# BIS Multimedia (12131013)

| Department | Information Science |
|---|---|
| **Minimum duration of study** | 3 years |
| **Total credits** | 469 |
| **NQF level** | 07 |

## 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 closing date is an administrative admission guideline for non-selection programmes. Once a non-selection programme is fulland has reached the institutional targets, then that programme will be closed for further admissions, irrespective of the closing date. However, if the institutional targets have not been met by the closing date, then that programme will remain open for admissions until the institutional targets are met.
- The following persons will be considered for admission: Candidates who are in possession of a certificate that is deemed by the University to be equivalent to the required National Senior Certificate (NSC) with university endorsement; candidates who are graduates from another tertiary institution or have been granted the status of a graduate of such an institution, and candidates who are graduates of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used for 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.
- All lectures at the University of Pretoria are presented in English only.

**Transferring students**

**Candidates previously registered for the BSc – Extended programme**

The Admissions Committee of the faculty considers applications of candidates who were previously registered for the BSc – Extended programme, on grounds of their NSC results as well as academic merit. Such students will only be considered for the four-year programme if they have passed all the prescribed modules and obtained a minimum of 65% in the Mathematics, Physics and Chemistry modules, respectively.

### Candidates previously registered at UP or at another university

The faculty's Admissions Committee considers applications of candidates who have already completed the final NSC examination and/or were previously registered at UP or at another university, on grounds of their NSC results as well as academic merit. Candidates who were dismissed from other faculties or universities will not be considered.

### Candidates previously registered at a teacher's college or university of technology

The faculty's Admissions Committee considers the application of these candidates on the grounds of their NSC results as well as academic merit.

### Qualifications from countries other than South Africa

- Citizens from countries other than South Africa and South African citizens with foreign qualifications must comply with all the other admission requirements and the prerequisites for subjects/modules.
- In addition to meeting the admission requirements, it may be expected from candidates to write the **TOEFL, IELTS or SAT,** if required.
- Candidates must have completed the National Senior Certificate with admission to degree studies or a certificate of conditional exemption on the basis of a candidate's foreign qualifications, the so-called "Immigrant" or "Foreign Conditional Exemption". The only condition for the "Foreign Conditional Exemption" that is accepted is: 'completion of the degree course'. The exemption certificate is obtainable from Universities South Africa (USAf). Detailed information is available on the website at click here.

**University of Pretoria website:** click here

| Minimum requirements Achievement level | | | | |
|---|---|---|---|---|
| English Home Language or English First Additional Language | | Mathematics | | APS |
| NSC/IEB | AS Level | NSC/IEB | AS Level | |
| 4 | D | 5 | C | **30** |

\* 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.

# 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 relevant head of department.

# Curriculum: Year 1

**Minimum credits: 144**

## 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<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** | 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<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** | 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<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 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<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** | 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<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 | 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<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** | 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** | 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)

| | |
|---|---|
| **Module credits** | 12.00 |
| **NQF Level** | 05 |
| **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.

## 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

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)

| | |
|---|---|
| **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 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 140 (INL 140)

| 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 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.

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

| Module credits | 16.00 |
|---|---|
| NQF Level | 05 |
| 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** | Module is presented in English |
| **Department** | School of the 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.

# Curriculum: Year 2

**Minimum credits: 184**

## Fundamental modules

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

| | |
|---|---|
| **Module credits** | 8.00 |
| **NQF Level** | 07 |
| **Service modules** | Faculty of Economic and Management Sciences |
| **Prerequisites** | No prerequisites. |
| **Contact time** | 1 other contact session per week |
| **Language of tuition** | Module is presented in 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 a socio-economically underprivileged community located in socio-economically deprived areas our society; awareness of personal, social and cultural values and an understanding of social issues; and development of life skills.

## Core modules

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

| | |
|---|---|
| **Module credits** | 16.00 |
| **NQF Level** | 06 |
| **Service modules** | Faculty of Natural and Agricultural Sciences |
| **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.

## 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** | 16.00 |
| **NQF Level** | 06 |
| **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)

| | |
|---|---|
| **Module credits** | 20.00 |
| **NQF Level** | 06 |
| **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)

| | |
|---|---|
| **Module credits** | 16.00 |
| **NQF Level** | 06 |
| **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.

## Publishing 210 (PUB 210)

| | |
|---|---|
| **Module credits** | 20.00 |
| **NQF Level** | 06 |
| **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.
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.

# 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: 141**

## Core modules

### Multimedia: Project 300 (IMY 300)

| | |
|---|---|
| **Module credits** | 45.00 |
| **NQF Level** | 07 |
| **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)

| | |
|---|---|
| **Module credits** | 30.00 |
| **NQF Level** | 07 |
| **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)

| | |
|---|---|
| **Module credits** | 30.00 |
| **NQF Level** | 07 |

| | |
|---|---|
| **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.

# Elective modules

## Software engineering 301 (COS 301)

| | |
|---|---|
| **Module credits** | 27.00 |
| **NQF Level** | 07 |
| **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)

| | |
|---|---|
| **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 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)

| | |
|---|---|
| **Module credits** | 18.00 |
| **NQF Level** | 07 |
| **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)

| | |
|---|---|
| **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)

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| **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**
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)

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| **Module credits** | 18.00 |
| **NQF Level** | 07 |
| **Prerequisites** | COS 210 and COS 212 |
| **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 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)

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| **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.