



# University of Pretoria Yearbook 2016

## BSc Physics (02133202)

**Duration of study** 3 years

**Total credits** 428

### Admission requirements

- In order to register NSC/IEB/Cambridge candidates must comply with the minimum requirements for degree studies as well as the minimum requirements for the relevant study programme.
- Life Orientation is excluded in the calculation of the Admission Point Score (APS).
- Grade 11 results are used for the provisional admission of prospective students.
- Final admission is based on the Grade 12 results.

Minimum requirements for 2016												
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	5	3	C	C	5	3	C	C	32

Candidates who do not comply with the minimum admission requirements may be considered for admission to the BSc or the BSc (Four-year Programme) based on the results of the NBT.

### Other programme-specific information

Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content presented over 2 semesters).

CMY 117,127 are recommended. Electives can be chosen from eg Mathematics, Meteorology, Geology, Geography, IT, Mathematical Statistics, Computer Science, Biochemistry, Zoology etc.

Electives can be chosen from eg Mathematics, Meteorology, Geology, Geography, IT and Mathematical Statistics, etc. Students interested in further studies in astronomy are advised to consider the module PHY 210 Astronomy for physicists as an elective.

PHY 353 and/or PHY 363 can be chosen as elective modules. Students interested in further studies in astronomy or high energy physics are advised to consider PHY 300 Observational astronomy and PHY 310 Particle and astroparticle physics as electives.

Electives are chosen as follows:

First year – 64 credits

Second year – 48 credits

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## Third year – 72 credits

A student must pass all the minimum prescribed and elective module credits as set out at the end of each year within a programme as well as the total required credits to comply with the particular degree programme. Please refer to the curricula of the respective programmes. At least 144 credits must be obtained at 300-/400-level, or otherwise as indicated by curriculum. The minimum module credits needed to comply with degree requirements is set out at the end of each study programme. Subject to the programmes as indicated a maximum of 150 credits will be recognised at 100-level. A student may, in consultation with the Head of Department and subject to the permission by the Dean, select or replace prescribed module credits not indicated in BSc three-year study programmes to the equivalent of a maximum of 36 module credits.

It is important that the total number of prescribed module credits is completed during the course of the study programme. The Dean may, on the recommendation of the Head of Department, approve deviations in this regard. Subject to the programmes as indicated in the respective curricula, a student may not register for more than 75 module credits per semester at first-year level subject to permission by the Dean. A student may be permitted to register for up to 80 module credits in a the first semester during the first year provided that he or she obtained a final mark of no less than 70% for grade 12 Mathematics and achieved an APS of 34 or more in the NSC.

Students who are already in possession of a bachelor's degree, will not receive credit for modules of which the content overlap with modules from the degree that was already conferred. Credits will not be considered for more than half the credits passed previously for an uncompleted degree. No credits at the final-year or 300- and 400-level will be granted.

The Dean may, on the recommendation of the programme manager, approve deviations with regard to the composition of the study programme.

Please note: Where elective modules are not specified, these may be chosen from any modules appearing in the list of modules.

It remains the student's responsibility to ascertain, prior to registration, whether they comply with the prerequisites of the modules they want to register for.

The prerequisites are listed in the Alphabetical list of modules.

## Transitional measures

### Transitional measures for Mathematics modules for 2016

- Students who would have registered for any of the degrees BSc in Environmental Sciences, Geography, Geoinformatics, BCom, BCom in Economics/Statistics or BScIT Information and Knowledge Systems prior to 2016, and not successfully completed WTW 114, WTW 126 or WTW 128 will be allowed to register for WTW 134, WTW 146 and WTW 148, respectively.
- Students who would have registered for BSc in Geology prior to 2016, and not successfully completed WTW 114, WTW 126 or WTW 128 will be allowed to register for WTW 158, WTW 164 or WTW 124 or WTW 148, respectively.
- Students who registered prior to 2016, and who failed both WTW 126 and WTW 128 will register for WTW 124 in 2016 if they wish to continue with mathematics at 200 level, or if WTW 126 and WTW 128 are required for



their respective degree programmes.

- Students who do not qualify for WTW 146 and WTW 148 in terms of their degree programmes, and failed one of WTW 126 or WTW 128, will be allowed to register for the respective module in 2016, and will attend the relevant lectures and tutorials of WTW 124. They will write separate semester tests and exams, covering just the relevant material from WTW 124.
- Students who registered prior to 2016 and passed WTW 126 but not WTW 128, will be allowed to continue with WTW 211 and COS 344 in 2016.
- Students who registered prior to 2016 and passed WTW 128 but not WTW 126, will be allowed to continue with the modules WTW 220, IAS 211 and GLY 265 in 2016, if they also meet the additional entry requirements.
- Students who registered prior to 2016, and who failed both WTW 161 and WTW 168 will register for WTW 164 in 2016.
- Students who failed one of WTW 161 or WTW 168, will be allowed to register for the respective module in 2016, and will attend the relevant lectures and tutorials of WTW 164. They will write separate semester tests and exams, covering just the relevant material from WTW 164.

## Promotion to next study year

A student will be promoted to the following year of study if he or she passed 100 credits of the prescribed credits for a year of study, unless the Dean on the recommendation of the head of department decides otherwise. A student who does not comply with the requirements for promotion to the following year of study, retains the credit for the modules already passed and may be admitted by the Dean, on recommendation of the head of department, to modules of the following year of study to a maximum of 48 credits, provided that it will fit in with both the lecture and examination timetable.

### **General promotion requirements in the faculty**

All students whose academic progress is not acceptable can be suspended from further studies.

- 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.
- A student who has been excluded from further studies may apply in writing to the Admissions Committee of the Faculty of Natural and Agricultural Sciences for re-admission.
- 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.
- Should the student not be re-admitted to further studies by the Admissions Committee, he/she will be informed in writing.
- Students who are not re-admitted by the Admissions Committee have the right to appeal to the Senior Appeals Committee.
- Any decision taken by the Senior Appeals Committee is final.

## Pass with distinction

A student obtains his or her degree with distinction if all prescribed modules at 300-level (or higher) are passed in one academic year with a weighted average of at least 75%, and obtain at least a subminimum of 65% in each of the relevant modules.



# Curriculum: Year 1

**Minimum credits: 140**

## Fundamental modules

- Academic information management 111 (AIM 111) - Credits: 4.00
- Academic information management 121 (AIM 121) - Credits: 4.00
- Language and study skills 110 (LST 110) - Credits: 6.00
- Academic orientation 102 (UPO 102) - Credits: 0.00
- Academic information management 102 (AIM 102) - Credits: 6.00

## Core modules

- Calculus 114 (WTW 114) - Credits: 16.00
- First course in physics 114 (PHY 114) - Credits: 16.00
- First course in physics 124 (PHY 124) - Credits: 16.00
- Mathematics 124 (WTW 124) - Credits: 16.00

## Elective modules

- General chemistry 117 (CMY 117) - Credits: 16.00
- General chemistry 127 (CMY 127) - Credits: 16.00
- Program design: Introduction 110 (COS 110) - Credits: 16.00
- Science and world views 155 (FIL 155) - Credits: 6.00
- Southern African geomorphology 166 (GGY 166) - Credits: 8.00
- Historical geology 161 (GLY 161) - Credits: 8.00
- Environmental and hazard geology 162 (GLY 162) - Credits: 8.00
- Cartography 110 (GMC 110) - Credits: 12.00
- Informatics 112 (INF 112) - Credits: 10.00
- Informatics 154 (INF 154) - Credits: 10.00
- Informatics 164 (INF 164) - Credits: 10.00
- Exploring the universe 154 (SCI 154) - Credits: 16.00
- Exploring the universe 164 (SCI 164) - Credits: 16.00
- Psychology 110 (SLK 110) - Credits: 12.00
- Psychology 120 (SLK 120) - Credits: 12.00
- Statistics 110 (STK 110) - Credits: 13.00
- Statistics 120 (STK 120) - Credits: 13.00
- Climate and weather of Southern Africa 164 (WKD 164) - Credits: 8.00
- Mathematical statistics 111 (WST 111) - Credits: 16.00
- Mathematical statistics 121 (WST 121) - Credits: 16.00
- Discrete structures 115 (WTW 115) - Credits: 8.00
- Numerical analysis 123 (WTW 123) - Credits: 8.00
- Mathematical modelling 152 (WTW 152) - Credits: 8.00
- Dynamical processes 162 (WTW 162) - Credits: 8.00
- Animal diversity 161 (ZEN 161) - Credits: 8.00
- Imperative programming 132 (COS 132) - Credits: 16.00
- Geoinformatics 120 (GIS 120) - Credits: 12.00
- Introduction to environmental sciences 101 (ENV 101) - Credits: 8.00
- Introduction to geology 155 (GLY 155) - Credits: 16.00



[Atmospheric structure and processes 155](#) (WKD 155) - Credits: 16.00  
[Informatics 171](#) (INF 171) - Credits: 20.00



## Curriculum: Year 2

**Minimum credits: 144**

### Core modules

General physics 263 (PHY 263) - Credits: 24.00

Linear algebra 211 (WTW 211) - Credits: 12.00

Calculus 218 (WTW 218) - Credits: 12.00

Analysis 220 (WTW 220) - Credits: 12.00

Waves, thermodynamics and modern physics 255 (PHY 255) - Credits: 24.00

Vector analysis 248 (WTW 248) - Credits: 12.00

### Elective modules

Introduction to proteins and enzymes 251 (BCM 251) - Credits: 12.00

Carbohydrate metabolism 252 (BCM 252) - Credits: 12.00

Lipid and nitrogen metabolism 261 (BCM 261) - Credits: 12.00

Biochemical principles of nutrition and toxicology 262 (BCM 262) - Credits: 12.00

Physical chemistry 282 (CMY 282) - Credits: 12.00

Analytical chemistry 283 (CMY 283) - Credits: 12.00

Organic chemistry 284 (CMY 284) - Credits: 12.00

Inorganic chemistry 285 (CMY 285) - Credits: 12.00

Process geomorphology 252 (GGY 252) - Credits: 12.00

Geomorphology of the built environment 265 (GGY 265) - Credits: 12.00

Geographic data analysis 220 (GIS 220) - Credits: 12.00

Geographic information systems introduction 221 (GIS 221) - Credits: 12.00

Sedimentology 253 (GLY 253) - Credits: 12.00

Structural geology 254 (GLY 254) - Credits: 12.00

Igneous petrology 261 (GLY 261) - Credits: 12.00

Metamorphic petrology 262 (GLY 262) - Credits: 12.00

Groundwater 265 (GLY 265) - Credits: 12.00

Remote sensing 220 (GMA 220) - Credits: 16.00

Surveying 210 (SUR 210) - Credits: 16.00

Surveying 220 (SUR 220) - Credits: 16.00

Site surveying 213 (TRN 213) - Credits: 12.00

Physical meteorology 261 (WKD 261) - Credits: 12.00

Linear algebra 221 (WTW 221) - Credits: 12.00

Differential equations 256 (WTW 256) - Credits: 8.00

Calculus 258 (WTW 258) - Credits: 8.00

Numerical methods 263 (WTW 263) - Credits: 8.00

Discrete structures 285 (WTW 285) - Credits: 12.00

Differential equations 286 (WTW 286) - Credits: 12.00

Invertebrate biology 251 (ZEN 251) - Credits: 12.00

African vertebrates 261 (ZEN 261) - Credits: 12.00

City structure, environment and society 266 (GGY 266) - Credits: 24.00



## Curriculum: Final year

**Minimum credits: 144**

### Core modules

Statistical mechanics, solid state physics and modelling 364 (PHY 364) - Credits: 36.00

Electronics, electromagnetism and quantum mechanics 356 (PHY 356) - Credits: 36.00

### 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

Inorganic chemistry 385 (CMY 385) - Credits: 18.00

Environmental geomorphology 361 (GGY 361) - Credits: 18.00

Applied geomorphology 363 (GGY 363) - Credits: 12.00

Geographic information systems 310 (GIS 310) - Credits: 24.00

Spatial analysis 320 (GIS 320) - Credits: 24.00

Ore deposits 361 (GLY 361) - Credits: 18.00

Geostatistics and ore reserve calculations 362 (GLY 362) - Credits: 18.00

Engineering geology 363 (GLY 363) - Credits: 18.00

Remote sensing 320 (GMA 320) - Credits: 24.00

Geometrical and space geodesy 310 (GMC 310) - Credits: 24.00

Physics project 353 (PHY 353) - Credits: 12.00

Physics project 363 (PHY 363) - Credits: 12.00

Soil mechanics 311 (SGM 311) - Credits: 16.00

Atmospheric vorticity and divergence 352 (WKD 352) - Credits: 18.00

Quasi-geostrophic analysis 361 (WKD 361) - Credits: 18.00

Analysis 310 (WTW 310) - Credits: 18.00

Complex analysis 320 (WTW 320) - Credits: 18.00

Financial engineering 354 (WTW 354) - Credits: 18.00

Financial engineering 364 (WTW 364) - Credits: 18.00

Algebra 381 (WTW 381) - Credits: 18.00

Dynamical systems 382 (WTW 382) - Credits: 18.00

Numerical analysis 383 (WTW 383) - Credits: 18.00

Partial differential equations 386 (WTW 386) - Credits: 18.00

Continuum mechanics 387 (WTW 387) - Credits: 18.00

Geometry 389 (WTW 389) - Credits: 18.00

Population ecology 351 (ZEN 351) - Credits: 18.00

Mammalogy 352 (ZEN 352) - Credits: 18.00

Community ecology 353 (ZEN 353) - Credits: 18.00

Evolutionary physiology 354 (ZEN 354) - Credits: 18.00

Insect diversity 355 (ZEN 355) - Credits: 18.00

Physiological processes 361 (ZEN 361) - Credits: 18.00

Evolution and phylogeny 362 (ZEN 362) - Credits: 18.00

Behavioural ecology 363 (ZEN 363) - Credits: 18.00

Conservation ecology 364 (ZEN 364) - Credits: 18.00

Applied entomology 365 (ZEN 365) - Credits: 18.00



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[Sustainable development 356](#) (GGY 356) - Credits: 18.00  
[Development frameworks 366](#) (GGY 366) - Credits: 18.00  
[Rock mechanics 364](#) (GLY 364) - Credits: 18.00  
[Human environmental interactions 301](#) (ENV 301) - Credits: 18.00  
[Fundamentals of weather forecasting 366](#) (WKD 366) - Credits: 36.00  
[Macromolecules of life: Structure-function and Bioinformatics 356](#) (BCM 356) - Credits: 18.00  
[Biocatalysis and integration of metabolism 357](#) (BCM 357) - Credits: 18.00  
[Cell structure and function 367](#) (BCM 367) - Credits: 18.00  
[Molecular basis of disease 368](#) (BCM 368) - Credits: 18.00  
[Observational astronomy 300](#) (PHY 300) - Credits: 36.00  
[Particle and astroparticle physics 310](#) (PHY 310) - Credits: 18.00

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The information published here is subject to change and may be amended after the publication of this information. The [General Regulations \(G Regulations\)](#) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the [General Rules](#) section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.