



# University of Pretoria Yearbook 2023

## Bachelor of Information Science (Multimedia) [BIS] (12131013)

**Department** Information Science

**Minimum duration of study** 3 years

**Total credits** 401

**NQF level** 07

### Programme information

Modern information technology offers the possibility of information products being designed and created from various types of media over and above the traditional text medium. Information technology therefore results in the convergence of various previously separate traditional media. The Multimedia qualification in the Department of Information Science addresses this development. Multimedia documents include text, graphics, sound, video and animation. Any type of institution in all economic spheres, including government, may profit from a multimedia approach to information design, organisation and retrieval.

The purpose of this qualification is to enable students to understand the necessary concepts to build and maintain multimedia products. This programme is therefore a combination of theory and practice and addresses the latest technological trends including current web development frameworks, game design, and interaction design.

### Admission requirements

#### Important information for all prospective students for 2023

The admission requirements below apply to all who apply for admission to the University of Pretoria with a **National Senior Certificate (NSC) and Independent Examination Board (IEB) qualifications**. [Click here for this Faculty Brochure](#).

#### Minimum requirements

##### Achievement level

##### English Home Language or English First Additional Language

##### Mathematics

##### APS

NSC/IEB

NSC/IEB

4

5

30

The suggested second-choice programmes for BIS (Multimedia) are BIS (Information Science), BIS (Publishing), BSc (Information and Knowledge Systems) and BCom (Informatics).

Life Orientation is excluded when calculating the APS.

You will be considered for final admission to degree studies if space allows, and if you have a National Senior Certificate (NSC) or equivalent qualification with admission to bachelor's degree studies, and comply with the minimum subject requirements as well as the APS requirements of your chosen programme.

**Applicants with qualifications other than the abovementioned** should refer to the Brochure: Undergraduate Programme Information 2023: Qualifications other than the NSC and IEB, available at [click here](#).

International students: [Click here](#).

### **Transferring students**

A transferring student is a student who, at the time of applying at the University of Pretoria (UP) is/was a registered student at another tertiary institution. A transferring student will be considered for admission based on NSC or equivalent qualification and previous academic performance. Students who have been dismissed from other institutions due to poor academic performance will not be considered for admission to UP.

**Closing dates:** Same as above.

### **Returning students**

A returning student is a student who, at the time of application for a degree programme is/was a registered student at UP, and wants to transfer to another degree at UP. A returning student will be considered for admission based on NSC or equivalent qualification and previous academic performance.

#### **Note:**

- Students who have been excluded/dismissed from a faculty due to poor academic performance may be considered for admission to another programme at UP, as per faculty-specific requirements.
- Only ONE transfer between UP faculties and TWO transfers within a faculty will be allowed.
- Admission of returning students will always depend on the faculty concerned and the availability of space in the programmes for which they apply.

### **Closing date for applications from returning students**

Unless capacity allows for an extension of the closing date, applications from returning students must be submitted before the end of August via your UP Student Centre.

## **Other programme-specific information**

Apart from the option to continue with BIS Multimedia (Honours), students may choose to apply for BScHons (Computer Science) if they have adhered to the admission requirements for that degree.

#### **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).

## **Promotion to next study year**

### **Refer also to General Academic Regulation G4.**

- 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 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.
- c. 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.
  - d. Students who fail a module for a second time, forfeit the privilege of registering for any modules of an advanced year of study.
  - e. Students whose academic progress is not acceptable can be suspended from further studies. Refer to the following important regulation: G4 and/or regulations as they appear for the applicable programmes.
  - f. A student who is excluded from further studies in terms of the stipulations of the above-mentioned regulations will be notified in writing by the Dean or admissions committee at the end of the relevant semester.
  - g. A student who has been excluded from further studies may apply in writing to the admissions committee of the School of Information Technology for readmission on or before 12 January.
  - h. 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.
  - i. Should the student not be readmitted to further studies by the admissions committee, he/she will be informed in writing.
  - j. Students who are not readmitted by the admissions committee have the right to appeal to the Senate Committee for Admission, Evaluation and Academic Support.
  - k. Any decision taken by the Senate Committee for Admission, Evaluation and Academic Support is final.

## 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% (not rounded) 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 relevant head of department.

## General information

### **University of Pretoria Programme Qualification Mix (PQM) verification project**

*The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.*



## Curriculum: Year 1

Minimum credits: 132

### Fundamental modules

#### Academic information management 111 (AIM 111)

**Module credits** 4.00

**NQF Level** 05

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Economic and Management Sciences  
Faculty of Humanities  
Faculty of Law  
Faculty of Health Sciences  
Faculty of Natural and Agricultural Sciences  
Faculty of Theology and Religion

**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

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology.

#### Academic information management 121 (AIM 121)

**Module credits** 4.00

**NQF Level** 05

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Economic and Management Sciences  
Faculty of Humanities  
Faculty of Law  
Faculty of Health Sciences  
Faculty of Natural and Agricultural Sciences  
Faculty of Theology and Religion  
Faculty of Veterinary Science

**Prerequisites** No prerequisites.

**Contact time** 2 lectures per week

**Language of tuition** Module is presented in 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 for Information Technology 121 (ALL 121)

**Module credits** 6.00

**NQF Level** 05

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
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 orientation 112 (UPO 112)

**Module credits** 0.00

**NQF Level** 00

**Language of tuition** Module is presented in English

**Department** EBIT Deans Office

**Period of presentation** Year

## Core modules

### Program design: Introduction 110 (COS 110)

**Module credits** 16.00

**NQF Level** 05

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Economic and Management Sciences  
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** Module is presented in 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)

**Module credits** 16.00

**NQF Level** 05

**Prerequisites** COS 132

**Contact time** 1 practical per week, 1 tutorial per week, 3 lectures per week

**Language of tuition** Module is presented in 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)

**Module credits** 16.00

**NQF Level** 05

**Service modules** Faculty of Economic and Management Sciences  
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** Module is presented in 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)

**Module credits** 8.00

**NQF Level** 05

**Service modules** Faculty of Education  
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** Module is presented in English

**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.

## Multimedia 110 (IMY 110)

**Module credits** 12.00

**NQF Level** 05

**Prerequisites** No prerequisites.

**Contact time** 1 practical per week, 2 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. 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. It explores the difference between the logical structure and the appearance of documents through the study of HTML and CSS. The focus is on creating static websites and learning the basic principles of information architecture and visual hierarchy.

## Multimedia 120 (IMY 120)

**Module credits** 12.00

**NQF Level** 05

**Prerequisites** No prerequisite.

**Contact time** 1 practical per week, 2 lectures 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 authoring tools. This module introduces the process of creating and editing images, animation, basic interactive content, and sound using multimedia authoring tools such as Adobe Photoshop, Adobe Illustrator, Adobe Animate and Adobe Audition.

## Information science 110 (INL 110)

**Module credits** 12.00

**NQF Level** 05

**Service modules** Faculty of Humanities

**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

Introduction to Information Science. 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, the 4th Industrial Revolution and other revolutions to come are addressed as well as core principles such as equity, diversity and inclusion.





## Information science 120 (INL 120)

<b>Module credits</b>	12.00
<b>NQF Level</b>	05
<b>Service modules</b>	Faculty of Humanities
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 practical per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Information Science
<b>Period of presentation</b>	Semester 2

### Module content

Organisation and representation of information. This module offers a brief overview of the basic principles and processes underlying the organisation, representation, and structuring of information. The process of organising information on the web (such as social networking sites), in multimedia formats, by means of document image processing and in databases is 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 for the web, as well as the various retrieval and management tools available for metadata. Practical classes include basic HTML and the design of web pages incorporating and applying what was covered in theory.

## Visual design (1) 102 (VIO 102)

<b>Module credits</b>	16.00
<b>NQF Level</b>	05
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	5 for Mathematics or WTW 114 or WTW 133 and 143
<b>Contact time</b>	1 lecture per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	School of the Arts
<b>Period of presentation</b>	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.



## Curriculum: Year 2

Minimum credits: 148

### Fundamental modules

#### Community-based project 202 (JCP 202)

<b>Module credits</b>	8.00
<b>NQF Level</b>	06
<b>Service modules</b>	Faculty of Economic and Management Sciences
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 other contact session per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Informatics
<b>Period of presentation</b>	Year

#### Module content

The Joint Community Project module is a credit-bearing educational experience where students are not only actively engaging in interpersonal skills development but also participate in service activities in collaboration with community partners. Students are given the opportunity to practice and develop their interpersonal skills formally taught in the module by engaging in teamwork with fellow students from different disciplines and also with non-technical members of the community. The module intends for the student to develop through reflection, understanding of their own experience in a team-based workspace as well as a broader understanding of the application of their discipline knowledge and its potential impact in their communities, in this way also enhancing their sense of civic responsibility. Compulsory class attendance 1 week before Semester 1 classes commence.

### Core modules

#### Data structures and algorithms 212 (COS 212)

<b>Module credits</b>	16.00
<b>NQF Level</b>	06
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	COS 110
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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)

<b>Module credits</b>	16.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	COS 212
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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 conceptualise and analyse problems and abstract a solution.

## Netcentric computer systems 216 (COS 216)

<b>Module credits</b>	16.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	COS 110
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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.

## Concurrent systems 226 (COS 226)

**Module credits** 16.00

**NQF Level** 06

**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)

**Module credits** 16.00

**NQF Level** 06

**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.

## Multimedia 210 (IMY 210)

**Module credits** 12.00

**NQF Level** 06

**Prerequisites** IMY 110 or equivalent HTML knowledge

**Contact time** 1 practical per week, 2 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.

Advanced Web technologies 1: This module investigates web technologies and their application in creating multimedia applications.

## Multimedia 211 (IMY 211)

**Module credits** 12.00

**NQF Level** 06

**Prerequisites** Departmental selection

**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.

Multimedia theory. This module offers the opportunity to study a range of topic areas related to the broad application of multimedia in various real-world contexts. The purpose is to familiarise multimedia students with current topics and trends such as adaptive hypermedia, prototyping, cloud computing and data science, and thus provide them with working knowledge in such fields as they might encounter or make use of in their future careers.

### Multimedia 220 (IMY 220)

**Module credits** 12.00

**NQF Level** 06

**Prerequisites** IMY 210 and COS 216

**Contact time** 1 practical per week, 2 lectures 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 Web technologies 2: This module investigates web technologies and their application in creating multimedia applications. It focuses on teaching practical web development skills.

### Visual design (2) 202 (VIO 202)

**Module credits** 24.00

**NQF Level** 06

**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** Module is presented in English

**Department** School of the 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.



## Curriculum: Final year

### Minimum credits: 121

Students must complete 2 elective modules from the list provided. The total number of credits for elective modules must be 45.

### Core modules

#### Multimedia: Project 300 (IMY 300)

<b>Module credits</b>	35.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 212
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Information Science
<b>Period of presentation</b>	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 digital game. The module involves extensive teaching of game design theory. The students are required to create a game by following an iterative design process, writing extensive documentation and conducting in-depth play testing. The final product is a creative, innovative and complete game.

#### Multimedia 310 (IMY 310)

<b>Module credits</b>	25.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Information Science
<b>Period of presentation</b>	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)

<b>Module credits</b>	25.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 practical per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Information Science
<b>Period of presentation</b>	Semester 2

### Module content

\*Closed - requires departmental selection.

Trends. This module covers a wide array of themes that relate to how multimedia and technology in general, is applied in the world today. It aims to critically assess the latest design and development trends, and evaluate the benefits and pitfalls associated with these new advances. It is also concerned with the creation of user centric applications through the implementation of the fundamental design laws of user experience design. The practical component of the module covers video editing tools and the basic skills required to create attractive videos.

## Elective modules

### Software engineering 301 (COS 301)

<b>Module credits</b>	27.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 212 and COS 214
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 110
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 221
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	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)

**Module credits** 18.00

**NQF Level** 07

**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)

**Module credits** 18.00

**NQF Level** 07

**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)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 110
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	COS 210 and COS 212
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Computer Science
<b>Period of presentation</b>	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)

**Module credits** 18.00

**NQF Level** 07

**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.

## Regulations and rules

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

The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these



regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations.

**University of Pretoria Programme Qualification Mix (PQM) verification project**

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.