework in which planning functions in South Africa. The interaction and co-operation of land and space, economy, politics and social aspects related to space in decision making and the support thereof. Interventions with regard to normative principles for sustainable development planning and design, definitions and rationale with land-use management and the strategic integrated development planning process.

## Planning prospects 320 (TRP 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 2 |

**Module content**

Critical reflections on planning as construct, activity and profession. Case study-based exploration of innovative planning practices.

## Professional practice 412 (TRP 412)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BTRP |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Quarter 2 |

**Module content**

Starting a career in the planning profession (including issues such as public vs. private sector employment, essential skills required, applying for vacancies, interaction with co-workers and other parties, company culture, client relationships, workplace ethics); developing a career in the planning profession (including issues such as essential communication-, management- and political-skills, typical mistakes to avoid in practice, setting a career path); introduction to project management; an overview of professional planning organisations in South Africa; remaining issues for class discussion, such as marketing, client service, promotion and time management.

## An overview of planning theory and practice 810 (TRP 810)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 20.00 |
| **Programmes** | MTRP (Coursework) |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 40 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Town and Regional Planning |
| **Period of presentation** | Semester 1 |

## Academic orientation 112 (UPO 112)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 0.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BIS Information Science<br>BIS Multimedia<br>BIS Publishing<br>BIT<br>BSc Architecture<br>BSc Computer Science<br>BSc Construction Management<br>BSc Information and Knowledge Systems<br>BSc Interior Architecture<br>BSc Landscape Architecture<br>BSc Quantity Surveying<br>BSc Real Estate<br>BTRP |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | EBIT Deans Office |
| **Period of presentation** | Year |

## Thesis: Transportation engineering 990 (VIN 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Visual design (1) 102 (VIO 102)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BIS Multimedia |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | 5 for Mathematics or WTW 114 or WTW 133 and 143 |
| **Contact time** | 1 lecture per week, 1 practical per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Visual Arts |
| **Period of presentation** | Year |

**Module content**

*Only for students who specialise in BIS Multimedia
Introduction to elements and principles of design, typography and layout. Application of visual principles and techniques. Media characteristics. The design process.

## Visual design (2) 202 (VIO 202)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BIS Multimedia |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | VIO 102 |
| **Contact time** | 1 discussion class per week, 1 lecture per week, 1 practical per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Visual Arts |
| **Period of presentation** | Year |

**Module content**

*Requires VIO 102
*Only for students who specialise in BIS Multimedia
Visual analysis and interpretation. Design function and specific applications in the electronic environment. Aesthetic, functional and communicative evaluation of design.

## Visual culture studies 111 (VKK 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Information Design<br>BA Languages<br>BA Visual Studies<br>BIS Publishing<br>BPolSci Political Studies<br>BSocSci Heritage and Cultural Tourism |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Visual Arts |
| **Period of presentation** | Semester 1 |

**Module content**

Foundations of visual culture
This module introduces art and visual culture theory using a wide range of texts and ideas. The module gives students wide exposure to visual discourses and includes a variety of visual culture examples e.g. artworks, advertisements. These discourses may include: exploring what visual culture is; modes of analysis; introducing terminology such as ideology and myth; dealing with selected periods from history contextually; introducing cultural icons and themes from popular visual culture.

## Visual culture studies 123 (VKK 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BA<br>BA Extended programme<br>BA Fine Arts<br>BA Information Design<br>BA Languages<br>BA Visual Studies<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 3 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Visual Arts |
| **Period of presentation** | Semester 2 |

**Module content**

*Images across media: historical perspectives*

This module presents a historical overview of the ways in which images have appeared across media in visual culture from a specific African vantage point within the global. This is done by means of exploring key modes, themes and visual texts with the aim of fostering an understanding of how historical events and cultural and ideological trends underpin the visual. Among the topics that may be covered are the progression of graphic and industrial design from the Industrial Revolution, photography, art, fashion, dress, magazines, printed culture and postcards. The module also provides an introduction to research approaches and methods in the field of visual culture.

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## Visual culture studies 211 (VKK 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Fine Arts<br>BA Information Design<br>BA Languages<br>BA Visual Studies<br>BIS Publishing<br>BPolSci Political Studies<br>BSocSci Heritage and Cultural Tourism |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Visual Arts |
| **Period of presentation** | Semester 1 |

**Module content**

Gender, sexuality and visual representation
Introduction to the representation of sex, gender and sexuality in visual culture.  Gender theory and terminology related to feminism, masculinity studies and *lbgtq* theory (lesbian, bisexual, gay, transgendered, queer) are unpacked. Themes and issues in gender and identity politics such as the male hero, the nude in late 19th century art, the femme fatale, hysteria, androgyny and transsexuality are dealt with. Sexuality and gender issues across a range of visual cultural such as soaps, sitcoms, artworks, advertisements, fashion, music videos and films are addressed.

## Sustainable construction 320 (VKN 320)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |

| | |
|---|---|
| **Programmes** | BSc Construction Management<br>BSc Quantity Surveying<br>BSc Real Estate |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Construction Economics |
| **Period of presentation** | Semester 2 |

**Module content**

Introduction to sustainable development and general sustainable construction principles, processes and technology. Sustainable practices on the construction site. Relevant regulations and voluntary programmes, including an introduction to 'Green Star' rating.

## Industrial waste engineering 780 (WAI 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Environmental Engineering<br>BEngHons Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Identification of source materials, physical and chemical properties of waste. Release and transport mechanisms from source to air, groundwater, soil. Primary pathways of contaminants including sorption, volatilisation, biotic and abiotic transformations. Toxicology: absorption, distribution, biochemical transformation, and secretion of chemicals. Acute and chronic toxicity quantification and evaluation of risk. Hazard identification, exposure assessment, toxicity assessment and risk characterisation. Minimum requirements for the handling, classification and disposal of hazardous waste. Minimum requirements for waste disposal by landfill. Minimum requirements for water monitoring at waste management facilities. Recycling and resource management. Waste prevention, minimisation and optimisation.

## Industrial waste engineering 787 (WAI 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Environmental Technology<br>BScHons Applied Science Water Utilisation |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

Identification of source materials, physical and chemical properties of waste. Release and transport mechanisms from source to air, groundwater, soil. Primary pathways of contaminants including sorption, volatilisation, biotic and abiotic transformations. Toxicology: absorption, distribution, biochemical transformation, and secretion of chemicals. Acute and chronic toxicity quantification and evaluation of risk. Hazard identification, exposure assessment, toxicity assessment and risk characterisation. Minimum requirements for the handling, classification and disposal of hazardous waste. Minimum requirements for waste disposal by landfill. Minimum requirements for water monitoring at waste management facilities. Recycling and resource management. Waste prevention, minimisation and optimisation.

## Dissertation: Water utilisation 890 (WBC 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Thesis: Water utilisation 990 (WBC 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Dissertation: Water utilisation engineering 890 (WBI 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |

| | |
|---|---|
| **Period of presentation** | Year |

## Thesis: Water utilisation engineering 990 (WBI 990)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 360.00 |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Year |

## Dissertation: Water resource engineering 890 (WBK 890)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 180.00 |
| **Programmes** | MEng Water Resources Engineering |
| **Prerequisites** | No prerequisites. |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Civil Engineering |
| **Period of presentation** | Year |

## Biological water treatment 780 (WBW 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Chemical Engineering<br>BEngHons Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Biological water treatment 787 (WBW 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Water Utilisation |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Chemical water treatment 780 (WCW 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Chemical water treatment 787 (WCW 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Water Utilisation |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Membrane processes 780 (WIM 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Membrane processes 787 (WIM 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Prerequisites** | No prerequisites. |
| **Contact time** | 10 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 |

## Water quality management and research 780 (WQB 780)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BEngHons Environmental Engineering<br>BEngHons Water Utilisation Engineering |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

## Water quality management and research 787 (WQB 787)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 32.00 |
| **Programmes** | BScHons Applied Science Environmental Technology<br>BScHons Applied Science Water Utilisation |
| **Contact time** | 32 contact hours per semester |
| **Language of tuition** | Module is presented in English |
| **Department** | Chemical Engineering |
| **Period of presentation** | Semester 1 or Semester 2 |

**Module content**

Water quality parameters: physical, chemical, biological, microbiological; Units of expression; Evaluation of parameters; Methods of analysis and practical laboratory analyses; Water quality interpretation, evaluation and assessment, water quality guidelines and requirements for domestic, industrial, agricultural, ecological, recreational requirements; Limnology and water quality in rivers and lakes; Surface water modelling; Ground water quality and assessment; Regulatory aspects including all relevant legislation; Integrated environmental management, integrated pollution control; Procedures to assess effluent discharge impacts; and Water quality management, policies and procedures, role of catchment management agencies, and catchment management plans.

## Mathematical statistics 111 (WST 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Computer Science<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | At least 5 (60-69%) in Mathematics in the Grade 12 examination |
| **Contact time** | 1 practical per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Characterisation of a set of measurements: Graphical and numerical methods. Random sampling. Probability theory. Discrete and continuous random variables. Probability distributions. Generating functions and moments.

## Mathematical statistics 121 (WST 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Computer Science<br>BSc Extended programme - Mathematical Sciences<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 111 GS or WST 133, 143 and 153 |
| **Contact time** | 1 practical per week, 4 lectures per week |

| | |
|---|---|
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Sampling distributions and the central limit theorem. Statistical inference: Point and interval estimation. Hypothesis testing with applications in one and two-sample cases. Introductory methods for: Linear regression and correlation, analysis of variance, categorical data analysis and non-parametric statistics. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

## Mathematical statistics 153 (WST 153)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Extended programme - Mathematical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 133 and WST143 and WTW 143. Must be taken concurrently with WTW 153. |
| **Contact time** | 1 practical per week, 2 tutorials per week, 4 lectures per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Probability distributions:
Introductory distribution theory and special statistical distributions (Binomial, Geometric, Hypergeometric, Poisson, Uniform, Normal, Gamma). Generating functions and moments. Bivariate probability distributions. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

## Mathematical statistics 211 (WST 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Computer Science<br>BSc Mathematical Statistics<br>BSc Mathematics |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 111, WST 121, WTW 114 GS and WTW 124 GS |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Set theory. Probability measure functions. Random variables. Distribution functions. Probability mass functions. Density functions. Expected values. Moments. Moment generating functions. Special probability distributions: Bernoulli, binomial, hypergeometric, geometric, negative binomial, Poisson, Poisson process, discrete uniform, uniform, gamma,exponential, Weibull, Pareto, normal. Joint distributions: Multinomial, extended hypergeometric, joint continuous distributions. Marginal distributions. Independent random variables. Conditional distributions. Covariance, correlation. Conditional expected values. Transformation of random variables: Convolution formula. Order statistics. Stochastic convergence: Convergence in distribution. Central limit theorem. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.

## Mathematical statistics 221 (WST 221)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 24.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Computer Science<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 211 GS |
| **Contact time** | 2 practicals per week, 4 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Stochastic convergence: Asymptotic normal distributions, convergence in probability. Statistics and sampling distributions: Chi-squared distribution. Distribution of the sample mean and sample variance for random samples from a normal population. T-distribution. F-distribution. Beta distribution. Point estimation: Method of moments. Maximum likelihood estimation. Unbiased estimators. Uniform minimum variance unbiased estimators. Cramer-Rao inequality. Efficiency. Consistency. Asymptotic relative efficiency.
Bayes estimators. Sufficient statistics. Completeness. The exponential class. Confidence intervals. Test of statistical hypotheses. Reliability and survival distributions. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.

## Stochastic processes 312 (WST 312)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 211, WST 221, WTW 211 GS and WTW 218 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 1 |

**Module content**

Definition of a stochastic process. Stationarity. Covariance stationary. Markov property. Random walk. Brownian motion. Markov chains. Chapman-Kolmogorov equations. Recurrent and transient states. First passage time. Occupation times. Markov jump processes. Poisson process. Birth and death processes. Structures of processes. Structure of the time-homogeneous Markov jump process. Applications in insurance. Practical statistical modelling, analysis and simulation using statistical computer packages and the interpretation of the output.

## Time-series analysis 321 (WST 321)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 211, WST 221, WTW 211 GS and WTW 218 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |

| | |
|---|---|
| **Period of presentation** | Semester 2 |

**Module content**

**Note: Only one of the modules WST 321 or STK 320 may be included in any study programme.**

Stationary and non-stationary univariate time-series. Properties of autoregressive moving average (ARMA) and autoregressive integrated moving average (ARIMA) processes. Identification, estimation and diagnostic testing of a time-series model. Forecasting. Multivariate time-series. Practical statistical modelling and analysis using statistical computer packages.

## Actuarial statistics 322 (WST 322)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Economic and Management Sciences<br>Faculty of Natural and Agricultural Sciences |
| **Prerequisites** | WST 211, WST 221, WTW 211 GS and WTW 218 GS |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Statistics |
| **Period of presentation** | Semester 2 |

**Module content**

Decision theory. Loss distributions. Reinsurance. Risk models. Ruin theory. Credibility theory. Methods to forecast future claim numbers and amounts. Practical statistical modelling and analysis using statistical computer packages.

## Calculus 114 (WTW 114)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Meteorology<br>BSc Physics |

| | |
|---|---|
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities |
| **Prerequisites** | Refer to Regulation 1.2. Mathematics 60% Grade 12. |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

*This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218 and WTW 220). Students will not be credited for more than one of the following modules for their degree: WTW 114, WTW 158, WTW 134, WTW 165.
Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Definite and indefinite integrals, evaluating definite integrals using anti-derivatives, the substitution rule.

## Discrete structures 115 (WTW 115)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BIT<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Extended programme - Mathematical Sciences<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | Refer to Regulation 1.2: A candidate must have passed Mathematics with at least 50% in the Grade 12 examination |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Propositional logic: truth tables, logical equivalence, implication, arguments. Mathematical induction and well-ordering principle. Introduction to set theory. Counting techniques: elementary probability, multiplication and addition rules, permutations and combinations, binomial theorem, inclusion-exclusion rule.

## Numerical analysis 123 (WTW 123)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 114 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Non-linear equations, numerical integration, initial value problems for differential equations, systems of linear equations. Algorithms for elementary numerical techniques are derived and implemented in computer programmes. Error estimates and convergence results are treated.

## Mathematics 124 (WTW 124)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BSc Computer Science |
| **Prerequisites** | WTW 114 |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

*Students will not be credited for more than one of the following modules for their degree:
WTW 124, WTW 146, WTW 148 and WTW 164. This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218, WTW 211 and WTW 220).

The vector space Rn, vector algebra with applications to lines and planes, matrix algebra, systems of linear equations, determinants. Complex numbers and factorisation of polynomials. Integration techniques and applications of integration. The formal definition of a limit. The fundamental theorem of Calculus and applications. Vector functions, polar curves and quadratic curves.

## Precalculus 133 (WTW 133)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BCom Extended programme<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Biological and Agricultural Sciences<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Health Sciences |
| **Prerequisites** | BSc and BCom students: At least 3 (40-49%) in Mathematics in the Grade 12 examination and must be taken concurrently with WTW133 |
| **Contact time** | 1 practical per week, 3 lectures per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Real numbers, elementary set notation, exponents and radicals. Algebraic expressions, fractional expressions, linear and quadratic equations, inequalities. Coordinate geometry: lines, circles. Functions: definition, notation, piecewise defined functions, domain and range, graphs, transformations of functions, symmetry, even and odd functions, combining functions, one-to-one functions and inverses, polynomial functions and zeros. Sequences, summation notation, arithmetic, geometric sequences, infinite geometric series, annuities and instalments. Degrees and radians, unit circle, trigonometric functions, fundamental identities, trigonometric graphs, trigonometric identities, double-angle, half-angle formulae, trigonometric equations, applications.

This module is only offered in English at the Mamelodi Campus for the BSc Extended programme. At the Hatfield and Groenkloof campuses it is offered in English and Afrikaans.

## Mathematics 134 (WTW 134)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BCom<br>BCom Economics<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BIT<br>BSc Biochemistry<br>BSc Biological Sciences<br>BSc Biotechnology<br>BSc Computer Science<br>BSc Construction Management<br>BSc Culinary Science<br>BSc Ecology<br>BSc Entomology<br>BSc Environmental Sciences<br>BSc Food Science<br>BSc Genetics<br>BSc Geography<br>BSc Geoinformatics<br>BSc Human Genetics<br>BSc Human Physiology<br>BSc Human Physiology, Genetics and Psychology<br>BSc Information and Knowledge Systems<br>BSc Medical Sciences<br>BSc Microbiology<br>BSc Nutrition<br>BSc Plant Science<br>BSc Quantity Surveying<br>BSc Real Estate<br>BSc Zoology<br>BScAgric Agricultural Economics and Agribusiness Management<br>BScAgric Animal Science<br>BScAgric Applied Plant and Soil Sciences<br>BScAgric Plant Pathology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Veterinary Science |
| **Prerequisites** | Refer to Regulation 1.2: At least 50% for Mathematics in the Grade 12 examination<br>. |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

**Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 165, WTW 114, WTW 158. WTW 134 does not lead to admission to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW 134 is offered as WTW 165 in the second semester only to students who have applied in the first semester of the current year for the approximately 65 MBChB, or the 5-6 BChD places becoming available in the second semester and who were therefore enrolled for MGW 112 in the first semester of the current year.*

Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration. Matrices, solutions of systems of equations. All topics are studied in the context of applications.

## Calculus 143 (WTW 143)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BCom Extended programme<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Health Sciences |
| **Prerequisites** | BSc and BCom students: WTW 133 and WST133 and must be taken concurrently with WTW143 |
| **Contact time** | 1 tutorial per week, 3 lectures per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Functions: exponential and logarithmic functions, natural exponential and logarithmic functions, exponential and logarithmic laws, exponential and logarithmic equations, compound interest. Limits: concept of a limit, finding limits numerically and graphically, finding limits algebraically, limit laws without proofs, squeeze theorem without proof, one-sided limits, infinite limits, limits at infinity, vertical, horizontal and slant asymptotes, substitution rule, continuity, laws for continuity without proofs. Differentiation: average and instantaneous change, definition of derivative, differentiation rules without proofs, derivatives of polynomials, chain rule for differentiation, derivatives of trigonometric, exponential and logarithmic functions, applications of differentiation: extreme values, critical numbers, monotone functions, first derivative test, optimisation.

## Linear algebra 146 (WTW 146)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Education |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

*Students will not be credited for more than one of the following modules for their degree:
WTW 124, WTW 146 and WTW 164. The module WTW 146 is designed for students who require Mathematics at 100 level only and does not lead to admission to Mathematics at 200 level.

Vector algebra, lines and planes, matrix algebra, solution of systems of equations, determinants. Complex numbers and polynomial equations. All topics are studied in the context of applications.

## Calculus 148 (WTW 148)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Computer Science<br>BSc Information and Knowledge Systems |
| **Service modules** | Faculty of Education |
| **Prerequisites** | WTW 114 GS or WTW 134 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

*Students will not be credited for more than one of the following modules for their degree:
WTW 124, WTW 148 and WTW 164. The module WTW 148 is designed for students who require Mathematics at 100 level only and does not lead to admission to Mathematics at 200 level.

Integration techniques. Modelling with differential equations. Functions of several variables, partial derivatives, optimisation. Numerical techniques. All topics are studied in the context of applications.

## Mathematical modelling 152 (WTW 152)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BSc Applied Mathematics<br>BSc Computer Science<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Refer to Regulation 1.2 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Introduction to the modelling of dynamical processes using difference equations. Curve fitting. Introduction to linear programming. Matlab programming. Applications to real-life situations in, among others, finance, economics and ecology.

## Calculus 153 (WTW 153)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Extended programme - Mathematical Sciences<br>BSc Extended programme - Physical Sciences |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | WTW 143 |
| **Contact time** | 1 tutorial per week, 3 lectures per week, Foundation Course |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Differential calculus of a single variable with proofs and applications. The mean value theorem, the rule of L'Hospital. Upper and lower sums, definite and indefinite integrals, the Fundamental theorem of Calculus, the mean value theorem for integrals, integration techniques, with some proofs.

## Calculus 158 (WTW 158)

| | |
|---|---|
| **Qualification** | Undergraduate |

| | |
|---|---|
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Engineering and Environmental Geology<br>BSc Geology |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | Refer to Regulation 1.2: A candidate must have passed Mathematics with at least 60% in the Grade 12 examination |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

*This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 158, WTW 114, WTW 134, WTW 165.
Introduction to vector algebra. Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Indefinite integrals, integration.

## Dynamical processes 162 (WTW 162)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |
| **Programmes** | BSc Computer Science |
| **Prerequisites** | WTW 114 GS |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |

| | |
|---|---|
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

*Students will not be credited for more than one of the following modules for their degree: WTW 162 and WTW 264.

Introduction to the modelling of dynamical processes using elementary differential equations. Solution methods for first order differential equations and analysis of properties of solutions (graphs). Applications to real life situations.

## Mathematics 164 (WTW 164)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Prerequisites** | WTW 114 GS or WTW 158 GS |
| **Contact time** | 1 tutorial per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

*This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 146, WTW 148 and WTW 124,

Vector algebra with applications to lines and planes in space, matrix algebra, systems of linear equations, determinants, complex numbers, factorisation of polynomials and conic sections. Integration techniques, improper integrals. The definite integral, fundamental theorem of Calculus. Applications of integration. Elementary power series and Taylor's theorem. Vector functions, space curves and arc lengths. Quadratic surfaces and multivariable functions.

## Linear algebra 211 (WTW 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Engineering and Environmental Geology<br>BSc Geology<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | WTW 124 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

This is an introduction to linear algebra on Rn. Matrices and linear equations, linear combinations and spans, linear independence, subspaces, basis and dimension, eigenvalues, eigenvectors, similarity and diagonalisation of matrices, linear transformations.

## Calculus 218 (WTW 218)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BCom<br>BCom Econometrics<br>BCom Statistics<br>BEd Senior Phase and Further Education and Training Teaching<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Engineering and Environmental Geology<br>BSc Geology<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Meteorology<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | WTW 114 and WTW 124 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Calculus of multivariable functions, directional derivatives. Extrema and Lagrange multipliers. Multiple integrals, polar, cylindrical and spherical coordinates.

## Mathematics 238 (WTW 238)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 16.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 256 and WTW 258 GS |
| **Contact time** | 2 tutorials per week, 4 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Linear algebra, eigenvalues and eigenvectors with applications to first and second order systems of differential equations. Sequences and series, convergence tests. Power series with applications to ordinary differential equations with variable coefficients. Fourier series with applications to partial differential equations such as potential, heat and wave equations.

## Differential equations 256 (WTW 256)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 158 and WTW 164 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Theory and solution methods for linear differential equations as well as for systems of linear differential equations. Theory and solution methods for first order non-linear differential equations. The Laplace transform with application to differential equations. Application of differential equations to modelling problems.

## Calculus 258 (WTW 258)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 158 and WTW 164 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Calculus of multivariable functions, directional derivatives. Extrema. Multiple integrals, polar, cylindrical and spherical coordinates. Line integrals and the theorem of Green. Surface integrals and the theorems of Gauss and Stokes.

## Numerical methods 263 (WTW 263)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 8.00 |

| | |
|---|---|
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Civil Engineering<br>BEng Civil Engineering ENGAGE<br>BEng Computer Engineering<br>BEng Computer Engineering ENGAGE<br>BEng Electrical Engineering<br>BEng Electrical Engineering ENGAGE<br>BEng Electronic Engineering<br>BEng Electronic Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE<br>BEng Mining Engineering<br>BEng Mining Engineering ENGAGE<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology |
| **Prerequisites** | WTW 164 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Numerical integration. Numerical methods to approximate the solution of non-linear equations, systems of equations (linear and non-linear), differential equations and systems of differential equations. Direct methods to solve linear systems of equations.

## Discrete structures 285 (WTW 285)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |
| **Programmes** | BIT<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Information and Knowledge Systems<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |

| | |
|---|---|
| **Prerequisites** | WTW 115 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Setting up and solving recurrence relations. Equivalence and partial order relations. Graphs: paths, cycles, trees, isomorphism. Graph algorithms: Kruskal, Prim, Fleury. Finite state automata.

## Financial engineering 354 (WTW 354)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BCom<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Computer Science<br>BSc Mathematical Statistics<br>BSc Mathematics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences |
| **Prerequisites** | WST 211, WTW 211 and WTW 218 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Mean variance portfolio theory. Market equilibrium models such as the capital asset pricing model. Factor models and arbitrage pricing theory. Measures of investment risk. Efficient market hypothesis. Stochastic models of security prices

## Algebra 381 (WTW 381)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BSc Computer Science |
| **Service modules** | Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities |

| | |
|---|---|
| **Prerequisites** | WTW 114 and WTW 211 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 1 |

**Module content**

Group theory: Definition, examples, elementary properties, subgroups, permutation groups, isomorphism, order, cyclic groups, homomorphisms, factor groups. Ring theory: Definition, examples, elementary properties, ideals, homomorphisms, factor rings, polynomial rings, factorisation of polynomials. Field extensions, applications to straight-edge and compass constructions.

## Numerical analysis 383 (WTW 383)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BCom<br>BCom Statistics<br>BSc Actuarial and Financial Mathematics<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Geology<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities |
| **Prerequisites** | WTW 114, WTW 123 WTW 124 and WTW 211 |
| **Contact time** | 1 practical per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Direct methods for the numerical solution of systems of linear equations, pivoting strategies. Iterative methods for solving systems of linear equations and eigenvalue problems. Iterative methods for solving systems of nonlinear equations. Introduction to optimization. Algorithms for the considered numerical methods are derived and implemented in computer programmes. Complexity of computation is investigated. Error estimates and convergence results are proved.

## Geometry 389 (WTW 389)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 18.00 |
| **Programmes** | BEd Senior Phase and Further Education and Training Teaching<br>BSc Applied Mathematics<br>BSc Chemistry<br>BSc Computer Science<br>BSc Geology<br>BSc Mathematical Statistics<br>BSc Mathematics<br>BSc Physics |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Humanities |
| **Prerequisites** | WTW 211 |
| **Contact time** | 1 tutorial per week, 2 lectures per week |
| **Language of tuition** | Afrikaans and English are used in one class |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Axiomatic development of neutral, Euclidean and hyperbolic geometry. Using models of geometries to show that the parallel postulate is independent of the other postulates of Euclid.

## Big data science elective 801 (WTW 801)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |
| **Programmes** | MIT<br>MIT Big Data Science |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Big data science elective 802 (WTW 802)

| | |
|---|---|
| **Qualification** | Postgraduate |
| **Module credits** | 5.00 |

| | |
|---|---|
| **Programmes** | MIT<br>MIT Big Data Science |
| **Contact time** | 5 contact hours |
| **Language of tuition** | Module is presented in English |
| **Department** | Mathematics and Applied Mathematics |
| **Period of presentation** | Semester 2 |

**Module content**

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

## Workshop practice 121 (WWP 121)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 6.00 |
| **Programmes** | BEng Chemical Engineering<br>BEng Chemical Engineering ENGAGE<br>BEng Industrial Engineering<br>BEng Industrial Engineering ENGAGE<br>BEng Mechanical Engineering<br>BEng Mechanical Engineering ENGAGE<br>BEng Metallurgical Engineering<br>BEng Metallurgical Engineering ENGAGE |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Separate classes for Afrikaans and English |
| **Department** | Mechanical and Aeronautical Engineering |
| **Period of presentation** | Semester 2 |

**Module content**

*Attendance module only
The module is offered at the end of the first year of study and lasts at least eight days, during which training is given in the following workshops: electronic projects, panel wiring, electrical motors and switch gear, general machines, welding, turning and sheet metal work. Each student's progress is assessed after each workshop.

## Introduction to isiZulu grammar – Capita selecta 111 (ZUL 111)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 12.00 |

| | |
|---|---|
| **Programmes** | BA<br>BA Extended programme<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in isiZulu |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

*For speakers of isiZulu as home language or first or second additional language.
Aspects of the grammar of isiZulu such as an introduction to the word categories; an introduction to the structure, meaning and use of the noun, the adjective, the relative, the possessive; the verb; writing and spelling rules; dictionaries and dictionary use; grammatical analysis.

## IsiZulu grammar - Capita selecta 211 (ZUL 211)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 20.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Foundation Phase Teaching<br>BEd Intermediate Phase Teaching<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | ZUL 111, AFT 121 |
| **Contact time** | 2 lectures per week |
| **Language of tuition** | Module is presented in isiZulu |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

Aspects of the grammar of isiZulu such as a continuation of the study of the word categories; grammatical analysis; the structure, meaning and use of the pronoun and the enumerative; an introduction to isiZulu speech sounds/phonetics.

### isiZulu 310 (ZUL 310)

| | |
|---|---|
| **Qualification** | Undergraduate |
| **Module credits** | 30.00 |
| **Programmes** | BA<br>BA Languages<br>BA Law<br>BEd Senior Phase and Further Education and Training Teaching<br>BIS Publishing<br>BPolSci Political Studies |
| **Service modules** | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| **Prerequisites** | ZUL 210, ZUL 220 will be required for students who completed ZUL 110, ZUL 120 at year level 1 and ZUL 211, AFT 220 will be required for students who completed ZUL 111, AFT 121 at year level 1 |
| **Contact time** | 1 discussion class per week, 2 lectures per week |
| **Language of tuition** | English, Afrikaans and isiZulu are used |
| **Department** | African Languages |
| **Period of presentation** | Semester 1 |

**Module content**

isiZulu grammar - Capita selecta

Aspects of the grammar of isiZulu such as a continuation of the study of the word categories; grammatical analysis; more intensive study of the structure, meaning and use of the noun (specifically derived nouns) and verb (specifically moods and verbal extensions); an introduction to the sound changes/phonology of isiZulu. The acquisition and inculcation of advanced communicative skills within a larger number of social, occupational and educational situations. Awareness of the nature and function of language structures is heightened further. Attention is also paid to cultural phenomena.