UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
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Faculty of **Engineering**

Dean:
Prof JH Knoetze
BEng, PhD (Eng) (Stell), FSAAE

CALENDAR 2014
PART 11

Various Parts of the Calendar

For convenience, the Calendar has been divided into the following parts:	
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General	1
Bursaries and Loans	2
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Afrikaans (Parts 1–12) or English copies of the individual parts are available from the Registrar on request.

PLEASE NOTE

- The fact that this Calendar (Part 11 of the set) is available in both English and Afrikaans does not necessarily mean that undergraduate teaching at the University is presented through the medium of English.
- Students should keep themselves informed regarding the University's rules and regulations. The complete provisions relating to examinations and promotions as well as rules for students of the University appear in Part 1 (General) of the Calendar. The rules of the Faculty of Engineering appear in Chapter 8 of this part of the Calendar.
- For all semester modules, the first examination is written at the end of the relevant semester. For all year modules, the first examination is written at the end of the relevant year.
- Before students finally select the modules they want to register for, they should inform themselves of the conditions in Section 8.4.

AMENDMENTS, ACCOUNTABILITY AND ACCURACY

The University reserves the right to make amendments to the Calendar at any time.

The Council and the Senate of the University accept no liability for inaccuracies in the content of the Calendar, if any. Every reasonable care has, however, been taken to ensure that the relevant information at hand, as at the time of going to press, is represented in the Calendar accurately and in full.

In the event of any dispute, the Afrikaans version of this part of the Calendar will be deemed to be the official version.

Communication with the University

In dealing with new formal applications for admission, the University assigns each applicant a number. This number *uniquely identifies* each individual and facilitates future communication.

We call this number *your student number*. The allocation of a student number does not, however, imply that the applicant has been finally accepted for the proposed programme of study. A separate letter is sent out for this purpose.

Once you have been allocated a student number, *you will be required to quote it in all future correspondence with the University.*

Correspondence regarding *academic matters*, i.e. study programmes, bursaries and loans, etc. (as well as residence allocation), should be directed to:

The Registrar
Stellenbosch University
Private Bag X1
7602 MATIELAND

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The Executive Director: Operations and Finance
Stellenbosch University
Private Bag X1
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Awards

Chancellor's Medal

1965	JH Gouws	BSc BEng	Electrical and Electronic
1977	JB Neethling	BEngHons	Civil
1986	AF Conradie	MEng BEng	Mechanical and Mechatronic, Industrial
1987	WD Rencken	BEng	Electrical and Electronic
1988	P Meyer	MEng	Electrical and Electronic
1992	TJ van der Walt	PhD	Process/Chemical
2001	CAW Vale	PhD	Electrical and Electronic
2003	M Schoeman	MScEng/BEng	Electrical and Electronic
2006	C Barnardo	PhD	Civil
2007	DIL de Villiers	PhD	Electrical and Electronic
2010	L Auret	PhD	Process/Chemical

Dean's Award for Outstanding Achievement

1996	DW Moolman	PhD	Process/Chemical
2004	M du Rand	PhD	Process/Chemical

ECSA Merit Medal
(Best BEng Student)

1982	PJ de Bruyn	Mechanical and Mechatronic, Industrial
1984	AF Conradie	Mechanical and Mechatronic
1985	GJJ van Zyl	Electrical and Electronic
1986	P Meyer	Electrical and Electronic
1987	WD Rencken	Electrical and Electronic
1988	K van der Westhuizen	Mechanical and Mechatronic
1989	IP Theron	Electrical and Electronic
1990	R de Villiers	Electrical and Electronic
1991	TR Niesler	Electrical and Electronic
1992	JC van Rooyen	Electrical and Electronic
1993	A van Zyl	Electrical and Electronic
1994	SWJ Esterhuyse	Mechanical and Mechatronic
1995	LC Schwardt	Electrical and Electronic
1996	P Poolman	Civil
1997	MO Vermeulen	Mechanical and Mechatronic
1998	CAW Vale	Electrical and Electronic
1999	PleR Herselman	Electrical and Electronic
2000	T Stehmann	Electrical and Electronic

2001	C Barnardo	Civil
2002	T Sickel	Electrical and Electronic
2003	P Joubert	Electrical and Electronic
2004	DIL de Villiers	Electrical and Electronic
2005	C Dorfling	Process/Chemical
2006	G Hardie	Electrical and Electronic
2007	L Loots	Electrical and Electronic
2008	R le Roux, P van der Spuy	Civil
2009	H Kamper	Electrical and Electronic
2010	MH Volkmann	Electrical and Electronic
2011	HJ Gadinger	Electrical and Electronic
2012	W Burger	Process/Chemical

Rector's Award for Excellence in Research

1999	JHR Enslin	Electrical and Electronic
1999	DG Kröger	Mechanical and Mechatronic
2000	C Aldrich	Process/Chemical
2000	A Rooseboom	Civil
2001	WJ Perold	Electrical and Electronic
2002	L Lorenzen	Process/Chemical
2003	B Herbst	Applied Mathematics
2004	JP du Plessis	Applied Mathematics
2005	JAC Weideman	Applied Mathematics
2005	DB Davidson	Electrical and Electronic
2006	C Aldrich	Process/Chemical
2008	P Meyer	Electrical and Electronic
2009	K Jenkins	Civil

Rector's Award for Excellence in Teaching

1994	JB Uys	Applied Mathematics
1995	WM Malan	Civil
1996	JH Cloete	Electrical and Electronic
1997	SM Bradshaw	Process/Chemical
1998	JH Knoetze	Process/Chemical
1999	J van Vuuren	Applied Mathematics
2000	I Nieuwoudt	Process/Chemical
2001	H du T Mouton	Electrical and Electronic
2002	JAC Weideman	Applied Mathematics
2003	H Reader	Electrical and Electronic
2004	P Crous	Applied Mathematics

2005	WJ Perold	Electrical and Electronic
2006	J de Swardt	Electrical and Electronic
2007	KG Clarke	Process/Chemical
2008	JH Knoetze	Process/Chemical
2009	R Geschke	Electrical and Electronic

Rector's Award for Excellence in Service

2000	RH Davidse	Civil
2000	RA Dreyer	Electrical and Electronic
2000	I McIvor	Civil
2000	WH van Rooyen	CES
2001	J Olin	Process/Chemical
2001	C Zietsman	Mechanical and Mechatronic
2001	S Locke	Electrical and Electronic
2002	P Basson	Electrical and Electronic
2002	W Samuels	General Engineering
2002	J Blom	Central Mechanical Services
2003	M Booysen	Electrical and Electronic
2003	R Sedeman	Civil
2003	A van der Spuy	Electrical and Electronic
2003	M van de Vinne	Central Mechanical Services
2004	JM Barnard	Process/Chemical
2004	F Kamper	Process/Chemical
2005	VS D'Aguanno	General Engineering
2005	I du Toit	Mechanical and Mechatronic
2006	N Combrinck	Civil
2006	M Myburgh	Electrical and Electronic
2007	I McIvor	Civil
2007	A Uys	Industrial
2007	C September	Mechanical and Mechatronic
2008	AHG September	Mechanical and Mechatronic
2008	EL Thyse	Process/Chemical
2008	L Martin	Electrical and Electronic
2009	J Steyl	Process/Chemical
2009	SS van der Spuy	Mechanical and Mechatronic
2009	K Martin	Civil
2009	PH Petzer	Electrical and Electronic

Rector's Award for Excellence in Community Interaction

2007	AN Engelbrecht	General Engineering
2008	D Cromhout	TRAC
2009	AJ Burger	Process/Chemical

Engineering – Lecturer of the Year

1992	JB Uys	Applied Mathematics
1993	J Rossouw	Civil
1994	G Geldenhuys	Applied Mathematics
1995	A Rooseboom	Civil
1996	JJ du Plessis	Electrical and Electronic
1996	DG Kröger	Mechanical and Mechatronic
1997	AH Basson	Mechanical and Mechatronic
1998	E Terblanche	Mechanical and Mechatronic
1999	L Lorenzen	Process/Chemical
2000	JB de Swardt	Electrical and Electronic
2001	A Schoonwinkel	Electrical and Electronic
2002	PJ Bakkes	Electrical and Electronic
2003	JL van Niekerk	Mechanical and Mechatronic
2004	PE Dunaiski	Civil
2004	JH Knoetze	Process/Chemical
2005	TW von Backström	Mechanical and Mechatronic
2006	J Bekker	Industrial
2007	WJ Perold	Electrical and Electronic
2008	MJ Kamper	Electrical and Electronic
2009	CJ Bester	Civil
2011	KD Palmer	Electrical and Electronic
2012	MM Blanckenberg	Electrical and Electronic
2012	GPAG van Zijl	Civil

Engineering – Researcher of the Year

1987	DG Kröger	Mechanical and Mechatronic
1988	JH Cloete	Electrical and Electronic
1989	HJ Viljoen	Process/Chemical
1990	JSJ van Deventer	Process/Chemical
1991	JP du Plessis	Applied Mathematics
1992	TW von Backström	Mechanical and Mechatronic
1993	JR Enslin	Electrical and Electronic
1994	A Rooseboom	Civil

1995	C Aldrich	Process/Chemical
1995	DB Davidson	Electrical and Electronic
1996	L Lorenzen	Process/Chemical
1997	WJ Perold	Electrical and Electronic
1998	DG Kröger	Mechanical and Mechatronic

Engineering – Upcoming Researcher of the Year

1999	I Nieuwoudt	Process/Chemical
1999	P Meyer	Electrical and Electronic
2000	MJ Kamper	Electrical and Electronic
2001	C van Niekerk	Electrical and Electronic
2002	JA van Vuuren	Applied Mathematics
2003	JJ Eksteen	Process/Chemical
2004	CJ Fourie	Electrical and Electronic
2005	C Scheffer	Mechanical and Mechatronic
2006	JF Görgens	Process/Chemical
2006	GPAG van Zijl	Civil
2007	M Botha	Electrical and Electronic
2008	M Kamper	Electrical and Electronic
2009	Y Kim	Mechanical and Mechatronic
2011	C Schwarz	Process/Chemical
2012	D de Villiers	Electrical and Electronic

Honorary Members of the Faculty

1998	SA Grobbelaar
1998	HB van der Walt
1998	AJO van der Westhuizen
1999	AC Britten
1999	MP Cilliers
1999	A Dippenaar
2001	WJ Barnard
2001	G Pretorius
2001	J Rall
2001	I Smit
2001	C van der Merwe
2001	D Wright
2004	R de Villiers
2004	J Gosling
2004	R Reinecke
2004	PW van der Walt
2004	HC Viljoen

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1. Introduction

1.1 THE FACULTY

Established in 1944, the Faculty of Engineering was the first Afrikaans engineering faculty in South Africa, and it produced its first graduates in 1945.

The three original Engineering Departments of Civil, Mechanical and Electrotechnical Engineering and the Department of Applied Mathematics were later augmented by the Departments of Chemical and Metallurgical Engineering and Industrial Engineering. In 1994, the Departments of Chemical and Metallurgical Engineering were amalgamated into one department, the Department of Chemical Engineering. Presently there are five departments in the Faculty, namely Civil Engineering, Electrical and Electronic Engineering, Industrial Engineering, Mechanical and Mechatronic Engineering, and Process Engineering.

The Faculty grew steadily and a new building complex became necessary. The current building complex was completed in the seventies and has been expanded from time to time since then, for example with the addition of the Knowledge Centre in 2012. The current building complex is spacious and well equipped. It meets all the needs regarding training, education, postgraduate study and research in a great variety of specialised engineering fields.

1.2 THE ENGINEERING PROFESSION

1.2.1 *The Role of the Professional Engineer*

Professional engineers play an indispensable and creative role in society. They are responsible for the sensible application of scientific and technical knowledge to utilise materials and forces of nature in an economical manner to the advantage of humanity. They also take care of the protection and improvement of the environment by planning, designing and building the necessary facilities and equipment for an advanced society. As such, they are the senior partners in the engineering human-resources team consisting of the artisan or craftsman (trained by means of an apprenticeship), technician or technologist (trained at a technikon or university of technology) and professional engineer (trained at a university).

1.2.2 *The Definition of an Engineer*

The Engineering Council of the United Kingdom has accepted the following definition of the concept “engineer”:

An engineer is one who has and uses scientific, technical and pertinent knowledge, understanding and skills to create, enhance, operate or maintain safe, efficient systems, structures, machines, plants, processes or devices of practical and economic value.

Engineering is a profession directed towards the skilled application of a distinctive body of knowledge based on mathematics, science and technology, integrated with business and management, which is acquired through education and professional formation in a particular engineering discipline. Engineering is directed at developing and providing infrastructure, goods and services for industry and the community.

Professional engineers are concerned primarily with the progress of technology through innovation, creativity and change. They develop and apply new technologies, promote advanced designs and design methods, introduce new and more efficient production techniques and marketing and construction concepts, and pioneer new engineering services and management methods. They may be involved with the management and direction of high-risk and resource intensive projects. Professional judgement is a key feature of their role, allied to the assumption of responsibility for the direction of important tasks, including the profitable management of industrial and commercial enterprises.

The purpose of the BEng degree is to equip students with the knowledge they need to be able to practise as professional engineers.

1.2.3 *Ethics*

Engineers are subject to a professional code of conduct. The Engineering Council of South Africa (ECSA) is vested with statutory powers in South Africa to lay down standards for education, and to register qualified persons as professional engineers. Registration as a professional engineer (PrEng) certifies that a person is authorised to practise as an engineer. ECSA also has the authority to take disciplinary action against engineers who are guilty of misconduct.

The code of conduct for engineers is in short:

Professional engineers undertake to:

- accept the responsibility to make engineering decisions that take into account the safety, health and welfare of the public, and to make public without delay any information regarding factors endangering the public or the environment;
- avoid conflicts of interest where possible, and to declare their interest where conflict may arise;
- be honest and realistic in claims or projections based on available information;
- reject all forms of bribery;
- promote knowledge and understanding of technology, and the correct application, and potential consequences thereof;
- maintain and improve their technical competence, and to only undertake technological tasks if they are qualified for it through training or experience and also only after full disclosure of any deficiencies;
- gather, accept and provide honest criticism on technical work, to acknowledge and improve mistakes, and to give recognition to contributions made by others;
- treat all people justly irrespective of race, religion, sex, handicap, age or national origin;
- avoid damage to others, their property, reputation or profession by false or malicious actions;
- assist colleagues and co-workers in their professional development, and help them to bide by the code of conduct for professional engineers.

1.2.4 *Further Information*

More information regarding the engineering profession is available on the website of the Engineering Council of South Africa (ECSA) at http://www.ecsa.co.za.

1.3 REGISTRATION AS A PROFESSIONAL ENGINEER

There are two requirements for registering as a professional engineer. Firstly, a university degree in engineering, as stipulated by the Engineering Profession Act, 2000 (Act No. 46 of 2000) is required to be able to register as a professional engineer with the additional title of PrEng. The South African Engineering Council (ECSA) recognises a BEng degree from Stellenbosch University for registration. Since ECSA is a signatory of the Washington Accord, our degree is also internationally recognised by the signatories to the Accord.

The second requirement is a period of in-service training of acceptable standard and duration according to ECSA. Normally the Council requires a minimum period of three years of in-service training.

1.4 THE MAIN FIELDS OF STUDY IN ENGINEERING

The following short descriptions should interest prospective engineering students:

1.4.1 *Chemical Engineering (Department of Process Engineering)*

One of the distillation columns in the Department that facilitates cutting-edge research in separation technology in the chemical industry.

Chemical engineering concerns large-scale processes through which the characteristics of materials are altered. Such processes vary from simple physical separations by means of distillation, evaporation, drying or filtration to complex chemical synthesis.

The practice of chemical engineering comprises the development, design, construction and operation of such processes on an economical basis. It requires sound knowledge of the fundamental sciences of mathematics, physics and chemistry as well as thermodynamics, transfer phenomena, reactor design, separation processes, control systems and the design of chemical plants.

In South Africa, chemical engineers are primarily involved in the production of fertilisers, cement, explosives, plastics and synthetic fibres as well as a great variety of chemicals. They are mostly in the employ of construction firms and research stations that serve the abovementioned manufacturers.

Chemical engineers who specialise in mineral processing are in great demand in the mining industry and in metallurgic plants for the production of metals and minerals from ore.

The Department of Process Engineering offers the degree of Bachelor of Engineering in Chemical Engineering with electives in mineral processing.

1.4.2 *Civil Engineering*

Civil engineers design and build structures such a buildings, bridges, dams and roads. The impact that such structures have on the environment is an important design criterion.

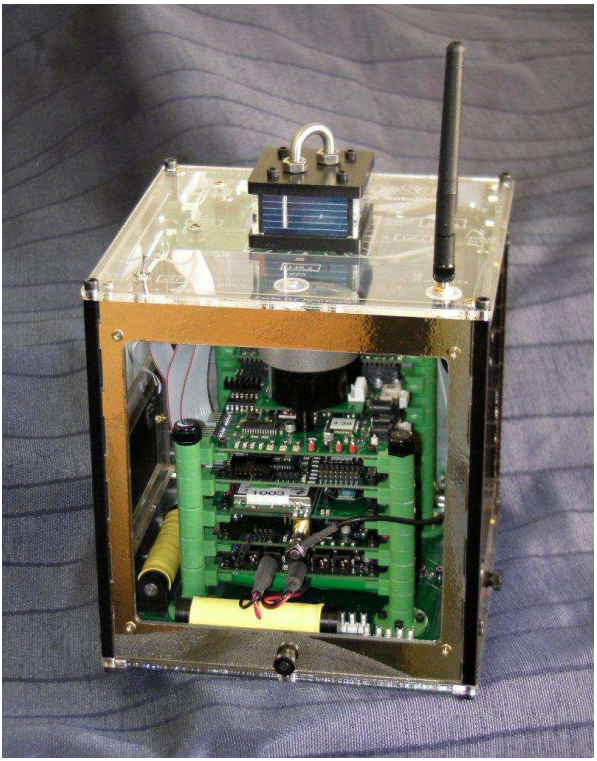
Civil engineers are responsible for the development, planning, design, construction, maintenance and operation of large-scale projects pertaining to especially the country's infrastructure. They can therefore achieve great job satisfaction through their involvement in the erection of large, permanent works such as irrigation systems, bridges, dams, harbours, canals, roads and streets, pipelines, sewerage systems, railways, structures of all kinds and

structure foundations, storm water systems, tunnels, towers, water supply systems, and all kinds of heavy construction work.

Through their work, they re-create, improve and conserve the environment, and supply the necessary facilities required for efficient community life.

The degree programmes in civil engineering are presented by the Department of Civil Engineering.

1.4.3 *Electrical and Electronic Engineering*



Edu_Satellite is an educational satellite that is used by the Department of Electrical and Electronic Engineering.

Approximately two-thirds of the modules in electrical and electronic engineering prepare the student in the analytical modelling and systematic design of systems. In this section of the programme the behaviour of electrical, electronic and electromagnetic systems are also studied by means of laboratory experiments. The application of electronic circuits, filters, computer systems, instrumentation systems and fundamental mathematics form the largest portion of this programme. At the start of the second semester of the third year, students select one of the following four directions of specialisation: telecommunication, energy, robotics and informatics. These tracks allow students to choose a partial focus area for their

degree programme, in order to best prepare them for the requirements of modern industry and/or postgraduate study. Further details regarding the composition and goals of the directions of specialisation are provided on the following web page: http://www.ee.sun.ac.za.

1.4.4 *Industrial Engineering*

Increasing competitiveness is the central theme of industrial engineering. The use of computerised manufacturing systems is common practice in modern factories.

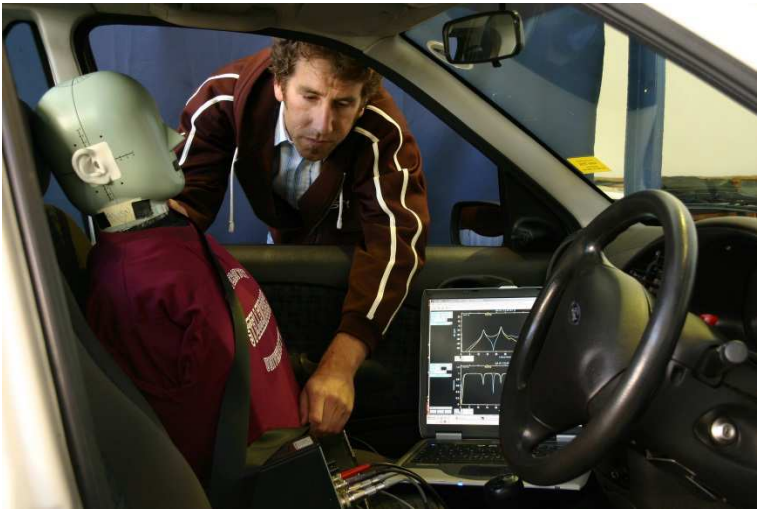
The industrial engineer essentially creates better manufacturing and service systems. Industrial engineering is therefore an interdisciplinary field of study in which training in several applied sciences, for instance mechanical and mechatronic and electrical and electronic engineering, together with economic management, natural sciences, information technology and information science, are combined as a unit for the design of various operational systems.

The industrial engineer's daily task involves a great variety of creative activities, especially in modern manufacturing and service industries. The work covers a wide spectrum. It starts at the design stage and moves on to the manufacturing or delivering stages, where attention is given to planning, efficiency and productivity, and concludes with marketing.

The industrial engineer is also particularly trained in the use of a computer in decision-making in enterprise management and the automatic control of machines and equipment.

The main options of industrial engineering are manufacturing technology and operational systems design. Among them, however, are important facets such as quality assurance, robotics, engineering economics, operations research, industrial ergonomics and information technology that are extremely important in the modern industrial and service environments.

1.4.5 *Mechanical and Mechatronic Engineering*



An experimental investigation of noise management in a motor vehicle employs various specialist areas of mechanical and mechatronic engineering.

Mechanical engineering is characterised by the motion and transfer of energy. It involves the design and development of, for example, machines and machine elements, vehicles, aeroplanes, vessels, missiles, cooling systems, cooling towers and engines.

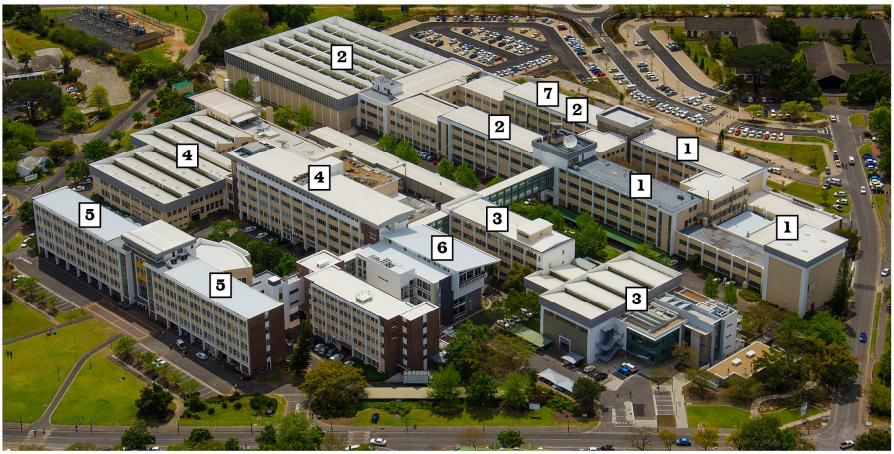
Heat transfer, fluid mechanics, strength of materials, dynamics and mechanical design are the most important disciplines in these fields. Training is therefore multi-faceted and leads to various professional careers in, for example, air conditioning and cooling, power generation systems, vehicle engineering, aeronautics and conservation of energy.

Mechatronic engineering is a combination of precision mechanical engineering, electronics and computer systems. A typical mechatronic system is characterised by close integration of the mechanical components, electronic sensors, mechanical and electrical actuators and computer controllers. Examples of mechatronic systems include electronic engine control systems, robots, automated assembly lines and artificial hearts.

The Department of Mechanical and Mechatronic Engineering offers two bachelor's degree programmes, i.e. one in Mechanical Engineering and one in Mechatronic Engineering. In the latter programme, specialist mechanical elements of the BEng (Mechanical) programme are replaced with electronic and computer system modules of the BEng (Electrical and Electronic) programme.

1.5 THE BUILDING COMPLEX OF THE FACULTY

The Faculty of Engineering is housed in a large building complex in Banghoek Road, Stellenbosch. It has excellent teaching and research laboratories, as well as an extensive support infrastructure.



The building complex shows the General (Main) Engineering Building (5) and the buildings housing the different departments. The number at the description of each department below correlates with the number in the figure above.

1.5.1 *General (Main) Engineering Building (5)*

The General (Main) Engineering Building houses the Dean's division of the Faculty of Engineering, as well as a variety of lecture halls and tutorial rooms. It also houses the divisions Applied Mathematics and Computer Science of the Department of Mathematical Sciences. Plakkies Cafeteria is housed on the ground floor of this building.

1.5.2 *Civil Engineering (2)*

The Department of Civil Engineering is housed in the Civil Engineering Building, comprising two four-storey blocks. The building houses offices, lecture halls, the administrative division and the laboratory section. The spacious laboratory section houses the irrigation, geotechnical, transport, water, concrete, heat transfer, solar energy, strength of materials and structures laboratories, as well as the Department's workshop and computer facilities.

1.5.3 *Electrical and Electronic Engineering (1)*

The Department of Electrical and Electronic Engineering is housed in the building situated in the north-eastern corner of the engineering complex. The entrance is shared with the Department of Civil Engineering. The southern wing houses the Department's laboratories and classrooms, and the northern wing contains offices and an auditorium. The Department's infrastructure includes well-equipped laboratories for antennas, control systems, radio and microwave technique, micro-electronics, electronics, electrical circuits, electrical machines, high voltage technique, computer systems, satellite systems and numerical signal processing.

1.5.4 *Engineering and Forestry Library (6)*
The Engineering and Forestry Library, a branch of the JS Gericke Library, is located on the first two floors of the Engineering Knowledge Centre.

1.5.5 Faculty of Engineering Computer User Area *(7)*
The Faculty has extensive information technology facilities. FIRGA, the Faculty of Engineering's computer users' area, consists of a general users' area with 131 modern workstations, as well as three electronic classrooms, respectively with 150, 83 and 72 modern workstations. All workstations provide access to the Internet and sophisticated software.

1.5.6 *Industrial Engineering (4)*
The Department of Industrial Engineering is housed in the Mechanical and Industrial Engineering Building. It maintains a number of departmental laboratories, including a rapid product development laboratory, a reverse engineering laboratory, three laboratories with advanced computer facilities, a quality control laboratory and a metrology laboratory.

1.5.7 *Mechanical and Mechatronic Engineering (4)*
The Department of Mechanical and Mechatronic Engineering is housed in the Mechanical and Industrial Engineering Building. The building accommodates specialised equipment, which includes the following: various wind tunnels, internal combustion engine testing benches, water tunnels and a towing tank for ship model tests, a test area for structures, and automation and biomedical engineering laboratories.

1.5.8 *Process Engineering (Chemical Engineering) (3)*
The Department of Process Engineering is housed in the Process Engineering Building and its new Annexe which together include three lecture halls and well-equipped pilot and laboratory-scale teaching and research facilities. The pilot-plant scale facilities include distillation columns, supercritical fluid extraction columns as well as a distillation characterisation set-up. The Department has equipment for measuring binary and multi-component phase equilibria, transport properties and mass transfer characteristics at pressures ranging from atmospheric to several hundred atmospheres. Computer facilities include a dedicated, industry-sponsored computer centre with high-end processing power and various process simulation and extensive data analysis packages. The extractive metallurgical laboratories house a variety of fully instrumented furnaces with gas cleaning and analysis capabilities as well as equipment for hydrometallurgical processing. The bioprocess engineering facility comprises pretreatment equipment, pilot-scale fermentation vessels, fully instrumented bioreactors, shaking incubators and peripheral equipment. The Department has extensive analytical facilities to support its range of research and teaching activities.

1.5.9 *School Centre (2)*
The Faculty has a variety of outreach programmes to stimulate interest in science, mathematics and technology, and also to promote skills development:

- TRAC is a national intervention programme, based on physical science and applied mathematics, that empowers and motivates learners from secondary schools to study in SET-directions on a tertiary level. The programme uses computer technology to reinforce scientific concepts. Learners and their teachers daily visit TRAC's several fixed computer laboratories, while TRAC facilitators also visit schools using mobile facilities. In Stellenbosch and the greater Western Cape area, TRAC uses one fixed and

two mobile laboratories. The TRAC headquarters is based in Stellenbosch in the Civil Engineering Building. Further details can be found at www.trac.sun.ac.za.

- SUNSTEP trains technology and science teachers to build electronic kits such as a burglar alarm, cordless microphone, electronic organ and FM radio and to transfer that knowledge to their learners. The theory falls within the specifications of the technology curriculum, and is the ideal enrichment for science learners who learn about capacitors, reactance, magnetism and Lenz's law. All the kits are designed in conjunction with the curriculum advisers of the WCED. There is also very close collaboration with the education departments of the Free State, Eastern Cape, Mpumalanga and Namibia, and the schools there are also serviced. The abovementioned provinces and Namibia are visited on an annual basis for training purposes.

  Schools contact SUNSTEP for teacher training, as well as learner workshops, which takes place at the Engineering School Center and also at schools. We are successful in stimulating learners' interest in science from Grade 7 already, and up to Grade 12. The electronic kits are of a high quality, are successfully assembled and soldered by learners, and create enthusiasm and excitement as well as a sense of success with the learners. Excellent feedback has been received from learners, teachers and heads of NGOs who conduct Saturday schools for township learners. The Namibia Education Department has asked SUNSTEP to duplicate the work done in South Africa in Namibia as well, and after a successful training session in Keetmanshoop and Windhoek this year, SUNSTEP has been requested to do the same in the Hardap and Urongo regions next year.

1.6 QUALIFICATIONS

The Faculty awards the following degrees:

1.6.1 *Bachelor's Degree*

BEng: Bachelor of Engineering

This four-year degree programme is the basic qualification in engineering that leads to registration as a professional engineer, and which equips the engineer with broad training.

1.6.2 *Postgraduate Diploma*

PDE: Postgraduate Diploma in Engineering (1 year)

This one-year postgraduate diploma (120 credits) follows an applicable BEng, a BSc or a BTech degree (with additional work). It comprises an in-depth study in preparation for a master's programme or a broadened study involving more than one engineering discipline. (The PDE does not lead to registration as a professional engineer.)

1.6.3 *Master's Degrees*

MScEng: Master of Science in Engineering

This programme was phased out as from 2011. The last first registrations for this programme was in February 2011.

MEng: Master of Engineering

The MEng programmes succeed the BEng, PDE, applicable four-year B degree and/or BScHons.

Two Master of Engineering qualifications by the Faculty:

- The MEng (Structured) is a lectured master's programme (minimum 120 credits course work) in engineering with a project (minimum 60 credits) in which the emphasis is on the advanced application of engineering sciences in design.

- The MEng (Research) consists of a research project of 180 credits. A satisfactory thesis on the research project is required.

1.6.4 *Doctoral Degrees*

PhD: Doctor of Philosophy

The PhD degree programme comprises a research project. The degree may only be awarded if the candidate has generated new knowledge through research.

DEng: Doctor of Engineering

The DEng may be awarded to candidates whose research makes a substantial contribution towards humanity's knowledge in the field of engineering.

1.7 RECOGNITION OF DEGREES

The four-year BEng degree of Stellenbosch University is recognised by several South African and foreign professional associations for membership of the specific associations, among others the South African Institution of Civil Engineers, South African Institution of Mechanical Engineers, South African Institute of Industrial Engineers, South African Institute of Electrical Engineers, South African Institution of Chemical Engineers, South African Institute of Mining and Metallurgy, the South African Academy of Science and Art, the (American) Institute of Electrical and Electronics Engineers, and the (British) Institution of Chemical Engineers and Institution of Electrical Engineers.

Under the auspices of the Washington Accord, through the Engineering Council of South Africa (ECSA), the BEng is also recognised for the purpose of registration as a professional engineer in the signature countries of the Washington Accord, for example Australia, Hong Kong, Ireland, New Zealand, the United Kingdom, the United States of America, Chinese Taipei, Japan, the Republic of Korea and Singapore.

In addition, the specific degrees generally provide direct admission to postgraduate study programmes in engineering at overseas universities.

2. Admission to the BEng Degree Programmes

2.1 FIELDS OF STUDY

2.1.1
The BEng degree may be awarded in any of the following fields of study: Chemical Engineering; Chemical Engineering – Mineral Processing option; Civil Engineering; Electrical and Electronic Engineering; Industrial Engineering; Mechanical Engineering and Mechatronic Engineering.

2.2 UNDERGRADUATE ENROLMENT MANAGEMENT

In order to meet the targets of Council with regard to the *size* (the total number of students) and *shape* (fields of study and diversity profile) of the student body of Stellenbosch University (SU), it is necessary to manage the undergraduate enrolments at SU.

SU's total number of enrolments is managed to be accommodated by its available capacity.

SU offers a balanced package of programmes covering all of three main study areas, namely (a) the humanities, (b) the economic and management sciences, and (c) the natural sciences, agricultural sciences, health sciences and engineering (Science, Engineering and Technology or SET).

SU is committed to the advancement of diversity.

Undergraduate enrolment management at SU adheres to the framework of the national higher-education system. A well-grounded cohesion between national and institutional goals, respecting important principles such as institutional autonomy, academic freedom and public responsibility, is pursued. The following points of departure apply:

- The expansion of academic excellence by maintaining high academic standards.
- The maintenance and improvement of high success rates.
- The fulfilment of SU's commitment to correction, to social responsibility and to contributing towards the training of future role models from all population groups.
- The expansion of access to higher education especially for students from educationally disadvantaged and economically needy backgrounds who possess the academic potential to study at SU with success.

Due to the limited availability of places and the strategic and purposeful management of enrolments, not all undergraduate applicants who meet the minimum requirements of a particular programme will automatically gain admission.

Details about the selection procedures and admission requirements for undergraduate programmes are given below, as well as on www.maties.com and on the faculty's web page at www.eng.sun.ac.za.

All undergraduate prospective students with the 2013 intake and beyond in mind must write the National Benchmarking Test (NBT). Consult the NBT web site (www.nbt.ac.za) or the

SU web site at www.maties.com for more information on the National Benchmarking Test.

The results of the National Benchmarking Tests may be used by SU for the following purposes (details are available at www.maties.com):

- supporting decision-making about the placement of students in Extended Degree Programmes,
- selection, and
- curriculum development.

2.3 ADMISSION REQUIREMENTS

2.3.1
Students may be admitted to the four-year BEng degree if they:

2.3.1.1
are in possession of a (National) Senior Certificate with admission to bachelor's studies or an exemption certificate issued by the Matriculation Board; and

2.3.1.2
obtained an average of at least 70% in the applicable school final examination; and

2.3.1.3
passed the (National) Senior Certificate or equivalent examination in Mathematics with the minimum of 70% and Physical Sciences with the minimum of 60% (Mathematics must be offered as subject and Mathematical Literacy is not accepted. With regards to the curriculum which was applicable until 2007, at least a B in Mathematics HG and at least a C in Natural Sciences HG is required); and

2.3.1.4
in the matriculation or equivalent examination, achieved at least the following in language subjects:

- English Home Language: 40%; or
- English 1st Additional Language: 60%; or
- English 1st Additional Language: 50%, together with Afrikaans Home Language: 40%, or Afrikaans 2nd Additional Language: 60%

2.3.2
Students may be admitted to the Extended Degree Programmes in Engineering if they –

2.3.2.1
are in possession of a (National) Senior Certificate with admission to bachelor's studies or an exemption certificate issued by the Matriculation Board; and

2.3.2.2
obtained an average of at least 60% in the applicable school final examination; and

2.3.2.3
passed the (National) Senior Certificate or equivalent examination in Mathematics with the minimum of 60% and Physical Science with the minimum of 50%. Mathematics must be offered as subject and Mathematical Literacy is not accepted.

2.3.2.4
in the matriculation or equivalent examination, achieved the following minimum requirements in these language subjects:

- English Home Language: 40%; or
- English 1st Additional Language: 60%; or
- English 1st Additional Language: 50%, together with Afrikaans Home Language: 40%, or Afrikaans 2nd Additional Language: 60%

2.3.3
Admission of prospective students who meet the abovementioned admission requirements shall also be subject to selection (see Sections 2.3 and 2.4).

2.4 ADMISSION AND SELECTION

2.4.1
Prospective first-year students in engineering must meet the relevant admission requirements and be selected for the particular programme to be admitted. Applications for a specific year must be submitted no later than 30 June of the preceding year. Prospective students who want to make use of university accommodation are advised to apply before 30 June.

The admission of prospective students who have already passed Grade 12 and have been admitted to a BEng programme may be regarded as final. Prospective students that are in Grade 12 at the time of their application may be admitted provisionally to a specific programme on the grounds of their Grade 11 results. Their final admission, however, shall be subject to, firstly, the submission of written proof of an obtained (National) Senior Certificate, or equivalent, that meets the admission requirements set out in Section 2.3 and, secondly, that their admission scores, based on their Grade 12 final examination marks, meet the particular programme's threshold score (described below).

2.4.2
The selection score is calculated as follows:

Selection score = 2 x Mathematics mark + 2 x Physical Science mark + English mark + best performance in another language + sum of marks for the best two other subjects (excluding Life Orientation and Mathematical Literacy).

The percentage obtained for the subject concerned is used for the calculation of the selection score. The maximum score is therefore 800. To be selected, a prospective student must obtain at least the threshold score of the particular programme. Students with scores below the threshold score, but above the minimum selection score for the programme, are placed on a waiting-list and may still be admitted to the programme concerned if places are available. Alternatively, such a student may instead be admitted to another programme, on condition that the student meets the threshold score for the programme concerned.

2.4.3
Prospective new first-year students will be required to write access tests (the access tests will be replaced by the National Benchmarking Test as from the 2013 intake). These test results, as well as school results and other relevant information, can be taken into consideration during selection. Personal interviews may form part of the selection requirements in exceptional circumstances. The selection formula in Section 2.4.2 is, however, the primary mechanism for selection.

2.4.4
Prospective students who applied before the date mentioned in 2.4.1, but were not admitted on grounds of their Grade 11 results, may submit their Grade 12 results to be reconsidered for admission.

2.4.5
Changing over from one programme to another within Engineering is subject to selection anew. Section 2.6 gives further details in this regard.

2.5 ENROLLING FROM OTHER PROGRAMMES, UNIVERSITIES, ETC.

The Faculty's specific guidelines are given in this section of the Calendar. These guidelines are used by the departmental committees to assess individual applications.

2.5.1 *Applicants from Other Programmes at Stellenbosch University*
Applicants must include with their application their full study record together with the curriculum/module outcomes for the modules for which they require recognition. Recognition will be granted on a module-by-module basis. Written feedback will be given to the applicant by the Faculty Secretary. The criteria that will be applied, are mainly the following:

- Applicants for admission to the four-year BEng programmes must still meet the relevant admission requirements with regard to Mathematics and Physical Sciences, unless they have already, during their studies at Stellenbosch University, passed mathematics, chemistry and physics at first-year level. Such applicants must have passed all modules within an appropriate BSc programme (where Mathematics 114 and 144, or Engineering Mathematics 115 and 145, are included) in their first year of study in order to be eligible for admission to a programme in engineering. In cases where the student has not passed all modules (or did not follow an appropriate BSc programme), their application is subject to approval by the home department of the proposed programme. In all cases Mathematics 114 and 144, or Engineering Mathematics 115 and 145, must be passed in order to be eligible for admission to a programme in engineering. All applications for admission and recognition of modules should, after the final marks are available, be submitted before 13 December in the year before the intended start of engineering studies.
- Applicants for admission to the second year of the Faculty's Extended Degree Programmes are required to have completed the first year of another appropriate Extended Degree Programme in one year of study and, in that year, achieved at least the level of performance required in the Extended Degree Programmes in Engineering for continuation from the first to the second year. All applications for admission should, after the final marks are available, be submitted before 13 December, in the year before the intended start of engineering studies.
- Students who have completed a BSc programme, but took longer than four years to complete that BSc programme, or who performed poorly in general, are normally not admitted to the BEng programmes. Students will generally be admitted to the first year of a BSc programme, but can apply for recognition for certain subjects already passed in the BSc programme.

- Modules that are successfully completed will be recognised where the curriculum, outcomes and credits of the module mostly meet the requirements of the compulsory module within the relevant engineering programme, or where the completed module includes work in addition to that which is required by the intented programme.
- Applicants for admission to the four-year BEng programmes and the Extended Degree Programmes must meet the applicable admission requirements with respect to language.

2.5.2 *Applicants from Other Universities in South Africa*

- Students who commenced their studies in a BEng or BScEng programme at another university, and wish to continue their studies in engineering at this university, are strongly advised to only complete the first year of study at the other university and then to apply to join here for a BEng programme from the second year of study.
- Students who study engineering at another university and have not been granted permission to continue their studies in engineering at that university, will not be permitted to enrol for a BEng programme here.
- Applications for admission to a BEng programme on a given year close on 30 September of the preceding year. Students who wish to apply for recognition of corresponding modules successfully completed at another university must do so in writing to the Registrar before 3 January of the relevant year.
- Students who are studying at another university in South Africa and wish to continue their studies in engineering at this university should have, from the outset of their studies at the other university, met the admission requirements of the Faculty of Engineering of Stellenbosch University, or be able to prove that they have passed mathematics, chemistry and physics at first-year level. Applicants must meet the applicable admission requirements with respect to language.

Applicants must include with their application their full study record together with the curriculum/module outcomes for the modules for which they require recognition. Recognition will be given on a module-by-module basis. The criteria that will be applied are mainly the following:

- Modules will be recognised where the curriculum, outcomes and credits of the module largely correspond to the required module in the engineering programme for which the student wishes to enrol, or where the completed module includes work in addition to that which is required by the intented programme.

2.5.3 *Enrolling from a Technikon or University of Technology*

Candidates who have obtained the applicable National Diploma or BTech degree and who have achieved above average academically can be admitted to the second year of the BEng if they have successfully written the examinations in the following modules:

Engineering Mathematics 145
Applied Mathematics B 154

and at most two further modules, as specified by the relevant department after taking the candidate's study record at the technikon or university of technology into consideration in order to ensure that the candidate has the necessary background for successful further study.

Candidates, who are in possession of the applicable BTech or Higher National Diploma, can be admitted to the third year of the BEng if they have successfully completed the following modules:

Chemical Engineering and Mineral Processing (Process Engineering)
Engineering Mathematics 214
Engineering Mathematics 242
Applied Mathematics B 224
Numerical Methods 262

Civil Engineering
Engineering Mathematics 214
Engineering Mathematics 252
Applied Mathematics B 224
Applied Mathematics B 242
Applied Mathematics B 264

Industrial Engineering
Engineering Mathematics 214
Engineering Mathematics 242
Production Management 212
Engineering Economics 212

Electrical and Electronic Engineering
Engineering Mathematics 214
Applied Mathematics B 224
Applied Mathematics B 242

Mechanical Engineering and Mechatronic Engineering
Engineering Mathematics 214
Engineering Mathematics 242
Applied Mathematics B 224
Numerical Methods 262

All branches
At most three further modules, as specified by the relevant department after taking the candidate's study record at the technikon or university of technology into consideration in order to ensure that the candidate has the necessary background for successful further study.

The candidate must write the normal examination and will only be provided with the syllabus, module content, class notes (if applicable) and the name of the text book. The candidate must pass all the examinations in at most two consecutive examination opportunities.

The outcome of the examination will be made known as a pass or fail, and will not be included in the candidate's study record.

Applicants must apply by 1 April of the preceding year so that applications can be assessed by departmental ARPL committees and timely feedback can be given with respect to examinations that possibly need to be written in June.

Applicants must include in their applications their full study records, together with the curriculum/module outcomes, for all modules which they have passed.

Applicants must meet the applicable admission requirements with respect to language. The applicant will receive feedback from the Faculty Secretary in writing.

2.5.4 Applicants from Universities outside South Africa

Students who desire recognition for qualifications and/or modules passed at universities outside South Africa must apply before 31 August during the preceding year. Applicants must include with their application their full study record together with the curriculum/module outcomes for the modules for which they require recognition. The Postgraduate and International Office/HSRC's assessment of overseas qualifications will be used as the guideline. In the event of qualifications or institutions where the standards are regarded as on the same level as at South African universities, the applications will be handled in a similar manner to those students who apply for admission from a university within South Africa. In other cases, no recognition will be given for individual modules, but applicants will be given the same opportunity to write complementary examinations as students from a technikon or university of technology.

Applicants must meet the applicable admission requirements with respect to language.

The applicant will receive feedback from the Faculty Secretary in writing.

2.5.5 *Other Applicants*

In the case of all other applicants who wish to apply for evaluation of previous study that is not covered in 2.5.1 to 2.5.4, the following applies:

- All such applications must be submitted by 1 April of the preceding year.
- Applicants must include with their applications full details of previous study: name, description (content, scope and outcomes), assessment criteria, type of assessment, type of accreditation of the institution, when obtained, etc. Should any of this information be omitted, the application will not be processed further.
- Experience in itself is not recognised; rather it must be learning which is assessed in a recognised manner.
- Departmental ARPL committees consider the application by comparing the education with relevant module contents, outcomes and credits. They can refuse the application (giving reasons), give recognition for certain module(s), recommend that an examination be written in certain modules (as is described in Section 2.5.3), and/or request a personal interview which will be considered to be an oral assessment. At least two academic personnel must be present at this interview.
- The applicant will receive feedback from the faculty secretary in writing.

2.6 CHANGE IN FIELD OF STUDY

As a result of the common first year, students can change their field of study (within the four-year BEng programmes) at the end of the first year without any complications, subject to selection, without having to do any additional modules. Changing from one field of study to another from the second year onwards implies that modules will need to be caught up, the number of which increases the later the change in field of study is made.

Permission to change from one programme to another within Engineering is subject anew to selection. Normally such a student will have to obtain at least 0,75 HEMIS credits in the first year of the four-year BEng programmes, which means that 75% of the module credits in the first-year programme must be passed, in order to stand a good chance of being selected for the intended new programme. Students in a four-year BEng programme that have passed all modules of the first year in their first academic year, will automatically

qualify to change programme, and similarly for students in the second year of an Extended Degree Programme.

Applications of enrolled undergraduate engineering students to change the direction of their studies must be submitted in writing to the Faculty Secretary before 13 December of the preceding year.

It is the relevant student's responsibility to determine whether changing from one programme to another meets the conditions imposed by his/her bursary providers.

The Centre for Student Counselling and Development and the departmental chairpersons in the Faculty of Engineering are available to give guidance to students regarding their choice of a field of study.

Please consult the Almanac in Part 1 (General) of the Calendar for the last date on which programmes may be changed.

2.7 RESIDENCY REQUIREMENT

Students who are already in possession of applicable degree qualifications, must pass at least the final two academic years of an approved BEng programme at this University in order to obtain a BEng degree.

3. Bachelor's Degree programmes

3.1 STUDY LOAD

The total academic load per undergraduate student amounts to approximately 60 hours per week (lectures, practicals, tutorials, homework and home study).

The hour values [h] of the different modules indicate how much time should be spent on every module each week.

3.2 ECSA ACCREDITATION

The BEng programmes of the Faculty are formulated to comply with the requirements of the Engineering Council of South Africa (ECSA) for accredited BEng programmes. This means that the programmes each contains at least the required number of credits per ECSA knowledge area as well as developing and assessing each ECSA exit level outcome. Every student that completes a BEng programme, irrespective of the electives chosen, meets the ECSA requirements.

3.3 SYMBOLS

The credit values and lecture load for each module are provided in the tables below. The symbols have the following meaning:

l: Lectures of 50 minutes each
p: Laboratory practicals of 60 minutes each
t: Tutorials of 60 minutes each
s: Seminars of 50 minutes each
h: Weekly workload in hours for the student
C: Credit value (SAQA credits: Total notional hours required to complete the module, divided by 10.)

Notes:

- The tables reflect the actual amount of contact time as accurately as possible.
- For lectures and tutorial periods that do not follow on each other (usually in the morning), one contact unit implies contact time of 50 minutes.
- For tutorials and practicals that occur in succession, the ten-minute break between periods is included in the contact time. A load of 2,25 for consecutive tutorials or practicals in the afternoon means that students start at 14:00 and finish at 16:15. A load of 2,5 consecutive tutorials or practicals in the afternoon means that students start at 14:00 and finish at 16:30.
- A load of 0,75 means a tutorial or practical takes up half an afternoon every second week (1 hour 20 minutes to 1 hour 30 minutes) or a full afternoon of three hours every fourth week.
- Venues are allocated to accommodate the number of periods, for example 3 periods for 2,25 consecutive tutorials.

3.4 LANGUAGE POLICY AND PLAN

The Faculty of Engineering is committed to the promotion of multilingualism and aims to offer as many modules as possible in both Afrikaans and English, or to make use of real-time interpreting (i.e. English is interpreted into Afrikaans, and Afrikaans is interpreted into English).

The official Language Policy and Plan of Stellenbosch University was approved by the Council of the University in 2002. The following summary is provided in the interest of brevity, but must be read in conjunction with, and is subject to, the full Language Policy and Plan. The full version is available at http://www.sun.ac.za/taal.

3.4.1 *Language Policy*

The University is committed to the use and sustained development of Afrikaans as an academic language in a multilingual context. Language is used at the University in a manner that is directed towards its engagement with knowledge in a diverse society.

The University acknowledges the special status of Afrikaans as an academic language and accepts the responsibility to promote it. At the same time, it takes account of the status of English as an international language of communication and of isiXhosa as an emerging academic language.

The University distinguishes between the use of the three languages in the following manner:

- Afrikaans is by default the language of learning and teaching at undergraduate level, while English is used to a greater extent at the postgraduate level.
- isiXhosa is promoted as an emerging academic language. The University creates opportunities for students and staff to acquire communication skills in isiXhosa.

The institutional language of the University is, by default, Afrikaans, while English is also used, depending on the circumstances, as an internal language of communication. All three languages are used, where possible, for external communication.

3.4.*2 Language Plan*

The Language Plan distinguishes between the implementation of the policy in learning and teaching situations and in the support services and management.

Choices between various language options may be made in learning and teaching situations, depending on the language abilities of the lecturer and the composition of the students and programme. These language options are arranged in a hierarchy. Reasons must be provided for deviating from the default option.

In extraordinary and compelling circumstances the University may deviate from the language specification of a module or programme, on condition that any such deviation must be reviewed at the end of each semester to determine whether its continuation remains justified. The deans manage this process, reporting on it to the Executive Committee (Senate).

Three general guidelines apply with regard to the language of learning and teaching in class:

- Modules in which a language is taught are conducted mainly in the language in question (for example isiXhosa is taught mainly in isiXhosa, Mandarin in Mandarin) and tasks, tests and examinations are set and answered accordingly.

- Questions papers in all other modules are set in Afrikaans and English and students may answer in Afrikaans or English.
- Except in cases where the aim of the module is language acquisition or the study of the language, students may ask questions and expect answers in Afrikaans or English.

Departments choose and implement the various language specifications as follows (the above three points apply generally for all options):

3.4.2.1 *A Specification**

Rationale
Applies as the default mode for all undergraduate modules. No reasons need to be given for exercising this option.

Characteristics
- Teaching is mainly in Afrikaans.
- Study material (textbooks, notes, transparencies, electronic learning and teaching material) may be in Afrikaans and/or English.
- Study framework is in Afrikaans and English.

3.4.2.2 *T Specification* (bilingual classes)*

Rationale
Is used for classes where –

- students' language competence requires greater use of English;
- a programme offered is unique to the University;
- multilingualism is important in the context of a specific occupation; and
- the lecturer does not yet have an adequate command of Afrikaans.

Characteristics
- Teaching is in Afrikaans for at least 50% of the time.
- Textbooks and reading matter are in Afrikaans and/or English.
- Study notes, transparencies and electronic learning and teaching material are fully in Afrikaans and English, or alternately in Afrikaans and English.

3.4.2.3 *E Specification (English as the main medium of instruction*)

Rationale
Is used only in highly exceptional circumstances for –

- programmes unique in South Africa;
- programmes in which students do not have adequate language skills (foreign or English-speaking students);
- modules in which the lecturer does not have a command of Afrikaans; and
- regional co-operation and strategic aims that necessitate English.

Characteristics
- Teaching is primarily in English.
- Textbooks and reading matter are in Afrikaans and/or English.
- Notes are in English with core notes in Afrikaans.
- Transparencies and electronic learning and teaching material are in English.

3.4.2.4 *A & E Specification (separate "streams" in Afrikaans and English)*

Rationale

Used only in most exceptional circumstances when academically and financially justified and attainable for –

- modules with large numbers of students;
- regional co-operation and attaining strategic goals; and
- programmes offered by satellite technology or interactive telematic education.

Characteristics

- The characteristics of the A and E options apply respectively here.

* For both of these options an academic language competence in Afrikaans and English is essential for successful study.

Afrikaans is the default language of communication for the support services and management. All official documents of the University are available in Afrikaans. "Default" does not, however, mean "exclusively": Important policy documents are available in English and communication with staff is also conducted in English. Guidelines are provided for the language to be used at meetings. Documents relating to the service conditions for staff are available in Afrikaans, English and isiXhosa.

Written communication with students is conducted in Afrikaans and English, and recruitment is conducted, where possible, also in isiXhosa. Oral communication is conducted in Afrikaans or English, according to the language of preference of the student.

The corporate image of the University reflects the Language Policy and Plan.

A Language Committee is appointed by the Council to implement the Language Policy and Plan.

The Language Centre assumes the responsibility for the provision of and/or co-ordination of the relevant language support required for the effective implementation of the Language Policy and Plan.

3.5 LANGUAGE POLICY OF THE FACULTY

3.5.1 *First- and Second-year Modules*

All first-year modules are presented in both Afrikaans and English (parallel sessions). All second-year modules are presented in both Afrikaans and English (parallel sessions or by way of interpreting).

3.5.2 *Further years of study*

The Faculty plans to, as from 2014, offer all third- and fourth-year modules, with the possible exception of some elective modules, in both English and Afrikaans by making use of real-time interpreting (i.e. English is interpreted into Afrikaans and Afrikaans is interpreted into English).

The planned language specifications for the undergraduate modules are included in Chapter 5 together with the details of the module descriptions. The final language specification for each module will be provided at the beginning of each semester in the study guide/module specification and may differ from the information given in the Calendar depending on the current conditions (for example the availability of class rooms with sufficient capacity and the language abilities of the available personnel).

3.6 CODE OF CONDUCT FOR LANGUAGE IN THE CLASSROOM

This Code of Conduct has been drawn up in order to provide practical guidelines for understanding and implementing the Language Policy and Plan of the US, which was accepted by the University Council in 2002. The Council regards it as important that the Language Policy and Plan of the US should be implemented with integrity. The Code is offered as an aid for dealing constructively with possible difficulties or uncertainties.

The core principle governing the day-to-day use of language on the campus is that all staff, students and clients of the University are responsible for language matters and may have the expectation that disputes will be approached and dealt with in a spirit of co-operation in which workable solutions are sought.

A distinction is drawn in the Code of Conduct between the responsibilities and expectations of staff and of students. Complaints on language matters of an academic nature will be dealt with in accordance with standard procedures.

The Language Policy and Plan sets the minimum language requirements for students studying at Stellenbosch University (Language Plan 2002:5):

As a general rule, students taking an A module or a T module require an academic language proficiency in both Afrikaans and English for effective study at the undergraduate level. A higher level of academic language proficiency in Afrikaans and/or English is required for postgraduate study.

Lecturers, especially with regard to their obligations to set and assess assignments, tests and question papers in English and Afrikaans, will be expected within a reasonable time from their appointment to develop sufficient receptive skills (listening and reading) in Afrikaans and English to be able to follow discussions in class, to set assignments and examination question papers in both languages and to be able to understand students' answers in both languages.

They should also be capable of judging the equivalence of translations and of fairly assessing answers in Afrikaans and English.

3.6.1 *Lecturers' Responsibilities*

Lecturers bear the responsibility of –

- implementing the language specifications of the module being taught in accordance with the requirements of the Language Plan (see in particular Section 3 of the Language Plan);
- revising and adjusting the language specifications where necessary and according to the circumstances (new text books, other lecturers);
- informing students briefly at the beginning of the teaching of the module, orally and in the module framework, of the choices and alternatives for which the language specifications make provision;
- ensuring that questions in assignments, tests and examinations have exactly the same content in English and Afrikaans;
- developing sufficient language proficiency to be able to mark assignments, tests and examinations in Afrikaans and English, or making other satisfactory arrangements that it takes place;
- ensuring that, in accordance with the guidelines for the T specification (see 3.3.1.2 of the Language Plan), students' language proficiency is sufficiently developed, and the

necessary measures are in place to ensure subject-specific language proficiency in Afrikaans and English, and

- striving at all times to act courteously and accommodatingly in situations involving language use (for example when questions are asked in English in a class where the language specification for the module is A).

3.6.2 *Lecturers' Expectations*

Lecturers can expect students to –

- take note of the characteristics of the language specification applicable to the specification laid down for the module (see Section 3 of the Language Plan);
- inform the lecturer as soon as possible of their needs with regard to academic language skills, and
- respect the spirit of the Language Policy and Plan, especially with regard to the development of skills in a language which is not their language of choice, by deliberately paying attention to it, taking part actively in class and working on their knowledge of subject terminology and subject discourse in both languages. This expectation applies especially to the T specification for modules.

3.6.3 *Students' Responsibilities*

Students bear the responsibility of –

- ascertaining the language options for each module and noting especially the consequences; for example that translations will not be available in some instances;
- being honest and open-hearted about their language skills and taking the responsibility for early and appropriate action if they should experience difficulties;
- deliberately developing the receptive skills (listening and reading) in the language not of choice for learning and teaching by active participation in class;
- buying and using the prescribed material (especially text books) to improve their language skills in the subject;
- being courteous and accommodating, and acting accordingly, in situations where language use is at issue, for example with regard to the difficulties of the minority group in the class, and
- accepting that one or a few students, because of inadequacies in his/their language proficiency, may not exercise or try to exercise a right of veto with regard to the use of Afrikaans or English in the class situation.

3.6.4 *Students' Expectations*

Students can expect that –

- help with language skills development will be provided should their academic language proficiency in Afrikaans and/or English be inadequate;
- they can ask questions and conduct discussions in Afrikaans or English (unless other languages are required, as in language modules), taking into account their own and the lecturer's language proficiency;
- Afrikaans and English versions of assignments and question papers will be available and will have the same content, and
- there will be a sensitivity for language difficulties, so that language errors made under examination conditions will be assessed with discretion.

3.7 FIRST-YEAR CURRICULUM

The following modules are prescribed for the first year of all the four-year BEng degree programmes:

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 176 or	3.00	0.00	0.00	0.00	6.00	week	(12)
Language Skills (Afrikaans) 186 or	3.00	0.00	0.00	0.00	5.00	week	(12)
Language Skills (English) 173	3.00	0.00	0.00	0.00	5.00	week	(12)
TOTALS	3.00	0.00	0.00	0.00			(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Mathematics 115	5.00	0.00	2.00	0.00	12.00	week	(15)
Applied Mathematics B 124	4.00	0.00	2.00	0.00	12.00	week	(15)
Engineering Chemistry 123	4.00	0.00	2.00	0.00	12.00	week	(15)
Engineering Drawings 123	1.00	3.00	3.00	0.00	12.00	week	(15)
Professional Communication 113	3.00	0.00	2.00	0.00	9.00	week	(12)
TOTALS	17.00	3.00	11.00	0.00			(72)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Mathematics 145	5.00	0.00	2.00	0.00	12.00	week	(15)
Applied Mathematics B 154	4.00	0.00	2.00	0.00	12.00	week	(15)
Computer Programming 143	3.00	2.00	0.00	0.00	9.00	week	(12)
Electro-Techniques 143	3.50	1.50	1.50	0.00	12.00	week	(15)
Strength of Materials 143	4.00	0.00	2.00	0.00	12.00	week	(15)
TOTALS	19.50	3.50	7.50	0.00			(72)

Exemption may be granted for the Academic Literacy Modules [Language Skills (Afrikaans) 176 and 186, as well as Language Skills (English) 173], to students who have performed satisfactorily in the language skills tests which will be taken during the welcoming week before the beginning of the first semester.

Language Skills (Afrikaans) 176 is a year module presented at a beginners' level to students who are not proficient in Afrikaans.

Language Skills (Afrikaans) 186 is a year module presented at an advanced level to students who have to improve their language skills in Afrikaans.

Language Skills (English) 173 is a year module presented at an advanced level to students who have to improve their language skills in English. Students whose language skills in Afrikaans are still inadequate at the end of their first year, as determined by the language skills test at the beginning of the first year, must take the academic literacy module Language Skills (Afrikaans) 276 during their second year.

3.8 SENIOR YEARS' CURRICULA

The following modules are prescribed for the senior years of the respective BEng degree programmes:

CHEMICAL ENGINEERING
(INCLUDING MINERAL PROCESSING – ALL OPTIONS)
(DEPARTMENT OF PROCESS ENGINEERING)

Year 2

Both Semesters

The Academic Literacy Module [Language Skills (Afrikaans) 276] is only applicable to students who followed the module Language Skills (Afrikaans) 176 during their first year of study.

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 276	3.00	0.00	0.00	0.00	6.00	week	(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Applied Mathematics B 224	3.00	0.00	3.00	0.00	12.00	week	(15)
Chemistry C 224	4.00	2.00	0.00	0.00	12.00	week	(15)
Chemical Engineering 224	3.00	0.00	3.00	0.00	12.00	week	(15)
Engineering Mathematics 214	4.00	0.00	2.00	0.00	12.00	week	(15)
Thermodynamics A 214	3.00	0.00	3.00	0.00	12.00	week	(15)
Practical Workshop Training 211	1.00	0.00	0.00	0.00	0.00	week	(0)
TOTALS	18.00	2.00	11.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Chemistry C 254	4.00	2.00	0.00	0.00	12.00	week	(15)
Chemical Engineering 254	3.00	0.00	3.00	0.00	12.00	week	(15)
Chemical Engineering 264	3.00	0.00	3.00	0.00	12.00	week	(15)
Chemical Engineering D 244	3.00	2.00	1.00	0.00	12.00	week	(15)
Engineering Mathematics 242	2.00	0.00	1.00	0.00	6.00	week	(8)
Numerical Methods 262	2.00	0.00	1.00	0.00	6.00	week	(8)
TOTALS	17.00	4.00	9.00	0.00			(76)

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Biology (Eng) 324	3.00	1.00	2.00	0.00	12.00	week	(15)
Chemical Engineering 316	3.00	1.00	2.00	0.00	12.00	week	(15)
Chemical Engineering 317	3.00	1.00	2.00	0.00	12.00	week	(15)
Heat Transfer A 326	3.00	1.00	2.00	0.00	12.00	week	(15)
Particle Technology 316	3.00	1.00	2.00	0.00	12.00	week	(15)
TOTALS	15.00	5.00	10.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Chemical Engineering 344	3.00	0.00	2.00	0.00	12.00	week	(15)
Chemical Engineering 354	3.00	0.00	2.00	0.00	12.00	week	(15)
Chemical Engineering 367	3.00	0.00	2.00	0.00	12.00	week	(15)
Chemical Engineering D 356	1.00	6.00	0.00	0.00	12.00	week	(15)
Mineral Processing 345	3.00	1.00	2.00	0.00	12.00	week	(15)
Vacation Training 361	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	13.00	8.00	8.00	0.00			(75)

Year 4

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Chemical Engineering 478 *	0.00	6.00	0.00	0.00	0.00	week	(30)
or							
Mineral Processing 478 *	0.00	6.00	0.00	0.00	0.00	week	(30)
TOTALS	0.00	6.00	0.00	0.00			(30)

** Workload: 3 hours per week (4 credits) in the first semester and 20 hours per week (26 credits) in the second semester.*

** Students with bursaries from mining houses take Mineral Processing 478 and not Chemical Engineering 478. All other students' choice between Mineral Processing 478 and Chemical Engineering 478 is determined by their project topics.*

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Chemical Engineering 412	2.00	0.00	2.00	0.00	6.00	week	(8)
Chemical Engineering 414	3.00	0.00	2.00	0.00	12.00	week	(15)
Chemical Engineering 426	3.00	1.00	2.00	0.00	12.00	week	(15)
Mineral Processing 415	3.00	0.00	2.00	0.00	12.00	week	(15)
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Philosophy and Ethics 314	3.00	3.00	1.00	0.00	9.00	week	(12)
TOTALS	17.00	4.00	10.00	0.00			(77)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Environmental Engineering 454	3.00	0.00	2.50	0.00	12.00	week	(15)
Design Project 488	1.00	3.00	0.00	0.00	24.00	week	(30)
TOTALS	4.00	3.00	2.50	0.00			(45)

CIVIL ENGINEERING

Year 2

Both Semesters

The Academic Literacy Module [Language Skills (Afrikaans) 276] is only applicable to students who followed the module Language Skills (Afrikaans) 176 during their first year of studies.

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 276	3.00	0.00	0.00	0.00	6.00	week	(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Applied Mathematics B 224	3.00	0.00	3.00	0.00	12.00	week	(15)
Engineering Geology 214	3.00	3.00	0.00	0.00	12.00	week	(15)
Engineering Mathematics 214	4.00	0.00	2.00	0.00	12.00	week	(15)
Strength of Materials 224	3.00	0.00	2.50	0.00	12.00	week	(15)
Land Surveying 214	3.00	3.00	0.00	0.00	12.00	week	(15)
TOTALS	16.00	6.00	7.50	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Applied Mathematics B 242	2.00	0.00	1.50	0.00	6.00	week	(8)
Applied Mathematics B 264	4.00	0.00	2.00	0.00	12.00	week	(15)
Building Materials 254	3.00	2.00	1.00	0.00	12.00	week	(15)
Engineering Informatics 244	3.00	0.00	2.50	0.00	12.00	week	(15)
Engineering Mathematics 252	2.00	0.00	1.00	0.00	6.00	week	(8)
Strength of Materials 254	3.00	0.00	2.50	0.00	12.00	week	(15)
Vacation Training 241	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	17.00	3.00	10.50	0.00			(76)

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Informatics 314	3.00	0.00	2.50	0.00	12.00	week	(15)
Engineering Statistics 314	3.00	0.00	2.50	0.00	12.00	week	(15)
Hydraulics 324	3.00	1.00	2.00	0.00	12.00	week	(15)
Geotechnique 324	3.00	1.00	1.50	0.00	12.00	week	(15)
Theory of Structures 324	3.00	0.00	2.50	0.00	12.00	week	(15)
TOTALS	15.00	2.00	11.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Geotechnique 354	3.00	1.50	1.00	0.00	12.00	week	(15)
Hydraulics 354	3.00	0.50	2.00	0.00	12.00	week	(15)
Structural Design 354	3.00	0.00	2.50	0.00	0.00	week	(15)
Theory of Structures 354	3.00	0.00	2.50	0.00	12.00	week	(15)
Transport Science 354	3.00	1.00	1.50	0.00	12.00	week	(15)
Vacation Training 342	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	15.00	4.00	9.50	0.00			(75)

Year 4

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Philosophy and Ethics 474 (Sem. 1)	3.00	0.00	1.00	0.00	6.00	week	(8)
Philosophy and Ethics 474 (Sem. 2)	0.00	3.00	0.00	0.00	3.00	week	(4)
TOTALS	3.00	3.00	1.00	0.00			(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Hydrology 424	3.00	0.00	2.50	0.00	12.00	week	(15)
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Structural Design 424	3.00	0.00	2.50	0.00	0.00	week	(15)
Transport Science 434	3.00	1.00	1.50	0.00	12.00	week	(15)
Hydraulic Engineering 424	3.00	0.00	2.50	0.00	12.00	week	(15)
TOTALS	15.00	1.00	10.00	0.00			(72)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Advanced Design (Civil) 446	2.00	6.00	0.00	0.00	12.00	week	(15)
Engineering Management 454	6.00	0.00	1.00	0.00	12.00	week	(15)
Environmental Engineering 454	3.00	0.00	2.50	0.00	12.00	week	(15)
Project (Civil Engineering) 458	1.00	20.00	0.00	0.00	22.00	week	(30)
TOTALS	12.00	26.00	3.50	0.00			(75)

ELECTRICAL AND ELECTRONIC ENGINEERING

Students who registered as first-years in 2009 (or thereafter) will specialise in one of the following modern focus areas in the fourth year: Telecommunication, Energy, Robotics or Informatics. Please refer to the following website for further information: http://www.ee.sun.ac.za

Year 2

Both Semesters

The Academic Literacy Module [Language Skills (Afrikaans) 276] is only applicable to students who followed the module Language Skills (Afrikaans) 176 during their first year of studies.

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 276	3.00	0.00	0.00	0.00	6.00	week	(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Applied Mathematics B 224	3.00	0.00	3.00	0.00	12.00	week	(15)
Computer Science E 214	3.00	3.00	0.00	0.00	12.00	week	(15)
Computer Systems 214	3.00	3.00	0.00	0.00	12.00	week	(15)
Engineering Mathematics 214	4.00	0.00	2.00	0.00	12.00	week	(15)
Systems and Signals 214	3.00	1.50	1.50	0.00	12.00	week	(15)
TOTALS	16.00	7.50	6.50	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Mathematics 242	2.00	0.00	1.00	0.00	6.00	week	(8)
Applied Mathematics B 242	2.00	0.00	1.50	0.00	6.00	week	(8)
Electronics 245	3.00	1.50	1.50	0.00	12.00	week	(15)
Energy Systems 244	3.00	1.50	1.50	0.00	12.00	week	(15)
Computer Systems 245	3.00	3.00	0.00	0.00	12.00	week	(15)
Systems and Signals 244	3.00	1.50	1.50	0.00	12.00	week	(15)
TOTALS	16.00	7.50	7.00	0.00			(76)

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Control Systems 314	3.00	1.50	1.50	0.00	12.00	week	(15)
Electromagnetics 314	3.00	1.50	1.50	0.00	12.00	week	(15)
Electronics 315	3.00	1.50	1.50	0.00	12.00	week	(15)
Systems and Signals 315	3.00	1.50	1.50	0.00	12.00	week	(15)
Design (E) 314	1.00	3.00	0.00	0.00	12.00	week	(15)
TOTALS	13.00	9.00	6.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Control Systems 344	3.00	1.50	1.50	0.00	12.00	week	(15)
Design (E) 344	1.00	3.00	0.00	0.00	12.00	week	(15)
Electronics 365	3.00	1.50	1.50	0.00	12.00	week	(15)
Systems and Signals 344	3.00	1.50	1.50	0.00	12.00	week	(15)
Elective Module	3.00	1.50	1.50	0.00	12.00	week	(15)
TOTALS	13.00	9.00	6.00	0.00			(75)

Elective Modules for Year 3

Choose one module from the following:

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Electromagnetics 344 *	3.00	1.50	1.50	0.00	12.00	week	(15)
Energy Systems 344 **	3.00	1.50	1.50	0.00	12.00	week	(15)

** Electromagnetics 344 is a prerequisite module for the Telecommunication specialty in Year 4*

** Energy Systems 344 is a prerequisite module for the Energy specialty in Year 4.

Year 4

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Philosophy and Ethics 474 (Sem. 1)	3.00	0.00	1.00	0.00	6.00	week	(8)
Philosophy and Ethics 474 (Sem. 2)	0.00	3.00	0.00	0.00	3.00	week	(4)
TOTALS	3.00	3.00	1.00	0.00			(12)

First Semester
Telecommunication

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
High Frequency Technique 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Systems and Signals 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Telecommunication 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Also choose one of the following:							
Electronics 414 or	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Science 315	2.00	4.00	0.00	0.00	12.00	week	(16)
TOTALS	14.00/ 15.00	4.00/ 7.00	4.00/ 5.00	0.00			(72/ 73)

First Semester
Informatics

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Systems and Signals 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Science 315	2.00	4.00	0.00	0.00	12.00	week	(16)
Computer Science 334	3.00	3.00	0.00	0.00	12.00	week	(16)
Also choose one of the following:							
Telecommunication 414 or	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Systems 414	3.00	1.00	1.00	0.00	12.00	week	(15)
TOTALS	14.00	9.00	3.00	0.00			(74)

First Semester
Energy

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Electronics 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Energy Systems 424	3.00	1.00	1.00	0.00	12.00	week	(15)
Energy Systems 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Also choose one of the following:							
Control Systems 414 or	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Systems 414	3.00	1.00	1.00	0.00	12.00	week	(15)
TOTALS	15.00	4.00	5.00	0.00			(72)

First Semester
Robotics

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Control Systems 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Systems and Signals 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Systems 414	3.00	1.00	1.00	0.00	12.00	week	(15)
Also choose one of the following:							
Electronics 414 or	3.00	1.00	1.00	0.00	12.00	week	(15)
Computer Science 315	2.00	4.00	0.00	0.00	12.00	week	(16)
TOTALS	14.00/ 15.00	4.00/ 7.00	4.00/ 5.00	0.00			(72/ 73)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Entrepreneurship (Eng) 444	3.00	0.00	3.00	0.00	12.00	week	(15)
Environmental Engineering 442 *	3.00	0.00	2.00	0.00	6.00	week	(8)
Project (E) 448	0.00	20.00	0.00	0.00	35.00	week	(45)
TOTALS	6.00	20.00	5.00	0.00			(68)

** Presented during the first 7 weeks of the semester.*

INDUSTRIAL ENGINEERING

Year 2

Both Semesters

The Academic Literacy Module [Language Skills (Afrikaans) 276] is only applicable to students who followed the module Language Skills (Afrikaans) 176 during their first year of studies.

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 276	3.00	0.00	0.00	0.00	6.00	week	(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Applied Mathematics B 224	3.00	0.00	3.00	0.00	12.00	week	(15)
Electro-Techniques 214	3.00	1.50	1.50	0.00	12.00	week	(15)
Engineering Economics 212	2.00	0.00	2.00	0.00	6.00	week	(8)
Engineering Mathematics 214	4.00	0.00	2.00	0.00	12.00	week	(15)
Production Management 212	2.00	0.00	2.00	0.00	6.00	week	(8)
Thermofluid Dynamics 214	3.00	0.00	3.00	0.00	12.00	week	(15)
Practical Workshop Training 211	1.00	0.00	0.00	0.00	0.00	week	(0)
TOTALS	18.00	1.50	13.50	0.00			(76)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Mathematics 242	2.00	0.00	1.00	0.00	6.00	week	(8)
Industrial Programming 244	2.00	0.00	3.00	0.00	12.00	week	(15)
Introductory Machine Design 244	1.00	3.00	2.00	0.00	12.00	week	(15)
Manufacturing Processes 244	2.00	1.50	1.00	0.00	12.00	week	(15)
Numerical Methods 262	2.00	0.00	1.00	0.00	6.00	week	(8)
Material Science A 244	3.00	3.00	0.00	0.00	12.00	week	(15)
TOTALS	12.00	7.50	8.00	0.00			(76)

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Control Systems 314	3.00	1.50	1.50	0.00	12.00	week	(15)
Electrical Drive Systems 324	3.00	1.00	2.00	0.00	12.00	week	(15)
Engineering Statistics 314	3.00	0.00	2.50	0.00	12.00	week	(15)
Philosophy and Ethics 314	3.00	3.00	1.00	0.00	9.00	week	(12)
Production Management 314	3.00	1.00	2.00	0.00	12.00	week	(15)
TOTALS	15.00	6.50	9.00	0.00			(72)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Quality Assurance 344	2.00	0.00	3.00	0.00	12.00	week	(15)
Electronics 245	3.00	1.50	1.50	0.00	12.00	week	(15)
Engineering Economics 354	2.00	0.00	3.00	0.00	12.00	week	(15)
Industrial Management 354	2.00	0.00	2.00	0.00	12.00	week	(15)
Operations Research (Eng) 345	2.00	0.00	3.00	0.00	12.00	week	(15)
Vacation Training 351	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	11.00	2.50	12.50	0.00			(75)

Year 4

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Industrial Project 498	0.00	0.00	0.00	1.00	0.00	week	(30)
TOTALS	0.00	0.00	0.00	1.00			(30)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Industrial Ergonomics 414	3.00	0.00	1.50	0.00	12.00	week	(15)
Information Systems 414	2.00	1.20	2.00	0.00	12.00	week	(15)
Manufacturing Systems 414	2.00	0.00	2.00	0.00	12.00	week	(15)
Project Management 412	3.00	0.00	1.00	0.00	9.00	week	(12)
Operations Research (Eng) 415	2.00	0.00	3.00	0.00	12.00	week	(15)
TOTALS	12.00	1.20	9.50	0.00			(72)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Enterprise Design 444	2.00	0.00	2.00	0.00	12.00	week	(15)
Environmental Engineering 442 *	3.00	0.00	2.00	0.00	6.00	week	(8)
Industrial Practice 442	2.00	0.00	1.00	0.00	6.00	week	(8)
Quality Management 444	2.00	0.00	3.00	0.00	12.00	week	(15)
Simulation 442	2.00	0.50	1.00	0.00	6.00	week	(8)
Vacation Training 451	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	11.00	1.50	9.00	0.00			(54)

** Presented during the first 7 weeks of the semester.*

MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL AND MECHATRONIC ENGINEERING

Year 2

Both Semesters

The Academic Literacy Module [Language Skills (Afrikaans) 276] is only applicable to students who followed the module Language Skills (Afrikaans) 176 during their first year of studies.

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Language Skills (Afrikaans) 276	3.00	0.00	0.00	0.00	6.00	week	(12)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Electro-Techniques 214	3.00	1.50	1.50	0.00	12.00	week	(15)
Engineering Mathematics 214	4.00	0.00	2.00	0.00	12.00	week	(15)
Strength of Materials 224	3.00	0.00	2.50	0.00	12.00	week	(15)
Thermodynamics A 214	3.00	0.00	3.00	0.00	12.00	week	(15)
Applied Mathematics B 224	3.00	0.00	3.00	0.00	12.00	week	(15)
TOTALS	16.00	1.50	12.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Engineering Mathematics 242	2.00	0.00	1.00	0.00	6.00	week	(8)
Introductory Machine Design 244	1.00	3.00	2.00	0.00	12.00	week	(15)
Material Science A 244	3.00	3.00	0.00	0.00	12.00	week	(15)
Numerical Methods 262	2.00	0.00	1.00	0.00	6.00	week	(8)
Strength of Materials W 244	3.00	1.00	2.00	0.00	12.00	week	(15)
Fluid Mechanics 244	3.00	1.00	2.00	0.00	12.00	week	(15)
TOTALS	14.00	8.00	8.00	0.00			(76)

Students must choose one of the following modules as elective, which must be added to the curriculum above:

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Practical Workshop Training 211	1.00	0.00	0.00	0.00	0.00	week	(0)
or							
Practical Workshop Training 241	1.00	0.00	0.00	0.00	0.00	week	(0)

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Electrical Drive Systems 324	3.00	1.00	2.00	0.00	12.00	week	(15)
Machine Design A 314	2.00	2.00	2.00	0.00	12.00	week	(15)
Modelling 334	4.00	1.00	2.00	0.00	14.00	week	(18)
Philosophy and Ethics 314	3.00	3.00	1.00	0.00	9.00	week	(12)
Strength of Materials W 334	3.00	1.00	2.00	0.00	12.00	week	(15)
TOTALS	15.00	8.00	9.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Control Systems 354	4.00	1.00	2.00	0.00	14.00	week	(18)
Electronics 245	3.00	1.50	1.50	0.00	12.00	week	(15)
Machine Design B 344	2.00	2.00	2.00	0.00	12.00	week	(15)
Thermofluid Dynamics 344	3.00	1.00	2.00	0.00	12.00	week	(15)
Vacation Training 341	0.00	1.00	0.00	0.00	0.00	week	(0)
Vibration and Noise 354	3.00	1.00	1.00	0.00	10.00	week	(12)
TOTALS	15.00	7.50	8.50	0.00			(75)

Year 4

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Mechanical Project 478 *	2.00	3.00	0.00	0.00	0.00	week	(45)
TOTALS	2.00	3.00	0.00	0.00			(45)

** Workload : 6 hrs/week (8 credits) in the first semester and 30 hrs/week (37 credits) in the second semester.*

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Energy Systems M 434	3.00	1.00	2.00	0.00	12.00	week	(15)
Heat Transfer A 414	3.00	1.00	2.00	0.00	12.00	week	(15)
Mechatronics 424	3.00	3.00	0.00	0.00	15.00	week	(18)
Project Management 412 *	3.00	0.00	1.00	0.00	9.00	week	(12)
TOTALS	12.00	5.00	5.00	0.00			(60)

Students must choose one of the following modules as elective, which must be added to the curriculum above:

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Finite Element Methods 414	3.00	1.00	2.00	0.00	12.00	week	(15)
Mechanical Engineering 414	3.00	1.00	2.00	0.00	12.00	week	(15)
Maintenance Management 414	3.00	1.00	2.00	0.00	12.00	week	(15)
Numerical Fluid Dynamics 414	3.00	1.00	2.00	0.00	12.00	week	(15)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Environmental Engineering 442 *	3.00	0.00	2.00	0.00	6.00	week	(8)
Mechanical Design 444	3.00	3.00	0.00	0.00	12.00	week	(15)
Production Management 444	3.00	0.00	2.00	0.00	10.00	week	(12)
Vacation Training 441	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	9.00	4.00	4.00	0.00			(35)

* *Presented during the first 7 weeks of the semester*

MECHATRONIC ENGINEERING

DEPARTMENT OF MECHANICAL AND MECHATRONIC ENGINEERING

Year 2: The same as Mechanical Engineering

Year 3

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Computer Systems 214	3.00	3.00	0.00	0.00	12.00	week	(15)
Electrical Drive Systems 324	3.00	1.00	2.00	0.00	12.00	week	(15)
Machine Design A 314	2.00	2.00	2.00	0.00	12.00	week	(15)
Modelling 334	4.00	1.00	2.00	0.00	14.00	week	(18)
Philosophy and Ethics 314	3.00	3.00	1.00	0.00	9.00	week	(12)
TOTALS	15.00	10.00	7.00	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Computer Systems 245	3.00	3.00	0.00	0.00	12.00	week	(15)
Control Systems 354	4.00	1.00	2.00	0.00	14.00	week	(18)
Electronics 245	3.00	1.50	1.50	0.00	12.00	week	(15)
Machine Design B 344	2.00	2.00	2.00	0.00	12.00	week	(15)
Vacation Training 341	0.00	1.00	0.00	0.00	0.00	week	(0)
Vibration and Noise 354	3.00	1.00	1.00	0.00	10.00	week	(12)
TOTALS	15.00	9.50	6.50	0.00			(75)

Year 4

Both Semesters

Choose one of the following modules:

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Mechatronic Project 478 *	2.00	3.00	0.00	0.00	0.00	week	(45)
Mechatronic Project 488 *	2.00	3.00	0.00	0.00	0.00	week	(45)

** Workload : 6 hrs/week (8 credits) in the first semester and 30 hrs/week (37 credits) in the second semester.*

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Electronics 315	3.00	1.50	1.50	0.00	12.00	week	(15)
Mechatronics 424	3.00	3.00	0.00	0.00	15.00	week	(18)
Design (E) 314	1.00	3.00	0.00	0.00	12.00	week	(15)
Project Management 412 *	3.00	0.00	1.00	0.00	9.00	week	(12)
Heat Transfer A 414	3.00	1.00	2.00	0.00	12.00	week	(15)
TOTALS	13.00	8.50	4.50	0.00			(75)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Mechanical Design 444	3.00	3.00	0.00	0.00	12.00	week	(15)
Environmental Engineering 442 *	3.00	0.00	2.00	0.00	6.00	week	(8)
Production Management 444	3.00	0.00	2.00	0.00	10.00	week	(12)
Vacation Training 441	0.00	1.00	0.00	0.00	0.00	week	(0)
TOTALS	9.00	4.00	4.00	0.00			(35)

** Presented in the first 7 weeks of the semester.*

4. The Extended Degree Programmes for Engineering

4.1 BACKGROUND

The Extended Degree Programmes for Engineering was established to help students with an inadequate school background to master a BEng programme and comprises a transition year followed by the curricula of the four-year BEng programmes. The Extended Degree Programmes therefore provide alternative access routes to the programmes in the Faculty of Engineering.

A limited number of students are selected for the Extended Degree Programmes, and preference is given to students from educationally disadvantaged communities. Section 8.2.4 gives the requirements that students have to meet in the first year to be allowed to proceed to the second year of the Extended Degree Programmes (which corresponds to the first year of the four-year BEng programmes).

4.2 PRESCRIBED MODULES

Both Semesters

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Chemistry 176	3.00	3.00	0.00	0.00	12.00	week	(32)
Computer Skills 176	2.00	0.00	2.00	0.00	5.00	week	(8)
Mathematics 186	3.00	0.00	3.00	0.00	12.00	week	(32)
TOTALS	8.00	3.00	5.00	0.00			(72)

First Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
University Practice in the Natural Sciences 176	3.00	0.00	0.00	0.00	6.00	week	(8)
Scientific Communication Skills 116	3.00	0.00	3.00	0.00	10.00	week	(12)
TOTALS	6.00	0.00	3.00	0.00			(20)

Second Semester

	l	*p*	*t*	*s*	*[h]*	*per*	*C*
Physics 146	3.00	3.00	0.00	0.00	12.00	week	(16)
Prepatory Technical Drawings 146	3.00	3.00	0.00	0.00	12.00	week	(16)
Scientific Communication Skills 146	3.00	0.00	0.00	0.00	5.00	week	(6)
TOTALS	9.00	6.00	0.00	0.00			(38)

5. Undergraduate Modules

5.1 ABBREVIATIONS AND NUMBERING SYSTEM

Example:

20753 APPLIED MATHEMATICS B

224 Dynamics of Rigid Bodies (15)
A & E *(4 l, 2 p, 2 t, 0 s per week)*

20753 is the subject number and is associated with the subject APPLIED MATHEMATICS B. **APPLIED MATHEMATICS B** is the name of the subject, **224** is the module code in the sequence **Y S H**:

Y indicates the year of study in which the module is usually presented. The example Applied Mathematics B 224 is presented in the second year of study. In the case of modules for honours degree programmes and postgraduate diplomas Y=7, for master's degree programmes Y=8, and for doctoral degree programmes Y=9.

S indicates the semester: S=1, 2 or 3 indicates a first-semester module, S=4, 5 or 6 indicates a second-semester module, and S=7, 8 or 9 a year module. The example Applied Mathematics B 224 is therefore a semester module presented in the first semester.

H is merely an auxiliary digit that distinguishes between different modules.

Dynamics of Rigid Bodies indicates the **module topic** (if described separately).

The digit that follows the module description in brackets indicates the **credit value** of the module. In the example, a student can obtain 15 **credits** by passing Applied Mathematics B 224. The **credit value** indicates how many hours of work would typically be required to complete the module, divided by ten (SAQA definition). A module with a credit value of 15 will require approximately 150 hours of work (including tests, examinations and contact sessions such as lectures).

A & E indicates the **language specification** of Applied Mathematics B 224. The respective language specifications are explained in Sections 3.4.2.1 to 3.4.2.4, of this Calendar part.

The **lecture load** *(4 l, 2 p, 2 t, 0 s per week)* has the following meaning:

l: lectures periods of 50 minutes
p: laboratory periods of 50–60 minutes each per week or three hours every third week
t: tutorial periods of 50–60 minutes
s: seminar periods of 50 minutes

The lecture load for the module Applied Mathematics B 224 is therefore 4 lecture periods, 2 laboratory practical periods and 2 tutorial periods per week.

The symbols in the **final mark formula** in the following section have the following meaning:

P = final mark,
K = class mark,
E = examination mark.

5.2 REQUIRED MODULES

Students must meet certain requirements before they may register for a particular module. The three requirement categories, indicated by the letters *PP*, *P* and *C*, are:

PP: Prerequisite Pass Module
A prerequisite pass module is a module in which a candidate has to attain a pass mark to be permitted to proceed to the module or modules for which this module is prescribed.

P: Prerequisite Module
A prerequisite module is a module in which students must have achieved a class mark of at least 40, if the module uses the examination system, or a final mark of at least 40, if other assessment methods are used, before they are allowed to proceed with the module for which it is a prerequisite module.

C: Corequisite Module
A corequisite module is a module that a candidate has to take in an earlier semester than, or in the same semester as, the module for which it is prescribed. A pass in such corequisite module is required before the degree or diploma concerned can be conferred.

In some modules, departmental approval (e.g. admission to the final year) is also required before a student may register for a module.

5.3 DETERMINING FINAL MARKS

The standard of a student's performance in a module is usually determined by means of the examination system, the flexible assessment system, or a system of continuous assessment. The University's regulations in this regard are set out in Part 1 of the Calendar.

In the Faculty of Engineering the class mark, based on tests, assignments, designs and project reports, may also be the final mark in certain modules. This method of determining the final mark is known as project assessment.

There are also modules in which satisfactory attendance is the only requirement. No final mark is awarded. All assignments must be executed satisfactorily before a student is credited with the module.

In some modules there are outcomes that have to be achieved to pass the module but that are not represented in the final mark formula. Subminima on certain assessments (or parts of assessments) are then used to assess the achievement of the outcomes. If a student has not achieved such an outcome (in other words, has not satisfied the corresponding subminimum), the student's final mark will not be allowed to exceed 45 for that module. If, during or after the completion of the semester's classes, a student cannot pass the module any more due to such subminima, he/she will normally not be admitted to further assessment opportunities for the particular module. This can lead to limiting the student's class mark to 35 or less in examination modules.

A student who, as a result of sickness or for any other certifiable reason, is unable to write a test or submit an assessment, must produce a declaration (for example a medical certificate) in this regard (indicating an acceptable reason and period of absence), to be submitted to the relevant lecturer within five working days after the test or assessment opportunity.

5.4 MODULE CONTENTS

36315 ADVANCED DESIGN (CIVIL)

446 Design Project (15)

A & E *(2.00 l, 6.00 p, 0.00 t, 0.00 s per week)*
150 hours per semester.
Each student completes a comprehensive design. The design can be done from any of the three subject areas. The detailed design is done by each student individually.

Home department: CIVIL ENGINEERING
Formula for Final mark: P = K
Method of Assessment: Project

Required modules:
Departmental approval

20753 APPLIED MATHEMATICS B

124 Statics (15)

A & E *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Vectors; forces; sum of forces at a point; direction cosines and direction angles; components and component vectors; scalar products; vector products; moment of a force; force systems on rigid bodies; equivalent force systems; couples; line of action of the resultant; equilibrium of a rigid body; friction; centre of mass; centroid; volumes; definite integration; moment of inertia of areas.

Home department: MATHEMATICAL SCIENCES

154 Dynamics (15)

A & E *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Kinematics in one and two dimensions; relative velocities; the equations of motion; rectilinear motion with constant forces; forces in a plane; parabolic motion; circular motion; the principle of work and energy; power; conservation laws; impulse and momentum; angle impulse and angle momentum; kinetics of particle systems.

Home department: MATHEMATICAL SCIENCES

Required modules:
C Engineering Mathematics 115
P Applied Mathematics B 124

224 Dynamics of Rigid Bodies (15)

A & E *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Plane kinetics of rigid bodies; rotation and translation; absolute motion; relative motion; instantaneous centre of zero velocity. Properties of rigid bodies; definite and multiple integrals; Cartesian, polar, cylindrical and spherical coordinate systems; areas, volumes, centres of mass and moments of inertia. Plane kinetics of rigid bodies; Newton's laws; energy methods. Introduction to three-dimensional dynamics of rigid bodies. Vibrations of rigid bodies.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics 144 or
P Applied Mathematics B 154

242 Vector Analysis (8)

A & E *(2.00 l, 0.00 p, 1.50 t, 0.00 s per week)*

The straight line and the plane; space curves, derivatives and integrals of vectors, curves, the unit tangent, arc length; surfaces, partial derivatives of vectors, the gradient vector, vector fields, vector differential operators; line integrals, gradient fields; surface integrals in the plane, Green's theorem, surface integrals in space, Stokes' theorem; volume integrals; Gauss' divergence theorem; centres of mass and moments of inertia of 1-, 2- and 3-dimensional bodies.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
C Applied Mathematics B 224
P Engineering Mathematics 145

264 Applied Mathematics for Civil Engineers (15)

A & E (Interpreting) *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Setting up of differential equations (ordinary and partial); analytic solutions; computer-aided geometric design (CAGD); applications of linear algebra to analytical geometry.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 154

57452 BIOLOGY (ENG)

324 Biotechnology (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
5 Practicals per semester
Chemical composition of cells; cell structure of bacteria and yeasts; microbial counting techniques; growth and inhibition of cell growth; environmental factors that influence growth; sources of energy; metabolism; enzyme catalysis; central dogma of information flow from DNA to mRNA to protein; basic recombinant DNA technology; genetic and metabolic manipulation of micro-organisms; industrial biological processes, e.g. bioleaching of ores; kinetic rate equations; process design equations for batch, fed-batch and continuous operation; endogenous respiration and energy of maintenance concepts; prediction of oxygen transfer coefficient and oxygen transfer rate; bioreactor scale-up, thermal death and degradation kinetics; batch and continuous sterilisation; downstream processing.
[Presented by the Department of Microbiology (40%) and the Department of Process Engineering (60%)]

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 254
C Chemical Engineering 316

39020 BUILDING MATERIALS

254 Basic Building Materials Practice (15)

A & E (Interpreting) *(3.00 l, 2.00 p, 1.00 t, 0.00 s per week)*
Composition, manufacturing, mechanical behaviour and durability of construction materials in civil engineering, including concrete, masonry, polymers, steel and timber; test methods for control and characterisation.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Chemistry 123

11576 CHEMICAL ENGINEERING

224 Principles and Processes of Chemical Engineering (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Introduction to processes and design; process modelling using conservation principles; analysis methods for chemical processes.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Chemistry 123
C Thermodynamics A 214

254 Mass and Energy Balances (15)

A & E *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Mass balances, unsteady mass balances, energy balances, heats of reaction and of solution, energy balances over process systems, combined mass and energy balances, non-ideal gases and compressibility, steam tables and physical properties of chemical components. Home assignments comprising self-study, tutorial problems, designs or seminars form an integral part of this module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Chemical Engineering 224
P Engineering Mathematics 214

264 Fluid Mechanics for Chemical Engineers (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Physical properties of liquids and gases; fluid statics; fluid kinematics; fluid dynamics; continuity, momentum and energy equations; dimensional analysis; viscous flow in pipes and closed ducts; friction charts; flow in non-round channels; flow measurement; losses in pipe systems, series and parallel pipes; boundary layers; turbomachinery; design of pump and piping systems; compressible flow; pipes and fittings.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 224
P Thermodynamics A 214
P Engineering Mathematics 214

271 Supplementary Studies (15)

A *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

The module content is arranged according to the requirements of individual students.

Home department: PROCESS ENGINEERING

316 Reaction Engineering I (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

1 Practical per semester.

Chemical reactor theory; homogeneous and heterogeneous reactions; the reaction rate equation; interpretation of batch reaction data; principles of reactor design; ideal batch, plug flow and constant flow stirred tank reactors; design for simple and complex reactions; influence of temperature and pressure; non-ideal flow; biochemical reactors. Home assignments comprising self-study, tutorial problems, designs or seminars form an integral part of this module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Chemical Engineering 317
C Heat Transfer A 326

317 Thermodynamics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
1 Practical per semester.
Equations of state for real gases and thermodynamic transformation relationships, thermodynamic properties of pure components, mixing rules for non-ideal vapour mixtures, vapour liquid equilibria, theory and application of solution thermodynamics, chemistry of reaction equilibria, multi-component and multi-phase equilibrium with application in solid-liquid-vapour systems, cooling. Simulation of phase equilibrium and reaction equilibrium on computer with use of standard process simulation packages.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Thermodynamics A 214
PP Chemical Engineering 254 and 264
Any two of the above three modules are required.
P Thermodynamics A 214
P Chemical Engineering 254 and 264
P Engineering Mathematics 214 and 242

344 Modelling and Optimisation (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Steady and unsteady state mass, energy and momentum balances. Modelling and simulation of integrated process units. Process integration.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 214 and 242
P Numerical Methods 262
P Chemical Engineering 254
C Chemical Engineering 316

354 Reaction Engineering II (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Energy balances in reactor design; non-steady conditions; design of heterogeneous reaction systems; solid phase catalytic reactions; deactivation of catalysts; mass transfer limitations; fluid-particle reactions; fluid reactions. Home assignments comprising self-study, tutorial problems, designs or seminars form an integral part of this module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 316

367 Mass Transfer Operations (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Distillation: batch and continuous distillation; McCabe-Thiele and Ponchont-Savarit graphical methods; multicomponent distillation; plate and packed columns; gas absorption; other mass transfer unit operations consisting of a selection from: cooling towers, drying, liquid-liquid extraction and adsorption. Tutorials, designs and seminars form an integral part of the module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 264 and 317

371 Supplementary Studies (15)

T *(1.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
The module content is arranged according to the requirements of individual students.

Home department: PROCESS ENGINEERING

412 Materials Engineering for Chemical Engineers (8)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Materials selection for chemical engineering; corrosion engineering.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP All the prescribed modules of the first 2 years of the relevant BEng programme.

414 Process Design (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Methods of conceptual process design including heuristics for separation system design; complex mass and energy balances and diagrams for integrated unit operations; plant layout; pipe and equipment selection and layout for multi-phase transport and processing; piping and instrumentation diagrams; loss control; risk analysis; preliminary hazard analysis and inherently safe process design; HAZOP and HAZAN studies; capital cost estimation, time-value of money, discounted cash flow, net present value, profitability standards; case studies.
Home assignments comprising self-study, tutorial problems, designs or seminars form an integral part of this module.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
C Heat Transfer A 326
C Chemical Engineering 316 and 367

426 Process Control (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
1 Practical per semester
Dynamic behaviour of processes and equipment; measurement instruments; valves; application of Laplace transforms; stability criteria; multi-variable control systems; non-linear control systems; state analysis; digital process control; optimal control; process identification; simulation/design of control systems on computer (PC).
Home assignments comprising self-study, tutorial problems, designs or seminars form an integral part of this module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Mathematics 242
P Chemical Engineering 316 and 344

478 Final-Year Project (30)

A & E *(0.00 l, 6.00 p, 0.00 t, 0.00 s per week)*
First Semester (4): (0,00 l, 2,00 p, 0,00 t, 0,0 s per week)
Second Semester (26): (0,00 l, 6,00 p, 0,00 t, 0,0 s per week)
Each student must complete an independent project on an approved topic.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

41696 CHEMICAL ENGINEERING D

244 Experimental Design (15)

A & E (Interpreting) *(3.00 l, 2.00 p, 1.00 t, 0.00 s per week)*
8 Practicals per semester.
Variability of measurements; tabulation, presentation and description of observations; discrete and continuous variables and their probability models; binomial, negative binomial; Poisson, exponential and normal distributions; reliability theory; simulation and application of probability models; sampling distributions and estimation of parameters; confidence intervals; the measurement of relationships; simple linear regression and correlation analysis; estimation with the method of least squares; fundamentals of quality control. Statistical design of experiments. Statistical analysis of experimental data.
Carrying out Chemical Engineering experiments on pilot scale; report writing and computer simulations.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
C Chemical Engineering 224 and 264

356 Pilot Plant Laboratory III (15)

A & E (Interpreting) *(1.00 l, 6.00 p, 0.00 t, 0.00 s per week)*
6 Practicals per semester.
Carrying out practical experiments on pilot plant scale. Evaluation, interpretation and writing complete technical reports on the experiments. Sampling and practical data interpretation on chemical plants (2 *l*).
[Presented by the Department of Process Engineering (85%)]

Techniques in analytical chemistry: principles of analysis, choice of analytical method, sample preparation. Selected methods, among others UV/vis, AA and mass spectroscopy, chromatography, ICP (8 *l*, 3 demonstrations).
[Presented by the Department of Chemistry and Polymer Science (15%)]

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
C Heat Transfer A 326
C Chemical Engineering 316 and 367
C Mineral Processing 345

11479 CHEMISTRY

176 Introduction to Chemistry (32)

A & E *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
For students in the BSc (Extended Degree Programme). This module deals with the following themes: classification of matter; atoms, molecules and ions; stoichiometry; reactions in aqueous solutions; atomic structure; chemical bonding; acid and bases; the periodic table. Examples that illustrate the importance and relevance of science as an everyday phenomenon.

Home department: CHEMISTRY AND POLYMER SCIENCE
Method of Assessment: Flexible Assessment

48321 CHEMISTRY C

224 Industrial Chemistry I (15)

A & E (Interpreting) *(4.00 l, 2.00 p, 0.00 t, 0.00 s per week)*
8 Practicals per semester
Bonding models; solid-state chemistry; chemistry in solution; introduction to coordination chemistry. Thermochemistry, chemical and phase equilibrium, ideal and electrolyte solutions, electrochemistry, colligative properties, elementary chemical kinetics.

Home department: CHEMISTRY AND POLYMER SCIENCE
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Chemistry 123

254 Industrial Chemistry II (15)

A & E (Interpreting) *(4.00 l, 2.00 p, 0.00 t, 0.00 s per week)*
8 Practicals per semester
Organic chemistry: basic nomenclature, introduction to preparation and reactions of *inter alia* alkenes, alkynes, alkyl halides, alcohols, ketones, carboxylic acids and esters; Introduction to polymer chemistry: chemistry of polymerisation reactions, *inter alia* polyesters, polyamides.

Home department: CHEMISTRY AND POLYMER SCIENCE
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Chemistry 123

30317 COMPUTER PROGRAMMING

143 Computer Programming (12)

A & E *(3.00 l, 2.00 p, 0.00 t, 0.00 s per week)*
Introduction to computer systems. Introduction to a programming environment; expressions; conditional statements; iterative structures; data types; static and dynamic data structures; file handling; abstract data types; objects; structured program design. Emphasis is placed on modular programming for engineering applications.
[Presented by the Department of Electrical and Electronic Engineering (75%) and by the Department of Mechanical and Mechatronic Engineering (25%)]

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=0,4K+0,6E
Method of Assessment: Examination

18139 COMPUTER SCIENCE

315 Machine Learning (16)

T *(2.00 l, 4.00 p, 0.00 t, 0.00 s per week)*
Dimension reduction techniques; machine-learning techniques based on maximum-likelihood, maximum-posterior and expectation-maximization estimates; modelling using logistic regression, Gaussian mixtures and hidden Markov models.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Continuous

Required modules:
PP Computer Science 144 or
P Computer Science E 214
P Mathematical Statistics 244 or
P Systems and Signals 344

334 Databases and Web Centric Programming (16)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Introduction to relational databases. Mapping relational model onto object model.
Implementing a database application in the context of the web. Web services.
Server-side scalability. Virtualization. Cloud Computing.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Continuous

Required modules:
P Computer Science 214, 244

For programmes in Engineering:
P Computer Science E 214
P Computer Systems 245

59536 COMPUTER SCIENCE E

214 Object-Oriented Programming (15)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Formulation and solution of problems by means of computer programming in an object-oriented set-up; principles of testing and debugging; key concepts in object orientation: abstraction, encapsulation, inheritance and polymorphism; design patterns as abstractions for the creation of reusable object oriented designs; searching and sorting algorithms; complexity theory for the analysis of algorithms; fundamental methods in the design of algorithms; dynamic data structures.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Continuous

Required modules:
PP Computer Programming 143
P Engineering Mathematics 115, 145

50040 COMPUTER SKILLS

176 Computer Skills (8)

A & E *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
This module is taken by students in the BSc (Extended Degree Programme). Utilisation of computers in computer users' areas on campus. Introduction to an operating system, Internet, E-mail, word processing, spreadsheet and presentation software.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: The class mark will serve as the final mark.

36153 COMPUTER SYSTEMS

214 Introduction to Computer Systems (15)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Boolean algebra; combinational and sequential circuit analysis and design; state machines; hardware description languages; programmable logic.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Computer Programming 143

245 Microprocessors (15)
A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Assembler language programming; basic microprocessor architecture; bus, memory and input-output systems.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Computer Systems 214

414 Computer Systems (15)
A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Hardware/software co-design; embedded systems; computer networks.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Computer Systems 245

23965 CONTROL SYSTEMS

314 Control Systems (15)
A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Classical feedback control of dynamic systems; feedback control architecture; dynamic modelling of mechanical, electronic and electro-mechanical systems; transfer functions; block diagrams; stability; transient effects and steady state error; root locus analysis and design; frequency response analysis and design; PID controllers; lead and lag compensation.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 214

344 Control Systems (15)
A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Continuous state space models, analysis and synthesis; continuous estimators; transient and steady state response of state variable representations; pole placement for finite time responses; Discrete systems, Z-transforms; ZOH circuits, difference equations; emulation design; discrete root locus; discrete state space analysis and design; practical issues: A/D and D/A convertors, quantisation effects and anti-aliasing filters.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Control Systems 314

354 Design of Control Systems for Mechanical and Mechatronic Systems (18)
A & E (Interpreting) *(4.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Design of control systems: PID controllers; root locus design; lead and lag compensation; frequency response analysis design. Continuous state space models, analysis and synthesis;

continuous estimators; transient and steady state response of state variable representations; pole placement techniques. Discrete control systems, Z-transforms; ZOH circuits; difference equations; discrete root locus; practical considerations: A/D en D/A converters and filters.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Modelling 334

414 Control Systems (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Modelling of non-linear systems; analysis and synthesis using describing functions, phase plane and Lyapunov methods. Discrete state-variable models for sampled plants, pole placement feedback and observer analysis and synthesis for regulators and servotrackers. Optimal LR and Kalman observer analysis and synthesis.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Control Systems 344

47929 DESIGN PROJECT

488 Design (30)

A & E *(1.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Choice of the best process from several available processes for a specific plant design, and factors and criteria involved. The design of a process plant (or sub-process) with consideration of process thermodynamics, kinetics and transport phenomena. The focus is on basic process design, safety, control, plant layout, process flowsheets and plant material and energy balances, piping and instrumentation diagrams, cost estimation, environmental impact, and profitability.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year Enrolment

46833 DESIGN (E)

314 Digital Design (15)

A & E (Interpreting) *(1.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Design philosophy; design techniques; milestones; data interpretation; development of simple software and hardware in order to demonstrate a small functional microprocessor system; debugging of digital circuits; report writing.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
P Computer Systems 245

344 Electronic Design (15)

A & E (Interpreting) *(1.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Design of a complex electronic system with circuit and software components; problem solution; application of scientific and engineering knowledge; design techniques for software and circuits; experiments; data-interpretation; fault diagnosis; use of equipment and software; independent learning; professional communication.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
P Electronics 315
P Computer Science E 214

11949 ELECTRICAL DRIVE SYSTEMS

324 Principles of Electrical Machines and Power Electronics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Non-ideal transformer model; introduction to machine principles; alternating current machine principles; basic working in the steady state of synchronous generators, synchronous motors and induction motors; inverter-fed induction machine drives; basic working in the steady state of direct current motors and direct current generators; converter-fed direct current machine drives; basic working of single-phase motors and stepper motors.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electro-Techniques 214

51357 ELECTROMAGNETICS

314 Electromagnetics (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Electrostatics; magnetostatics; Ohmic conduction; Lorentz force law; laws of Coulomb, Ampère, Faraday and Gauss; Maxwell's equations; capacitance; inductance.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 224 and B 242

344 Electromagnetics (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Maxwell's equations; electromagnetic waves; transmission lines; antennas.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electromagnetics 314

12491 ELECTRONICS

245 Electronics (15)

A & E *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Semi-conductor physics; pn junctions; diode circuits; bipolar transistors; small signal dynamic transistor models.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 214 or
P Electro-Techniques 214

315 Electronics (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Single-stage transistor amplifiers; junction FETs and MOSFETs; frequency response of amplifiers; transistor switches; filters.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electronics 245

365 Electronics (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Power amplifiers; current sources; differential amplifiers; feedback amplifiers and stability; non-ideal operational amplifiers; oscillators and wave-shaping circuits.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electronics 315

414 Electronics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
The terminal properties of power electronic switches; the operation, analysis and design of thyristor-controlled rectifiers; basic DC-to-DC converters: the buck, boost and buck-boost converters; half-bridge, full-bridge and three-phase converters; switch-mode power supplies; basic inductor and transformer design; simulation and closed-loop control of converters.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electronics 365
P Control Systems 314

12599 ELECTROTECHNIQUE

143 Introduction to Circuit Theory and Electrical Machines (15)

A & E *(3.50 l, 1.50 p, 1.50 t, 0.00 s per week)*
Kirchhoff's laws; node-voltage analysis and mash-current analysis; superposition; Thevenin and Norton equivalents; simple RC and DC circuits; sinusoidal signals and phasors; AC circuit analysis; power and energy; magnetic circuits; ideal transformers; introduction to electrical machines.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=0,4K+0,6E
Method of Assessment: Examination

214 Electro-Techniques (15)

A & E *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Alternating current theory; phasors; transient behaviour of first- and second-order RLC circuits; resonance; low-pass, high-pass and bandpass filters; Bode plots; AC power; complex power; power factor and power factor improvement; ideal transformer; three-phase AC theory, power in three-phase circuits; star- and delta-connected balanced and unbalanced loads; low-voltage distribution; earthing; over-current and earth fault protection; generation of electricity; transmission; cost of electricity; magnetic circuits; B-H curves; electro-mechanics; electro-mechanical actuators (solenoids); ideal operational amplifiers.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electro-Techniques 143

43915 ENERGY SYSTEMS

244 Electrical Energy Systems (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Introduction to power systems; single and three-phase alternating current theory; power transformers; per-unit system; symmetrical components; modelling of transmission lines; steady-state operation of transmission lines.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 214

344 Energy Conversion (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Introduction to electrical machine systems; AC machine principles; steady-state operation of synchronous and induction machines; DC machine principles; steady-state operation of DC machines; the converter-fed DC machine system; the converter-fed induction machine system; dq0 transformation; dq0 AC machine modelling and dynamics.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Energy Systems 244

414 Renewable Energy Systems (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Introduction to renewable energy resources; principle of renewable energy power conversion; commercially viable renewable energy technologies; renewable energy system sizing and design; maximum power point control technology; power conditioning and grid integration of renewable energy systems; economic benefits and environmental impact assessment.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Energy Systems 344
C Electronics 414

424 Electrical Energy Systems (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Power systems: power flow studies; symmetric and asymmetric faults, protection systems; power system stability.

High voltage: HV measuring equipment; measuring techniques and tests; insulation coordination; theory and characteristics of insulating materials; electrical discharges.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Energy Systems 244 and 344

51365 ENERGY SYSTEMS M

434 Mechanical Energy Systems (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Thermodynamic relationships for ideal and non-ideal gases, Joule-Thompson throttling effect; further applications of air-watervapour mixtures in the psychrometrics of air conditioning systems and cooling towers; mass and energy balances for reactive systems; the principles of internal combustion engines. Boiler, pump and atmospheric cooling systems; advanced analysis of vapour and combination power cycles; Stirling cycle; high-pressure water and pebble bed modular nuclear reactor-based cycles; introduction to solar energy; analytical determination of available radiant energy; central collector; parabolic trough and solar chimney power station cycles. Wind and ocean energy.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Thermofluid Dynamics 344

49484 ENGINEERING CHEMISTRY

123 Chemistry for Engineering Students (15)

A & E *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Basic concepts, units and dimensions, significant figures, conversion between unit systems; components of matter, atomic structure, the periodic table and chemical bonding; stoichiometry; chemical reactions (acid-base, precipitation and redox); properties of mixtures and solutions; chemical equilibrium; electrochemistry; gas laws, state functions and (T, P, V) relationships; thermodynamics and thermochemistry; introduction to basic engineering applications.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=0,4K+0,6E
Method of Assessment: Examination

Required modules:
C Engineering Mathematics 115

46825 ENGINEERING DRAWINGS

123 Orthographic Drawings (15)

A & E *(1.00 l, 3.00 p, 3.00 t, 0.00 s per week)*
Projection planes; points, lines and planes in space; trace points of lines and trace lines of planes; true lengths and true angles between lines and planes; true angles between planes; new projection planes; interpenetrations; developments; isometric projections. Works drawings: 1st- and 3rd-angle projections; line alphabet; dimensioning; scale; three-view drawing layout; auxiliary views; hidden detail; introduction to sections and cross-hatching. Introduction to 2D CAD and 3D parametric CAD.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=0,5K+0,5E
Method of Assessment: Examination

18791 ENGINEERING ECONOMICS

212 Engineering Economics (8)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Introduction to accounting: financing, tax and growth of a business. Income, balance sheet and cash flow statements. Financial ratios.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

354 Engineering Economics (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
The capital cycle, time value of money, discounted cash flow, equivalence and returns, after tax cash flow analyses, inflation and exchange rates. Working capital cycles, the cost of capital, cost accounting, budgets. Introduction to the macro economy and the SA budget.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Economics 212

59552 ENGINEERING GEOLOGY

214 Geology for Civil Engineers (15)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
This module does not grant admission to Geology 224, 244 and 254.

Introduction to the Earth system: internal structure, plate tectonics; Crystallography introductory; Mineralogy: physical properties of common minerals; Petrology: magma, igneous, sedimentary and metamorphic rocks; Structural geology: strike and dip of layers, folds and faults, tectonic forms, foliation, lineation, geological mapping.

Home department: EARTH SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Chemistry 123

59560 ENGINEERING INFORMATICS

244 Object-Oriented Programming and Modelling (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Basic concepts of the object-oriented programming model, algorithms and data structures for engineering models, object models of simple problems.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Computer Programming 143

314 Object Modelling of Physical Problems (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Boundary value problems and integral forms of physical problems, finite element methods for the solution of these problems, solution of systems of linear equations, implementation of a finite element object model.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Informatics 244
P Engineering Mathematics 252
P Applied Mathematics B 242

51373 ENGINEERING MANAGEMENT

454 Engineering Economics and Professional Practice (15)

A & E (Interpreting) *(6.00 l, 0.00 p, 1.00 t, 0.00 s per week)*

Engineering economics: basic concepts, time value of money; relation between present, future and serial values; cash flow. Economic analysis, comparison and decision-making among alternatives: net present value, internal rate of return, cost/benefit models, handling of risk. Life cycle costing, depreciation and replacement decision. Development financing.
Professional practice: Engineering Act, ethical code, professional registration and accountability. Practice management and bussiness plans. Design and construction management, the role of the client. Sustainablity. Tender documentation. Strategic management. Labour relations and project safety. Development projects. Infrastructure asset management.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
Departmental approval

38571 ENGINEERING MATHEMATICS

115 Introductory Differential and Integral Calculus (15)

A & E *(5.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Any student who wishes to take this module must have achieved a mark of at least 6 (or 70%) for Mathematics in the NSC or the IEB's school-leaving certificate or must have successfully completed the first year of a suitable extended degree programme.
Mathematical induction and the binomial theorem; functions; limits and continuity; derivatives and rules of differentiation; applications of differentiation; the definite and indefinite integral; integration of simple functions.

Home department: MATHEMATICAL SCIENCES

145 Further Differential and Integral Calculus (15)

A & E *(5.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Complex numbers; transcendental functions; integration techniques; improper integrals; conic sections; polar coordinates; partial derivatives; introduction to matrices and determinants.

Home department: MATHEMATICAL SCIENCES

Required modules:
P Engineering Mathematics 115

197 Engineering Mathematics for EDP students (8)

A & E *(0.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Supplemental module for Engineering Mathematics 115: mathematical induction and the binomial theorem; functions; limits and continuity; derivatives and rules for differentiation; applications of differentiation; the definite and indefinite integral; integration of simple functions.

Home department: MATHEMATICAL SCIENCES

198 Engineering Mathematics for EDP students (8)

A & E *(0.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Supplemental module for Engineering Mathematics 145: transcendental functions; integration techniques; improper integrals; conic sections; polar coordinates; partial derivatives; complex numbers; introduction to matrices and determinants.

Home department: MATHEMATICAL SCIENCES

214 Differential Equations and Linear Algebra (15)

A & E *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Ordinary differential equations of first order; linear differential equations of higher orders; Laplace transforms and applications. Matrices: linear independence, rank, eigenvalues. Laplace transforms and applications.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Mathematics 115 or 145
P Engineering Mathematics 145

242 Series and Partial Differential Equations (8)

A & E *(2.00 l, 0.00 p, 1.00 t, 0.00 s per week)*
Infinite series and Taylor series; Fourier series; introduction to partial differential equations; Fourier transforms.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Mathematics 145 or 214
P Engineering Mathematics 214

252 Galerkin Finite Element Method (8)

A & E (Interpreting) *(2.00 l, 0.00 p, 1.00 t, 0.00 s per week)*
Infinite series, Taylor series. Weighted residuals; introduction to the Galerkin finite element method for problems in one and two dimensions.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Mathematics 145 or 214
P Engineering Mathematics 214

59498 ENGINEERING STATISTICS

314 Engineering Statistics (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*

Applied probability theory; applications based on discrete and continuous random variables and their probability distributions, such as the normal, gamma, lognormal, log-Pearson type 3 (LP3), Gumbel (EV1) distributions; queuing processes; joint distributions; descriptive statistics and graphical presentations; moments, averages, median and standard deviations; moment generating functions; variation coefficient; skewness coefficient; peaking coefficient; sampling theory; point and interval estimation; hypothesis testing; μ2 and K-S testing; simple linear and non-linear regression and correlation analyses; introduction to multiple linear regression; introduction to analysis of variance and experimental design.

Home department: Statistics and Actuarial Science
Formula for Final mark: P=0,4K+0,6E
Method of Assessment: Examination

Required modules:
PP Engineering Mathematics 115, 145

59501 ENTERPRISE DESIGN

444 Enterprise Design (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Systems engineering, approaches towards enterprise modelling and supply chain management. Concepts like knowledge management, innovation, and different life cycles will be applied through the complete design of an enterprise within formal information, manufacturing and organisational architectures.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
Final-year enrolment

59455 ENTREPRENEURSHIP (ENG)

444 Entrepreneurship (Eng) (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Business strategy: business as a system; life cycles; competitiveness forecasts; entry into the market; portfolio decisions; long-term profitability; marketing management; introduction to the theory of organisation. Financial management: time-value of money, basic discounting concepts; economic analysis of investment proposals; introduction to financing and dividend decisions.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

50431 ENVIRONMENTAL ENGINEERING

442 Engineering and the Environment (8)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
for 7 weeks
Energy and the environment; environmental engineering principles, including sustainable development, ethical elements of environmental management and socio-ecological factors in decision making; environmental assessments and management, including pollution control and abatement, environmental impact assessments, environmental auditing, environmental management systems and ISO 14000 standards; environmental governance and related legislation.
[Presented by the Department of Mechanical and Mechatronic Engineering (50%) and the Department of Process Engineering (50%)]

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
Prerequisite for Engineering students: All the prescribed modules for the first two years of the relevant BEng programme
Prerequisite for AgriSciences students: All the modules for the first two years of the Wood Products Science programme

454 Environmental Engineering (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Energy and the environment; environmental engineering principles, including sustainable development, ethical elements of environmental management and socio-ecological factors in decision making; environmental assessments and management, including pollution control and abatement, environmental impact assessments, environmental auditing, environmental management systems and ISO 14000 standards; environmental governance and related legislation (7 weeks).
Water chemistry, aspects and abatement of air pollution, solid-waste management, immobilisation of solid waste, engineering techniques for effluent and water treatment such as ultrafiltration and reverse osmosis, adsorption and ion exchange, precipitation and crystallisation, ultra violet radiation, biological techniques. Disposal of hazardous waste. (6 weeks)
[Presented by the Department of Civil Engineering (50%) and the Department of Process Engineering (50%)]

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
All the prescribed modules for the first 2 years of the relevant BEng programme

41726 FINITE ELEMENT METHODS

414 Finite Element Methods (Elective Module) (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Revision of strength of materials concepts; principle of virtual work; truss/beam elements; plane stress/strain elements; isoparametric formulation; 3D elements; axisymmetric elements; plate and shell elements; structural symmetry; dynamic analysis; buckling analysis; use of finite element software to solve simple problems.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
P Strength of Materials W 334

44415 FLUID MECHANICS

244 First Course in Fluid Mechanics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Physical properties of liquids and gases; fluid statics and manometers, forces on and stability of buoyant bodies, pressure centre and meta-centre; fluid kinematics; fluid dynamics; integral relations for a control volume; introduction to vector analysis; differential relations; continuity, momentum and energy equations; Bernoulli and Navier-Stokes equations; similarity theory, dimensional analysis; viscous flow in pipes and closed ducts; friction charts; flow in non-round channels; flow measurement; losses in pipe systems, series en parallel pipes; basic theory of turbomachines; pumps; characteristic curves of pumps; pump systems.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 224
P Thermodynamics A 214
P Engineering Mathematics 214

21180 FOOD FACTORY MACHINERY

414 Engineering Fundamentals of Food Processing (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Engineering approach to problem-solving; thermodynamic properties of water and an ideal gas; conservation of mass, momentum and energy, and entropy; thermodynamic processes in closed and open systems; generation, usage and reticulation of steam; pump and pipe systems; fans and ducts; steady-state conduction, convection and radiation; air-water vapour mixtures and air conditioning processes.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

444 Food Process Engineering (15)

E *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Behaviour and properties of Newtonian and non-Newtonian fluids; the refrigeration cycle and refrigeration components and equipment; storage of food products by cooling and freezing; heat transfer, including the determination of heat transfer coefficients, boiling and condensation; transient heat transfer during heating, freezing and thawing; mass transfer; thermal processing of foodstuffs; evaporation and concentration; drying theory and drying equipment; mixing; process control.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=0,5K+0,5E
Method of Assessment: Examination

Required modules:
P Food Factory Machinery 414

39667 GEOTECHNIQUE

324 Geotechnical Theories (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.50 t, 0.00 s per week)*

Geotechnical soil properties: particle size analysis, plasticity, soil classification, phase relationships, compaction. Ground water movement: permeability, seepage theory, flow nets, filter design. Effective stress: theory of effective stress, stress by own weight and seepage effects. Elastic stress theory: stresses and immediate settlement resulting from surface loading. Consolidation settlement: settlement of clay soil, rate of settlement, total and immediate settlement.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Engineering Geology 214

354 Sliding Resistance, Retaining Walls, Foundations and Slopes (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.00 t, 0.00 s per week)*

Shear strength: shear testing, shear behaviour of sand and clay, stress paths, pore pressure coefficients. Lateral earth pressure: earth pressure theory, gravity walls, embedded walls. Bearing capacity: shallow foundations, eccentric loads, settlement on sand, piles. Slope stability: parallel slips, circular slip, method of slices, safety factors.
Practical: consolidation test in the oedometer.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Strength of Materials 224
C Geotechnique 324

33928 HEAT TRANSFER A

326 Heat Transfer (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
1 Practical per semester.
Heat conduction; analytical and numerical methods for steady and unsteady conduction. Convection: boundary layer equations, laminar and turbulent flow, natural convection, boiling and condensation. Heat exchangers: overall transfer coefficients, parallel, transverse and cross-flow, logarithmic mean temperature difference, effectiveness-NTU calculations, types and design principles. Radiation: absorption and emission, black bodies, emissivity, form factors, radiation heat transfer between surfaces, radiating gases. Mass transfer: diffusion processes, transport analogies, Colburn j-factors, combined mass and heat transfer. Homework assignments in the form of self-study, tutorial problems, designs or seminars form an integral part of the module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Thermodynamics A 214
P Engineering Mathematics 214
P Chemical Engineering 254 and 264
P Engineering Mathematics 242
P Numerical Methods 262

414 Heat Transfer (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Heat conduction; analytical and numerical methods for steady and unsteady conduction. Convection: boundary layer equations, laminar and turbulent flow, natural convection, boiling and condensation. Heat exchangers: overall transfer coefficients, parallel, transverse and cross-flow; logarithmic mean temperature difference, effectiveness-NTU calculations, types and design principles. Radiation: absorption and emission, black bodies, emissivity, form factors, radiation heat transfer between surfaces, radiating gases. Mass transfer: diffusion processes, transport analogies, Colburn j-factors, combined mass and heat transfer. Homework assignments in the form of self-study, tutorial problems, designs or seminars form an integral part of the module.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Fluid Mechanics 244
P Thermodynamics A 214

52124 HIGH FREQUENCY TECHNIQUE

414 High-Frequency Technique (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Smith chart and applications; impedance-matching networks; amplifier design; oscillator design; high-frequency systems; electromagnetic compatibility; electro-dynamics and radiation; wire antennas; antenna design; HF metrology.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electromagnetics 344

21350 HYDRAULIC ENGINEERING

424 Storm Water Drainage and Hydraulic Structures (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Stormwater hydraulics: general introduction and guidelines; design floods.
Stormwater discharge: land, roads, parking areas, kerbs and inlets, storm water pipe systems; flood attenuation ponds; canals, culverts, bridges: damming and scour.
Hydraulic structures; sharp- and broad-crested overflows and their submergence; dam overflows; energy dissipaters; flow control gates; lateral discharge and outlet structures. Introduction to coastal engineering.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Hydraulics 324 and 354

14400 HYDRAULICS

324 Flow Theory and Pipe Flow (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Hydrostatics; pressure and pressure measurement; pressure forces on submerged bodies; flotation and buoyancy; principles of fluid flow; flow patterns; fundamental equations of fluid dynamics; application of the conservation laws to fluids; application of the energy and momentum equations; velocity and discharge measurement; potential flows; real and ideal fluids; behaviour of real fluids; viscous flow; stability of laminar flow and the onset of turbulence; shearing in turbulent flows; the boundary layer; implications of the boundary layer; cavitation; surface tension; flow in pipes and closed conduits; fundamentals of pipe flow; laminar flow; turbulent flow; local head loss; partially full pipes; pipeline systems and design; series, parallel and branched pipe systems; distribution systems; design of pumping mains; hydraulic machines; classification of machines; continuous flow pumps; pump selection; turbines; cavitation in hydraulic machines; surge in pipelines; surge protection; effects of rapid valve closure; unsteady compressible flow; complex problems.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Applied Mathematics B 154
PP Engineering Mathematics 145

354 Open Channel Flow and Water Treatment (15)

A & E (Interpreting) *(3.00 l, 0.50 p, 2.00 t, 0.00 s per week)*

Open channel flow and flow classification; uniform flow; rapidly varied flow; energy conservation; hydraulic jump.

Momentum principle; critical depth flow measurement; gradually varied flow; flow profile classification; backwater (transitional) curve calculation (direct and standard step methods); unsteady flow; waves in open channel flow.

Basic water chemistry; basic water microbiology; water quality; treatment processes (settling, filtration, coagulation, flocculation); principles of biological treatment; aerobic processes (activated sludge and biological filters); anaerobic processes; disinfection; sewer networks and sanitation systems.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Chemistry 123
P Hydraulics 324

14397 HYDROLOGY

424 Flood and Resource Hydrology (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*

A systematic overview of the different components of the hydrological cycle, variability of the South African climate, hydrological processes, sources of data and the characteristics of South African data. Storage yield analysis: philosophy and concepts, time series, gap filling, human influences on catchments, water demand, catchment models. Low flow analysis: analysis of time series, regionalised data for South Africa, geohydrology, water demand management. Flood design techniques (empiric, deterministic and probabilistic); extreme floods.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Hydraulics 354
P Engineering Statistics 314

44792 INDUSTRIAL ERGONOMICS

414 Industrial Ergonomics (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 1.50 t, 0.00 s per week)*

Operation analysis, work standards; reduction of setup times, training practices, remuneration, anthropometry, workstation and tool design, man/machine interfaces, work physiology and biomechanics, the work environment, cognitive work, shift work, aspects of occupational health and safety.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

53937 INDUSTRIAL MANAGEMENT

354 Industrial Management (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Industry dynamics and the value chain, BPR (Business Process Re-engineering); SCM (Supply Chain Management) and logistics management, information technology and e-commerce within the framework of a formal ERP (Enterprise Resource Planning) system.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Production Management 212

10618 INDUSTRIAL PRACTICE

442 Management and Organisational Behaviour (8)

A & E (Interpreting) *(2.00 l, 0.00 p, 1.00 t, 0.00 s per week)*
Work and people organisation, organisational culture, motivation principles, motivation methods, building groups into teams, conflict management and negotiation, managing organisational change, overview of labour legislation, guest lectures by engineers from industry.

Home department: INDUSTRIAL ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
Final-year enrolment

25445 INDUSTRIAL PROJECT

498 Industrial Project (30)

T *(0.00 l, 0.00 p, 0.00 t, 1.00 s per week)*
Independent execution of a theoretical and/or practical investigation in the field of industrial engineering, and the submission of a comprehensive report. (The project runs for the whole final year, with 30% of the project completed in the first semester, and 70% in the second semester.)

Home department: INDUSTRIAL ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

47422 INDUSTRIAL PROGRAMMING

244 Industrial Programming (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Use of spreadsheets: data manipulation, numerical methods, graphs, basic financial calculations, planning and analysis of scenarios and optimising. Visual Basic for Applications for spreadsheet use. Basic computer communication. Theory and application of forecasting with emphasis on spreadsheet applications.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 145

48062 INFORMATION SYSTEMS

414 Information Systems (15)

A & E (Interpreting) *(2.00 l, 1.20 p, 2.00 t, 0.00 s per week)*
Techniques and resources required for the design, development and implementation of information systems; system development life cycle; entity-relationship models; data flow models; normalisation; design of input and output interfaces; quality assurance of the information system; system implementation; design, development and implementation of an Internet-based information system in group projects.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Industrial Programming 244

39705 INTRODUCTORY MACHINE DESIGN

244 Design Process, Machine Parts and Machine Drawing (15)

A & E *(1.00 l, 3.00 p, 2.00 t, 0.00 s per week)*
Conceptual design process, human factors in design. Design for assembly. Machine parts: seals, couplings, keys, retaining rings and bearings. Freehand sketches, part models, 2D detail drawings of parts and part lists, 3D modelling and interference checking. Drawing standards: measurement instrumentation for manufacturing, surface roughness, tolerancing, geometric tolerancing, shrink fits, welding symbols. Design of belt and chain drives. Working drawings and design projects in which the theory is applied.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Drawings 123
P Strength of Materials 143

39314 LAND SURVEYING

214 Surveying (15)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Legislation, servitudes, cadastral information. Co-ordinate systems; levelling, taceometric surveys and traversing; setting out of circular curves and engineering work; areas and volumes with profiles and longitudinal sections; photogrammetry.
Introduction to GIS, GPS, digital terrain modelling (DTM).

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Engineering Mathematics 145

59439 LANGUAGE SKILLS (AFRIKAANS)

176 Language Skills (Afrikaans) (12)

A *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
This year module is attended by students in their first year of studies , on a beginners level, whom the Faculty has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integrated manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)
Method of Assessment: Continuous

186 Language Skills (Afrikaans) (12)

A *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
This year module is attended by students in their first year of study, at an advanced level, whom the Faculty has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integral manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)
Method of Assessment: Continuous

276 Language Skills (Afrikaans) (12)

A *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
This year module is attended by students in their second year of study, on a postbeginner's language level, whom the Faculty has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integrated manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)
Method of Assessment: Continuous

59730 LANGUAGE SKILLS (ENGLISH)

173 Language Skills (English) (12)

E *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*

This year module is attended by students in their first year of study, at an advanced level, whom the Faculty of Engineering or Faculty of Agrisciences has identified as needing to further develop their English language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integrated manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)
Method of Assessment: Continuous

16020 MACHINE DESIGN A

314 Fatigue, Fracture Mechanics and Machine Components (15)

A & E (Interpreting) *(2.00 l, 2.00 p, 2.00 t, 0.00 s per week)*

3D-statics. Design for static loads, fatigue and fracture mechanics. Design of sliding bearings. Design projects where the theory is applied up to and including complete working drawings. Design for assembly, machining, casting, welding and plastic forming. Introduction to reverse engineering and rapid prototyping.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Introductory Machine Design 244
P Strength of Materials W 244

16039 MACHINE DESIGN B

344 Design of Machine Subsystems (15)

A & E (Interpreting) *(2.00 l, 2.00 p, 2.00 t, 0.00 s per week)*

Design of lead screws, bolt connections, fasteners, springs, clutches, breaks. Cam analysis and design. Kinematics of gear systems and forces. Gear design. Shaft connections. Design projects where theory is applied up to complete manufacturing drawings. CNC programming.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Machine Design A 314

11745 MAINTENANCE MANAGEMENT

414 Maintenance Management (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

Strategic maintenance planning, plant acquisition policy, business interface, structuring of maintenance objectives, reliability statistics, Reliability Centred Maintenance, plant maintenance life planning and scheduling, preventive maintenance, top-down/bottom-up approach, managing maintenance resources, maintenance organisation, human factors,

maintenance team work, Total Productive Maintenance, maintenance systems, maintenance budgeting, maintenance control, short-term work planning, management of shutdowns, network analysis technique for management of shutdowns, other shutdown methodologies, spare-part management, maintenance management information systems.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Mechatronics 424

34134 MANUFACTURING PROCESSES

244 Manufacturing Processes (15)

A & E (Interpreting) *(2.00 l, 1.50 p, 1.00 t, 0.00 s per week)*
Engineering materials; mechanical behaviour of materials used in manufacture; theory and forces in metal cutting operations; economics of metal cutting operations; milling processes; drilling processes; conventional manufacturing processes including casting, metal forming, sheetmetal processes, welding and particle processes; non-conventional manufacturing processes; manufacturing with polymers; layer manufacturing processes; low-cost automation; manufacturing with robotics; introduction to computer-aided manufacturing, rapid prototyping and reverse engineering design; factory visits and process design projects.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Material Science A 244

45381 MANUFACTURING SYSTEMS

414 Manufacturing Systems (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Introduction to manufacturing systems, computer-aided design (CAD) systems and geometric modelling, reverse engineering; concurrent engineering; rapid prototyping and manufacturing; computer-aided process planning (CAPP); CNC technology; network automation of manufacturing systems; part inspection on automated coordinate measuring machines (CMM); material handling; group technology and manufacturing cells; flexible and reconfigurable manufacturing; computer integrated manufacturing (CIM).

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Manufacturing Processes 244

30325 MATERIAL SCIENCE A

244 Materials Science A (15)

A & E *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*

Metals: physical testing; dislocations and strengthening mechanisms; cold work; phase diagrams; micro-structure; iron iron-carbide system; cooling curves; thermal processing; properties of ferrous and non-ferrous alloys; fracture analysis.

Ceramics: introduction to ceramics; mechanical properties; types and application; advanced engineering ceramics; fire proof materials; manufacturing processes; future use of advanced ceramics.

Polymers: classification; polymerisation; molecular structure; crystalinity; glass transition; melting point; elasticity; flow viscosity; creeping; yielding; morphologic changes during loading; reinforcing mechanisms; types; advanced fibre-reinforced polymers.

Corrosion: types; corrosion processes and rate for metals; corrosion control and protection; corrosion-related phenomena; degradation of polymers; material protection.

Thermal properties of materials.

Materials selection for engineering applications (project).

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Strength of Materials 143

21539 MATHEMATICS

186 Introductory Mathematics (32)

A & E *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

For BSc (Extended Degree Programme) and BEng (Extended Degree Programme) students.

Any student who wishes to take this module must have achieved a mark of at least 5 (or 60%) for Mathematics in the NSC or the IEB's school-leaving certificate.

An introduction to calculus, linear algebra and mathematical reasoning: different presentations of functions in terms of formulas, graphs, tables and stories; inverse of a function; exponential and logarithmic functions; trigonometric functions and their inverse functions; modelling with functions. Gradual progression from average to instantaneous rate of change; limits; basic integration. Systems of equations; analytic geometry; mathematical induction; binomial theorem.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: Flexible Assessment

21466 MECHANICAL DESIGN

444 Principles of Systems Engineering (15)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*

Principles of systems engineering; introduction to design optimisation; legal aspects of engineering practice and safety. Design of systems that integrate heat transfer, fluid mechanics, fluid machines and control systems (design projects are done in teams).

Home department: MECHANICAL AND MECHATRONIC ENGINEERING

Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
P Heat Transfer A 414
P Modelling 334

39292 MECHANICAL ENGINEERING

414 Specialist Topics in Mechanical Engineering (Elective module) (15)

A *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Topics from specialist areas in mechanical engineering, such as air-conditioning and refrigeration, aeronautical engineering, marine engineering, vehicle engineering and machine design. The exact content of the module is determined annually as dictated by the availability of specialist lecturers and the requirements of students.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

39179 MECHANICAL PROJECT

478 Capstone Project for Mechanical Engineering Students (45)

A & E *(2.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Professional communication: written and oral project presentations, reports. Independent execution of theoretical and/or practical design and/or investigation in the field of mechanical engineering with formal oral presentations and the submission of a final comprehensive report.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

56790 MECHATRONIC PROJECT

478 Capstone Project for Mechatronic Engineering Students (45)

A & E *(2.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Professional communication: written and oral project presentations, reports. Independent execution of theoretical and/or practical design and/or investigation in the field of mechatronic engineering with formal oral presentations and the submission of a final comprehensive report.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

488 Capstone Project for Mechatronic Engineering Students (45)

A & E*(2.00 l, 3.00 p, 0.00 t, 0.00 s per week)*

Professional communication: written and oral project presentations, reports. Independent execution of theoretical and/or practical design and/or investigation in the field of mechatronic engineering with formal oral presentations and the submission of a final comprehensive report.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

50458 MECHATRONICS

424 Mechatronic Design (18)

A & E (Interpreting) *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*

Sensors, measurement accuracy and uncertainty, actuators; digital and analogue interfaces; sequential control with relay logic, PLCs and PCs. One or more projects in which mechanics, electronics, computer use and control are integrated. The statistics of measurement and reliability (this section will be presented as a block course in the week before the start of the semester).

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
P Electrical Drive Systems 324
P Electronics 245
P Modelling 334

47988 MINERAL PROCESSING

345 Mineral Processing (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

Mineral growths and principles of liberation; solid state analysis; population balances; mineral liberation and liberation distributions; classification with sieves and hydrocyclones; empirical models; comminution; density-based separation equipment; surface chemistry and flotation; leaching, Pourbaix diagrams; introductory mass balance reconciliation.
[Presented by Dept Process Engineering, 80% of module.]

Introduction to mineralogy. Characterisation of materials in the solid state: scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS) and wave length dispersion spectroscopy; X-ray fluorescence (XRF) and X-ray diffraction techniques (XRD); reflectance and transmittance microscopic techniques and image analysis; microscopic techniques based on polarised light and etched materials, sample preparation for solid state characterisation and spectroscopic techniques. Laser ablation, glow discharge and spark discharge optical emission spectra.
[Presented by Dept Earth Sciences, 20% of module.]

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 254
P Chemical Engineering D 244
P Particle Technology 316

415 Extraction Processes (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
High temperature process of natural raw materials and secondary materials: applied phase and reaction equilibrium thermodynamics relevant to solid state solutions, molten alloys, slag melts and matt melts. Process modelling and design of high temperature reactors for gasification, roasting, calcining, sintering, reactive smelting, converting and refining, with consideration of kinetic as well as thermodynamic factors. Energy, metallurgical fuels and reductants. Measurement and control techniques for high temperature reactors. Refractory materials.
Electrochemical processing: basic thermodynamics, kinetic and mass transfer principles of electrochemical reactors; electrode surface phenomena; design aspects; applications at both high and low temperatures.
Homework tasks in the form of self study, tutorial problems, designs or seminars form an integral part of the module.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 317

478 Final-Year Project (30)

A & E *(0.00 l, 6.00 p, 0.00 t, 0.00 s per week)*
First Semester (4): (0.00 l, 2.00 p, 0.00 t, 0.00 s per week)
Second Semester (26): (0.00 l, 6.00 p, 0.00 t, 0.00 s per week)
Each student must complete an independent project on an approved topic.

Home department: PROCESS ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year enrolment

56804 MODELLING

334 Modelling and Simulation of Mechanical Systems (18)

A & E (Interpreting) *(4.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Modelling of mechanical systems: kinematics of planar mechanisms, velocity and acceleration diagrams, balancing; formulation of differential equations, solutions using Laplace transforms, block diagrams and transfer functions; state space formulation, eigen values and stability. Simulation of mechanical systems: numerical solutions of ordinary first order differential equations; programming of mathematical models in Matlab and Simulink; interpretation of results; experimental identification of model parameters. Transient and stationary behaviour; frequency response analysis; Bode and polar plot diagrams.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 224
P Engineering Mathematics 214 and 242

53678 NUMERICAL FLUID DYNAMICS

414 Numerical Fluid Dynamics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Modelling of flow: elements of numerical flow software, conservation laws and differential equations for mass, momentum and energy, boundary conditions, equation of state, grid types and generation, linearisation, discretisation, false diffusion, SIMPLE pressure correction algorithm, stability, relaxation factors, source term linearisation, error calculations, convergence, use of commercial codes; course project.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Continuous

Required modules:
P Thermofluid Dynamics 344

36323 NUMERICAL METHODS

262 Numerical Methods (8)

A & E *(2.00 l, 0.00 p, 1.00 t, 0.00 s per week)*
Introduction to MATLAB; zeros of functions; solving of systems of linear equations; numerical differentiation and integration; interpolation and curve-fitting; numerical methods for solving ordinary and partial differential equations.

Home department: MATHEMATICAL SCIENCES

Required modules:
P Engineering Mathematics 214

59528 OPERATIONS RESEARCH (ENG)

345 Operations Research (Deterministic Models) (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

The systems approach to problem-solving; problems leading to linear programming, network, integer and non-linear programming models; algorithms for solving such models; tasks, including exercises with computer packages.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 214

415 Operations Research (Stochastic Models) (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*

Analysis of problems leading to deterministic and stochastic dynamic programming models; Markov chains and waiting-line models; techniques for solving such models; decisions under uncertainty; Bayes' theorem; multi-criteria decision-making.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Statistics 314

47902 PARTICLE TECHNOLOGY

316 Particle Technology (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

1 Practical per semester.

Characteristics and mathematical description of particles and their size distributions; determination of the particular characteristics of single particles and powders; the mechanical behaviour and flow patterns of particle systems; mixing and segregation of particle systems; particle size reduction and particle size classification; sedimentation and thickener design; flow through packed beds; fluidisation and fluidised bed behaviour of particles; hydraulic and pneumatic transport of particles; filtration: principles, process analysis and design; centrifugal separation; crystallisation. Surface characterisation of powders (BET), suspension and stirring of slurries.

Home department: PROCESS ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Chemical Engineering 254 and 264
P Chemical Engineering D 244

65609 PHILOSOPHY AND ETHICS

314 Philosophy and Ethics (12)

A & E (Interpreting) *(3.00 l, 3.00 p, 1.00 t, 0.00 s per week)*
Culture and technology, applied ethics, social philosophy. Participation in specific community projects, or leadership training related to community projects.
[Presented by the Department of Philosophy (67%) and Faculty of Engineering (33%)]

Home department: PHILOSOPHY
Method of Assessment: Continuous

474 Philosophy and Ethics (12)

A & E (Interpreting) *(3.00 l, 0.00 p, 1.00 t, 0.00 s per week in Semester 1)*
(0.00 l, 3.00 p, 0.00 t, 0.00 s per week in Semester 2)
Culture and technology, applied ethics, social philosophy.
In second semester: participation in specific community projects, or leadership training related to community projects.
[Presented by the Department of Philosophy (67%) and the Faculty of Engineering (33%).]

Home department: PHILOSOPHY
Method of Assessment: Continuous

12201 PREPATORY TECHNICAL DRAWINGS

146 Prepatory Technical Drawings (16)

T *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
Principles of first- and third-angle projection. Linework and lettering. Isometric projections and drawings. Drawing layouts. Full section views. Geometric constructions, tangency and loci applications. True lengths and auxiliary views. Conic sections and interpenetrations of solids (excluding interpenetrations that require the use of generator lines). Developments. Introduction to parametric geometric modelling in computer-aided design (CAD).

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

23256 PRODUCTION MANAGEMENT

212 Production and Operational Management (8)

A & E (Interpreting) *(2.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Introduction to the operational environment; strategy and productivity; process flow analysis; service processes; lean operations management; facility location; scheduling techniques.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

314 Operations Facilities and Management (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

Facility design from a strategic, process en schedule context; flow and space relationships; personnel requirements; materials handling; layout models and algorithms; operational aspects of a warehouse; operational aspects of a distribution centre; manufacturing process design; supply chain management; classic inventory control; material requirements planning (MRP); Theory of Constraints (TOC).

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Production Management 212
C Engineering Statistics 314

444 Financial and Production Management (12)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Introduction to operations management, productivity and competitiveness; the funds flow cycle and the accounting equation; process flow analysis; cost accounting; quality management and statistical process control; budgets and capital expenditure including discounted cash flow techniques; inflation and tax; just-in-time management (JIT), theory of constraints scheduling (TOC); inventory control and MRP; supply chain management (SCM).

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

59447 PROFESSIONAL COMMUNICATION

113 Professional Communication (12)

A & E *(3.00 l, 0.00 p, 2.00 t, 0.00 s per week)*

Effective communication with various target audiences with specific objectives in mind; particular focus on the planning and writing of a technical report; other document types in the professional environment such as proposals and correspondence; text skills, such as coherence, appropriate style and text structure; appropriate referencing methods; introduction to oral presentation skills; written communication in teams.

Home department: ENGINEERING (ADMIN)
Formula for Final mark: P=K
Method of Assessment: Project

30279 PROJECT (CIVIL ENGINEERING)

458 Project (Civil) (30)

A & E *(1.00 l, 20.00 p, 0.00 t, 0.00 s per week)*
300 hours per semester
Each student completes during the second semester of the final year an approved design or research project. A comprehensive report on the project is submitted. The project must be of an investigative nature and the ability of the student to work independently will be assessed. Each student will deliver an oral and poster presentation on the project.

Home department: CIVIL ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Departmental approval

46795 PROJECT (E)

448 Project (E) (45)

A & E *(0.00 l, 20.00 p, 0.00 t, 0.00 s per week)*
Thesis project: Each student must do an independent project on an approved topic and submit a full report. An oral examination is required where the professional communication skill of each student is assessed.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Formula for Final mark: P=K
Method of Assessment: Project

Required modules:
Final-year Enrolment

51993 PROJECT MANAGEMENT

412 Project Management (12)

A & E (Interpreting) *(3.00 l, 0.00 p, 1.00 t, 0.00 s per week)*
Project management framework: integration, scope, time, cost, human resources, communication, risk, safety and procurement. Project management processes: initiating, planning, execution, control and commissioning.
[Presented by the Department of Process Engineering (50%) and the Department of Industrial Engineering (50%)]

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

12998 PHYSICS

146 Preparatory Physics (16)

A & E *(3.00 l, 3.00 p, 0.00 t, 0.00 s per week)*
For BSc (Extended Degree Programme) students. The module focuses on the nature of physics with the following themes as content: mechanics, electromagnetism, modern physics.

Home department: PHYSICS
Method of Assessment: Flexible Assessment

46167 QUALITY ASSURANCE

344 Quality Assurance (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Definition of quality, methods and techniques of quality assurance, statistical process design, sampling. Principles of robust design. Formulation of measures of system performance and quality. Identification of quality noise factors. Formulation and implementation of techniques to reduce effects of noise. Synthesis and selection of design concepts for robustness.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Statistics 314

59471 QUALITY MANAGEMENT

444 Quality Management (15)

A & E (Interpreting) *(2.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Definition of reliability and maintainability; reliability management; methods and techniques for reliability modelling, allocation, prediction and maintainability assurance; fault tree analysis; failure mode analysis; quality management; history and background; ISO 9000; total quality management; leadership, 6-sigma; cost considerations; quality audits; experimental design with Statistica.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Statistics 314

64866 SCIENTIFIC COMMUNICATION SKILLS

116 Scientific Communication Skills (12)

A & E *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
For BSc (Extended Degree Programme) students. This module focuses on the development of speaking, listening, and reading skills in the academic environment in general and specifically in the natural sciences. Aspects such as engaging with and understanding relevant academic and natural science texts, understanding text components, the use of fluent, correct and proper language, and the interpretation of graphic data, will be addressed.

Home department: LANGUAGE CENTRE
Method of Assessment: Continuous

146 Scientific Communication Skills (6)

A & E *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
For BSc (Extended Degree Programme) students. This module focuses on the development of writing skills in the academic environment in general and specifically in the natural sciences. Aspects such as engaging with and understanding relevant academic and natural science texts, understanding text components, presenting data in an edited and coherent text, the use of correct and proper language, the employment of accurate language, correct referencing technique and using graphics to clarify data will be addressed.

Home department: LANGUAGE CENTRE
Method of Assessment: Continuous

53945 SIMULATION

442 Simulation (8)

A & E (Interpreting) *(2.00 l, 0.50 p, 1.00 t, 0.00 s per week)*
Principles of discrete-event simulation of stochastic processes; generation of random numbers and values for random variables; Monte-Carlo principle; simulation methodology; concept models; theory, techniques and resources required for the analysis of input- and output data of simulation models; applications with a software package.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
PP Engineering Statistics 314

19712 STRENGTH OF MATERIALS

143 Introduction: Mechanics of Deformable Bodies (15)

A & E *(4.00 l, 0.00 p, 2.00 t, 0.00 s per week)*
Introduction to mechanics, internal forces and stresses, deformations and strain, material response: material law, axially loaded elements, torsion elements with circular cross section, symmetrical bending of beams, thin walled pressure vessels. Introductory materials science: crystalline and amorphous solids, crystalline structures, defects and applications.
[Presented by the Department of Civil Engineering (80%) and by the Department of Mechanical and Mechatronic Engineering (20%)]

Home department: CIVIL ENGINEERING

Formula for Final mark: P=0,4K+0,6E
Method of Assessment: Examination

Required modules:
C Engineering Mathematics 115
C Applied Mathematics B 124

224 Stress Analysis (15)

A & E *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Stress and strain analysis; relation between stress and strain for materials; transformation of stress and strain, principal stress and principal strain; elastic and plastic material behaviour for axially loaded members, stability of axially loaded members (Euler theory), torsion, bending and skew bending elements with solid and thin-walled sections; shear stress in bending; composite stress – axial, torsion, shear and bending; stress concentrations, failure theories and fatigue; elastic design of members.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Strength of Materials 143

254 Structural Analysis (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Determining equilibrium, reactions, section forces, material law, controlling differential equations, strains and displacements of structural elements. Axial members and trusses, torsion members, bending members and plane frames. Representation of loadings and reactions with discontinuity functions. Theory and application of classic structural analysis techniques. Macaulay, moment-area, slope displacement, stiffness (displacement), flexibility (force) methods, energy methods and virtual work.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Strength of Materials 224

19739 STRENGTH OF MATERIALS W

244 Displacements, Failure Criteria, Stress and Strain Transformations (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
Displacements and deflection of beams. Energy methods. Stress and strain transformations. Mohr circles. Von Mises, Tresca and Mohr-Coulomb failure theories. The relationship between stress and strain and the application to thick-walled cylinders, curved beams, press and shrink fits, rotating discs and rings, etc. Experimental stress analysis using strain gauges.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 214
P Strength of Materials 224

334 Fracture Analysis, FEM and Composite Materials (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*

Fracture analysis; non-destructive testing (NDT); plate theory; introduction to variational methods for finite element structural analysis; introduction to manufacturing and strength of composite materials, with emphasis on fibre plastic structures.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 214 and 242
P Strength of Materials W 244

36307 STRUCTURAL DESIGN

354 Concrete Construction (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*

Conceptual understanding of reinforced concrete structures: limit states approach and loads according to the relevant design codes of practice (gravitational loads). Material behaviour of concrete (shrinkage, creep and applications according to the relevant codes of practice).
Short column analysis: stresses, areas of steel and concrete, basic detailing. Slender columns (uni-axial and bi-axial bending).
Beam analysis: bending, redistribution of moments, shear forces, basic detailing, displacement control (L/d ratio according to design codes of practice).
Slab design: beam and slab with application of tables in codes of practice, flat slab design and punching shear, basic detailing.
Simplified frames as allowed by codes of practice (application of commercial frame analysis software packages).
Introduction to prestressed concrete (statically determinate beams): choice of tendon force and tendon profile, losses, details (anchor zone).
Anchorage of reinforcement: laps and bond of reinforced concrete.
Furthermore, continuously as part of the above: quality control during design and construction, specifications, representation of a physical structure by theoretical modelling.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Building Materials 254
P Strength of Materials 254
C Theory of Structures 324

424 Steel Construction (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*

Description of the basis of design. Determination of structural loading according to the relevant code of practice: review of general prescriptions, focus on wind loading as applied to steel structures. Conceptual design of steel structures. Determination of the response of steel structures in terms of function, stability and load effects (element forces and deflections). Determination of the function, response and capacity of structural steel

elements, tension elements, compression elements, beams, beam-columns, connections and foot plates in terms of the relevant code of practice. Design of basic steel structure.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Strength of Materials 254
C Structural Design 354
C Theory of Structures 354

46779 SYSTEMS AND SIGNALS

214 Introduction to Systems and Signals (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Techniques of circuit analysis; the operational amplifier; first-order and second-order electrical circuits; mutual inductance; sinusoidal steady-state analysis and power calculations; balanced 3-phase circuits.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Electro-Techniques 143

244 Frequency Domain Techniques (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
The Laplace transforms and their application to dynamic circuits; transfer functions; convolution, impulse versions and Bode plots; Fourier series; Fourier transforms and their applications to circuits; two-port networks; filters.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 214
P Engineering Mathematics 214

315 Signal Theory (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*
Time/frequency transformations as underlying principle; the Fourier transform and the discrete Fourier transform (DFT); LTI systems; modulation as building block for telecommunication systems; application of transforms in AM, SSB, FM, FDM and TDM; (de)modulation circuits with theoretical verification.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 244

344 Stochastic Signals (15)

A & E (Interpreting) *(3.00 l, 1.50 p, 1.50 t, 0.00 s per week)*

One- and multi-dimensional random variables; expected values, moments, distribution functions and probability density functions; operations on and transformations of random variables; random signals, auto- and cross-correlation, stationary and spectral characteristics; behaviour with linear systems.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 315

414 Digital Signal Processing (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*

Sampling and time/frequency duality; Fourier transforms and series of discrete-time signals, the discrete Fourier transform (DFT), the fast Fourier transform (FFT), convolution by means of the FFT; describing and characterising discrete-time systems using the z-transform, impulse responses, frequency responses; difference equations; elementary filters, FIR and IIR filter design; using auto-correlations and cross-correlations.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 344

20419 TELECOMMUNICATION

414 Introduction to Telecommunications (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*

Channel capacity; baseband data transmission: intersymbol interference and error probabilities; signal-to-noise ratios; probability of error for digital modulation schemes (ASK, PSK, FSK); digital transmission of analogue signals (PCM) and quantisation noise; forward error correction codes.

Home department: ELECTRICAL AND ELECTRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Systems and Signals 344

19984 THEORY OF STRUCTURES

324 Introduction to Continuum Mechanics (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*

Configuration of a 3-D continuum; displacements, deformations, physical interpretation of strain.
Stress tensor in a 3-D continuum; visual presentation and transformation of stresses, principals stresses.
Equilibrium equations of structural mechanics.
Linear-elastic material law.

Boundary condition of structural mechanics.
Numerical (finite element) methods for computer-based solving of civil engineering problems in structural mechanics, modelling and interpretation of the results for the 3-D elasticity problem.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Engineering Informatics 314
P Strength of Materials 254

354 Finite Element Methods (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 2.50 t, 0.00 s per week)*
Theory of structural components, membranes, thin plates and frames. Finite element theory and computer implementation of elements for the components stated. Modelling and interpretation of results for the different cases.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Theory of Structures 324

33863 THERMODYNAMICS A

214 Applied Thermodynamics A (15)

A & E *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Concepts and definitions, units and dimensions; properties of pure substances; thermal state variables and equations, specific heat, Cp and Cv; vapours; gas-vapour mixtures, saturation; use of steam tables, phase diagrams; ideal and non-ideal gases; compressibility charts, improvements to the state equation; short introduction to conduction, convection and radiation; Fourier's law; one-dimensional steady conduction; mass balances (steady and unsteady); energy, mechanical work, first law of thermodynamics; applications to closed and open systems: processes and cycles; method of problem solving; state changes for ideal gases; isochoric, isobaric, isothermic, adiabatic and polytropic changes; enthalpy and technical work; entropy and the second law; temperature-entropy diagram; maximum available energy. Applications of thermodynamics; technical cycle processes; power generation; psychrometrics, partial vapour pressure, absolute and relative humidity; air-conditioning and cooling towers; cooling cycles.
[Presented by the Department of Mechanical and Mechatronic Engineering (50%) and by the Department of Process Engineering (50%)]

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Mathematics 145
C Applied Mathematics B 154
P Engineering Chemistry 123

59544 THERMOFLUID DYNAMICS

214 Introductory Thermofluid Dynamics (15)

A & E (Interpreting) *(3.00 l, 0.00 p, 3.00 t, 0.00 s per week)*
Engineering approach to problem solving; thermodynamic properties of water and an ideal gas; conservation of mass, momentum and energy; entropy; thermodynamic processes in closed and open systems; generation, use and distribution of steam; pump and pipe systems; fans; ducts; steady conduction, convection and radiation heat transfer; air-vapour mixtures and air-conditioning processes.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Engineering Chemistry 123

344 Thermodynamics and Fluid Dynamics (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 2.00 t, 0.00 s per week)*
External flow: introduction to fluid flow over bodies; Reynolds number and geometric effects; momentum-integral approach; boundary layer equations: flat plate with and without pressure gradients; lift and drag forces. Compressible flow: compressibility and the Mach number; stagnation conditions; isentropic flow; flow with heat addition and with friction; shock wave phenomena; the application of compressible flow; the effect of area change. Introduction to turbomachinery, pumps, axial fans; compressible flow through fluid machinery, dimensional analysis; rothalpy; centrifugal and axial compressors; gas turbines; steam turbines. Introduction to Numerical Fluid Dynamics (NFD).

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Thermodynamics A 214
P Fluid Mechanics 244

21040 TRANSPORT SCIENCE

354 Transportation Engineering (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.50 t, 0.00 s per week)*
Traffic flow models; road capacity; statistical applications; traffic control; transportation planning; modelling: trip generation, trip distribution, modal choice and trip assignment; traffic impact studies; traffic safety; economic evaluation.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
C Engineering Statistics 314

434 Road Design (15)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.50 t, 0.00 s per week)*
Transportation modes; movement equations; human factors; geometric design; overview of pavements; elastic layer theory; properties and behaviour of granular, asphaltic and cementitious materials, behaviour and transfer functions; alternative design methods,

including CBR design, mechanistic design and low-volume road design; flexible and rigid pavements; influence of climate; construction; rehabilitation and maintenance.

Home department: CIVIL ENGINEERING
Method of Assessment: Flexible Assessment

64007 UNIVERSITY PRACTICE IN THE NATURAL SCIENCES

176 University Practice in the Natural Sciences (8)

A & E *(3.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
Study load: 78 lectures in total, presented as 5L per week in the first semester and 1L per week in the second semester.
For students in the BSc (Extended Degree Programme). It is followed up during the second semester in the different subject-specific modules of Mathematics 176, Physics 146, Chemistry 176 and Biology 146. Basic terminology and concepts are addressed. Study and life skills receive attention. The natural sciences and specifically the subjects taken by the students serve as a context.

Home department: MATHEMATICAL SCIENCES
Method of Assessment: *Flexible assessment*

40150 VACATION TRAINING

241 Vacation Training (Civil) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)
A block of a minimum of four weeks' vacation training must be completed. A report, complying with the Department's requirements, must be submitted as examination script. The student must make his own arrangements for vacation training. The Department is willing to assist with the arrangements. Students that do not succeed in arranging vacation work must, before the particular holiday, formulate a project of equivalent scope and submit it to the Chair of the Department for approval. Vacation Training 241 may be completed at any time after the commencement of the second academic year.

Home department: CIVIL ENGINEERING
Method of Assessment: Attendance

341 Vacation Training (Mechanical and Mechatronic) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)
Students must complete at least four uninterrupted weeks, or six weeks with no more than one interruption of up to four weeks, of vacation training on which a report that complies with the Department's requirements is submitted as examination script. Students must make their own arrangements for vacation training. The Department is prepared to assist them in this regard. In cases where employment cannot be found, students must formulate a project of equivalent scope and submit it to the Chair of the Department for approval. Vacation Training 341 may be completed at any time after commencement of the second year of study.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Attendance

342 Vacation Training (Civil) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)

A block of a minimum of four weeks' vacation training must be completed. A report, complying with the Department's requirements, must be submitted as examination script. The student must make his own arrangements for vacation training. The Department is willing to assist with the arrangements. Students that do not succeed in arranging vacation work must, before the particular holiday, formulate a project of equivalent scope and submit it to the Chair of the Department for approval. Vacation Training 342 may be completed at any time after the commencement of the second academic year.

Home department: CIVIL ENGINEERING
Method of Assessment: Attendance

351 Vacation Training (Industrial) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)

A period of at least three weeks of vacation training must be completed, supported by a report in accordance with departmental requirements. The report will be subject to examination. While students are expected to arrange their own vacation employment, the Department is prepared to provide assistance in this regard. In cases where employment cannot be found, students are required to complete a project or task as agreed upon with the Chair of the Department. Vacation training (Industrial) 351 may be completed at any time after the start of the second academic year of study. Students may also apply for permission to do a single session of vacation training. This session must be of at least six weeks duration (uninterrupted), and a single report is required which must cover the complete session. This alternative allows the student to complete Vacation Training 351 (Industrial) as well as Vacation Training 451 (Industrial) simultaneously, and may be completed at any time after the start of the third academic year.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Attendance

361 Vacation Training (Chemical) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)

At least six weeks' vacation training should be done in total, of which at least three weeks must be uninterrupted. Preferably the students should do work in the chemical and mineral process industries and gain exposure to the large-scale equipment used in industry which is not available at the University. The work should be of engineering or scientific nature, and preferably be done under the guidance of a graduate chemical or metallurgical engineer.

Home department: PROCESS ENGINEERING
Method of Assessment: Attendance

441 Vacation Training (Mechanical and Mechatronic) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)

The same particulars as Vacation Training 341, except that Vacation Training 441 can be completed any time after the start of the third academic year.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Attendance

451 Vacation Training (Industrial) (0)

(0.00 l, 1.00 p, 0.00 t, 0.00 s per week)
Refer to Vacation Training (Industrial) 351 for details. Vacation Training (Industrial) 451 may be completed at any time after the start of the third academic year of study.

Home department: INDUSTRIAL ENGINEERING
Method of Assessment: Attendance

23477 VIBRATION AND NOISE

354 Vibration and Noise of Mechanical Systems (12)

A & E (Interpreting) *(3.00 l, 1.00 p, 1.00 t, 0.00 s per week)*
Vibration of systems with a single degree of freedom: formulation of mathematical models, free and forced vibration of undamped and damped systems. Systems with two and more degrees of freedom: natural frequencies and modes of undamped systems, free and forced vibrations, and frequency response functions. Vibration of continuous systems. Control of vibration: balancing, isolation, absorbers, and vibration measurement. Vibration monitoring for maintenance purposes.
Fundamentals of sound and noise; measuring and standards of industrial noise; influence of noise on the environment. The control of noise by damping and shielding.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Flexible Assessment

Required modules:
P Applied Mathematics B 224
P Modelling 334

40142 PRACTICAL WORKSHOP TRAINING

211 Practical Workshop Training (0)

A & E *(1.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
After their first year of study, students receive training in workshop practice at a workshop appointed by the University. Students may complete such training at other institutions that have suitable facilities and staff, provided that prior written permission is obtained from the relevant departmental chair. Such permission must be obtained prior to the commencement of the module.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Attendance

241 Practical Workshop Training (0)

A & E *(1.00 l, 0.00 p, 0.00 t, 0.00 s per week)*
Students receive, after their first study year, training in workshop practice in a workshop appointed by the University. Students may complete such training at other organisations which have the necessary facilities and personnel, provided that written permission is obtained from the relevant departmental chair. Such permission must be obtained prior to the commencement of the module.

Home department: MECHANICAL AND MECHATRONIC ENGINEERING
Method of Assessment: Attendance

5.5 METHOD OF ASSESSMENT

The method of assessment is normally given with the description of the module in Section 5.4. If a method of assessment is not given with a module, the default method applies, i.e. Examination with P=0,4K+0,6E. However, the Flexible Assessment method may be used in some modules, even though not indicated as such, since the Faculty is participating in trial applications of Flexible Assessment.

5.6 TRANSITIONAL MEASURES

As a result of the programme changes, transitional measures have been implemented in order to accommodate the new modules being phased in.

Chemical Engineering – including Mineral Processing – all options (Department of Process Engineering)
No transitional measures.

Civil Engineering
No transitional measures.

Electrical and Electronic Engineering

Module	Last year of presentation	Transitional arrangement
Computer Science 344	Module is still presented for BSc students.	Repeaters do the module with the BSc students.

Industrial Engineering
No transitional measures.

Mechanical and Mechatronic Engineering
No transitional measures.

6. Postgraduate Programmes

The regulations that apply to postgraduate studies in engineering at this University are given below. Complete details regarding postgraduate studies in engineering are available on request from the respective departmental chairpersons.

Credits referred to are SAQA (South African Qualification Authority) credits where 1 credit corresponds to 10 hours of work.

6.1 THE POSTGRADUATE DIPLOMA IN ENGINEERING (PDE)

6.1.1 *Fields of Study*

The Faculty of Engineering offers one-year programmes that lead to the qualification PDE in the following fields: Chemical Engineering, Chemical Engineering – Mineral Processing, Civil Engineering, Electrical Engineering, Electronic Engineering, Engineering Management, Industrial Engineering, and Mechanical Engineering. Not all the programmes are presented in a given year.

6.1.2 *Admission Requirements*

To be admitted to the Postgraduate Diploma in Engineering (PDE) students must (see the Admission Model at the end of this chapter) –

6.1.2.1

have at least an approved bachelor's degree in engineering or science from a South African university or university of technology; or

6.1.2.2

have other academic degree qualifications and appropriate experience acceptable to the Senate.

6.1.3 *Preparatory and/or Supplementary Study*

Each department retains the right to require of students to undertake preparatory and/or supplementary study.

6.1.4 *Presentation of the Programme*

Depending on the composition of the programme, it can be presented in semester, self study or block courses, that may be followed full-time or part-time. In some cases candidates may commence study in the second semester if presentation is done by means of block courses or self study.

6.1.5 *Requirements for a pass*

A final mark of at least 50% must be obtained in each of the prescribed modules.

6.1.6 *Application*

For admission to the PDE, applications must be submitted to the Registrar at least three months before the start of the first or second semester, depending on when prospective students wish to start the programme. Official application forms will then be sent to them. When submitting these application forms to the University, they must supply the following additional information:

6.1.6.1

Details of qualifications already obtained and appropriate experience gained.

6.1.6.2
Certified copies of the relevant certificates.

6.1.6.3
The prospective field of study of the PDE that the student wishes to follow.

6.2 MASTER'S DEGREES

6.2.1 *Programmes and Fields*
The Faculty offers master's programmes in engineering that lead to the qualifications Master of Science in Engineering (MScEng) and Master of Engineering (MEng). The MScEng programme is currently being phased out. The last students for this programme enrolled in 2011.

The programme MEng (Structured) is a course-based programme that comprises a number of prescribed modules (maximum 120 credits) and an assignment (minimum 60 credits).

The programme MEng (Research) requires a thesis with a minimum credit value of 180.

The master's programmes are offered in the following fields: Chemical Engineering, Civil Engineering, Electrical Engineering, Electronic Engineering, Engineering Management, Extractive Metallurgical Engineering, Mechanical Engineering, and Mechatronic Engineering.

6.2.2 *Admission and Residence Requirements*
(See the Admission Model at the end of this chapter.)

6.2.2.1
The University may award the degrees Master of Engineering (MEng) (Structured) and Master of Engineering (MEng) (Research) in the Faculty of Engineering to students registered at the University for at least one year after obtaining the degree Bachelor of Engineering, the degree Bachelor of Science with Honours, another relevant four-year bachelor's degree or the Postgraduate Diploma in Engineering, or after reaching, in another manner, a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate.

6.2.2.2
The written consent of the Senate, or Executive Committee acting on behalf of the Senate, must be obtained for admission to the master's degree.

6.2.3 *General Requirements*
The general requirements for master's study in the Faculty of Engineering are:

6.2.3.1
Formal class attendance and the completion of prescribed modules, supplementary independent study, assignments and so forth as prescribed for a specific candidate by the chairperson of the department concerned for the acquisition of a given master's degree.

6.2.3.2
Modules are prescribed to candidates on the basis of:

6.2.3.2.1
The requirements of the specific field of study.

6.2.3.2.2
The goals candidates wish to achieve by studying, their academic background and their experience.

6.2.3.2.3
The availability of lecturing personnel who can handle the specific fields of study. Not all the fields/modules will necessarily be presented every year.

6.2.3.3
Written and/or oral examinations covering the prescribed study must be completed to the satisfaction of the University. A minimum final mark of 50 (out of 100) must be obtained in such an examination.

6.2.3.4
The maximum residence periods for all the respective postgraduate programmes are given in the table at the end of this chapter.

6.2.4 *Requirements for MScEng and MEng (Research) (see Admission Model at the end of this chapter)*
6.2.4.1
In some MScEng en MEng (Research) programmes candidates will not be expected to follow further modules if they already have an honours degree in science, a relevant four-year bachelor's degree or a bachelor's degree in engineering, or an equivalent qualification in the subject of the dissertation, while other MScEng and MEng (Research) programmes include compulsory modules. The candidate must pass all the prescribed modules of the specific degree programme before the degree can be awarded.

6.2.4.2
An approved research project must be completed satisfactorily and a thesis submitted. It must be evident from this thesis that the student is capable of independent scientific and technical investigation and the interpretation of results. The thesis must be accompanied by a declaration that it has not been submitted at another university for a degree, and that it is the student's own work. The complete thesis must be written by the student himself/herself. The body of the thesis must form a coherent whole, and normally comprises an introduction, a background study, one or more chapters that develop or design the core contribution, a set of experiments by which the quality of the contribution is tested, and a conclusion chapter. The thesis must also include a complete list of sources used.

6.2.4.3
Students who wish to study on a part-time basis and/or do the research work mentioned in Section 6.2.4.2 at another approved institution, must obtain written approval from the Senate.

6.2.4.4
Certain MScEng and MEng (Research) programmes can include modules which may be used together with a research project to determine the final mark.

6.2.5 *Examination*
6.2.5.1
Examination is carried out in accordance with the procedures outlined in the Faculty's *Minimum Standards – Postgraduate Examination*. Candidates, who wish to graduate at the December graduation ceremony, must submit their theses for final examination on or before 1 October. The corresponding submission date for the March graduation ceremony is usually 1 December.

6.2.5.2
Each MScEng and MEng (Research) student must submit a copy of a journal article on his/her research, which has been approved by the supervisor(s), at the oral examination. It is the prerogative of the supervisor(s) to decide whether the article will be submitted to a journal or a conference.

Note: Should the thesis be classified as confidential or secret, the article must still be submitted at the oral examination.

6.2.6 *Requirements for MEng (Structured)*
6.2.6.1
Satisfactory completion of an approved assignment (normally 60 credits), in which the emphasis is on the practical application of theory and on assessing the value of the impact of this application, is required.

6.2.7 *Application*
Students must submit a written application to the Registrar for admission as a master's student. The following information must be supplied:

6.2.7.1
Details of qualifications already obtained.

6.2.7.2
Certified copies of the relevant certificates.

6.2.7.3
The proposed field of study or subject of the thesis.

6.2.8 *Presentation*
Depending on their content, the programmes may be presented full-time and without interruption, or by means of block courses that may be followed full-time or part-time. In certain cases where the presentation is by means of block courses, the candidates may start their study in the second semester.

6.3 THE PhD DEGREE

6.3.1 *Requirements*
The University may award the degree Doctor of Philosophy in the Faculty of Engineering to students who –

6.3.1.1
Were registered for the degree Doctor of Philosophy at Stellenbosch University –

6.3.1.1.1
for at least two years after the degree Master of Science in Engineering, Master of Science or Master of Engineering (with a research component) was awarded to them, or after reaching (in another manner) a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate; or

6.3.1.1.2
for at least three years after the degree Bachelor of Engineering was awarded to them, or after reaching, in another manner, a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate.

6.3.1.2
Satisfactorily completed a formal PhD assessment within the first year of enrolment.

6.3.1.3
Did original research in the field of engineering sciences under the supervision of a supervisor for a period of at least two academic years at the University, or at another institution approved by the University, to the satisfaction of the University.

6.3.1.4
Submitted a dissertation that in the view of the Senate indicates that a specific contribution, with signs of independent critical judgement, was made by the student to the enrichment of knowledge in the particular subject area. The dissertation must be accompanied by a declaration that it had not already been submitted at another university for the purpose of obtaining a degree, and that it is the student's own work.

PhD dissertations can be submitted in any of the formats described in Section 6.7.5 of the chapter "Higher Degrees" of the Calendar, Part 1. Dissertations that contain research in the form of published and/or unpublished articles, should at least contain an introductory overview, as well as an overview of the dissertation's structure with a summary of the most important results, conclusions that detail the originality and importance of the research, and recommendations that explain the basis of future work.

Research may be presented in a dissertation in the form of published and/or unpublished articles if the research work and the originality of the research are substantially the PhD candidate's own work. The dissertation shall, for each article, include a declaration in which the contribution of the candidate is indicated, in the format prescribed in Section 6.7.15 of the chapter "Higher Degrees" of the Calendar, Part 1.

6.3.1.5
Underwent an oral examination to the satisfaction of the University, provided that, subject to the approval of the Senate, exemption from the oral examination may be granted in special cases.

6.3.2 *Application*
(See the Admission Model at the end of this chapter.)

On applying for registration the student must submit the following particulars: the customary contact information; qualifications already completed (accompanied by certified copies of these qualifications if they were not obtained from Stellenbosch University); the intended commencement date; and the name of a supervisor and, if applicable, the names of one or more co-supervisors. The dissertation topic and supervisor(s) must, after the evaluation mentioned in Section 6.3.1.2, be submitted to the Senate for approval.

6.3.3 *Examination*
6.3.3.1
A PhD candidate shall not submit his/her dissertation for examination before written permission has been given by the supervisor(s).

6.3.3.2
The requirements regarding the number of copies of the dissertation that must be submitted, as well as further requirements that must be met before the degree may be awarded, are set out in the chapter "Higher Degrees" of the Calendar Part 1.

6.3.3.3
The examination is conducted in accordance with the procedures set out in the Faculty's *Minimum Standards – Postgraduate Examination*. Candidates who wish to be considered for the December graduation ceremony must submit their dissertations for examination before

or on 1 September, and candidates who wish to be considered for the March graduation ceremony must submit their dissertations for examination before or on 1 November.

6.3.3.4
Each PhD candidate must submit proof at his/her oral examination that a journal article, reporting the research of his/her dissertation, has already been submitted to a journal of acceptable standard.

Note: Should the dissertation be classified as confidential or secret, the article must still be submitted to the examination committee, but the requirement that it shall have been submitted to a journal, does not apply.

6.4 THE DEng DEGREE

6.4.*1 Requirements*
The University may award the degree Doctor of Engineering in the Faculty of Engineering to students who –

6.4.1.1
Were registered for at least one year as a student for the degree Doctor of Engineering at the University, and if –

6.4.1.1.1
a period of at least two years elapsed after the degree Doctor of Philosophy (Engineering) had been awarded to them, or after reaching in another manner a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate; or

6.4.1.1.2
a period of at least five years elapsed after the degree of Master of Science, Master of Science in Engineering or Master of Engineering had been awarded to them, or after reaching in another manner a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate; or

6.4.1.1.3
a period of at least nine years elapsed after the degree Bachelor in Engineering had been awarded to them, or after reaching in another manner a standard of competence in their field of study which is deemed sufficient for this purpose by the Senate.

6.4.1.2
After completion of the specified periods of study, were working full-time in their field to the satisfaction of the Senate.

6.4.1.3
Performed advanced original research and/or creative work, both to the satisfaction of the University, in the field of engineering sciences.

6.4.1.4
Submitted original and previously published works which, according to the judgment of the Senate, indicates that they have made a significant and outstanding contribution to the enrichment of knowledge of the engineering sciences.

6.4.2 *Examination*
6.4.2.1
A DEng candidate shall not submit his/her dissertation for examination before written permission has been given by the supervisor(s).

6.4.2.2
The requirements relating to the submission date, the number of copies to be submitted, as well as the additional requirements that must be met before the degree can be awarded, are set out in the chapter "Higher Degrees" of the Calendar, Part 1.
6.4.2.3
Candidates are not subject to an oral examination.

6.5 CONVERTING FROM PDE TO MEng

In deserving cases, the Faculty Board may recommend that registration for a PDE be converted to a registration for a MEng. The conversion may be done when the candidate has progressed more than the required standards in his/her studies and wishes to continue studying at a master's level.

6.6 CONVERTING FROM MEng TO MScEng

Since the MScEng programme is being phased out, conversion to it is no longer allowed.

6.7 CONVERTING FROM MScEng AND MEng (RESEARCH) TO PhD

In deserving cases, the Faculty Board may recommend that registration for a master's degree in Engineering, only MScEng and MEng (Research), be converted to registration for a doctorate. Applications are handled in accordance with the rules in the Calendar Part 1, and the procedure described in the Faculty's *Procedure for Upgrading to PhD*.

6.8 POSTGRADUATE MODEL IN THE FACULTY OF ENGINEERING AND MAXIMUM PERIOD OF ENROLMENT

6.8.1 *Postgraduate Model for the Faculty of Engineering*
The postgraduate programme structure, as contained in the flow diagram "Qualification and Admission Model for Postgraduate Programmes in the Faculty of Engineering" (see diagram at the end of this chapter), was approved by the Faculty Board in 2004 and, as from 2005, is applicable to all new postgraduate students who are admitted.

(*Please note:* As from 2012, students at the master's level may register only for the MEng programme.)

6.8.2 *Maximum Period of Enrolment*
The table "Maximum Period of Enrolment" (see table at the end of this chapter) was approved by the Faculty Board in 2004.

(Should a student exceed the maximum registration period, he/she may not automatically re-register, but must first obtain permission from the Faculty Committee – the closing date for reapplications is 31 January every year.)

FACULTY OF ENGINEERING

Maximum Period of Enrolment

PDE [120 SAQA credits]

Year of Enrolment	1	2	3	4
Full-time Enrolment			X	
Part-time Enrolment				X

MEng (Structured) [180 SAQA credits]

Year of Enrolment	1	2	3	4	5
Full-time Enrolment			X		
Part-time Enrolment					X

MEng (Research) [180 SAQA credits]

Year of Enrolment	1	2	3	4	5	6
Full-time Enrolment				X		
Part-time Enrolment						X

MScEng [240 SAQA credits]

Year of Enrolment	1	2	3	4	5	6
Full-time Enrolment				X		
Part-time Enrolment						X

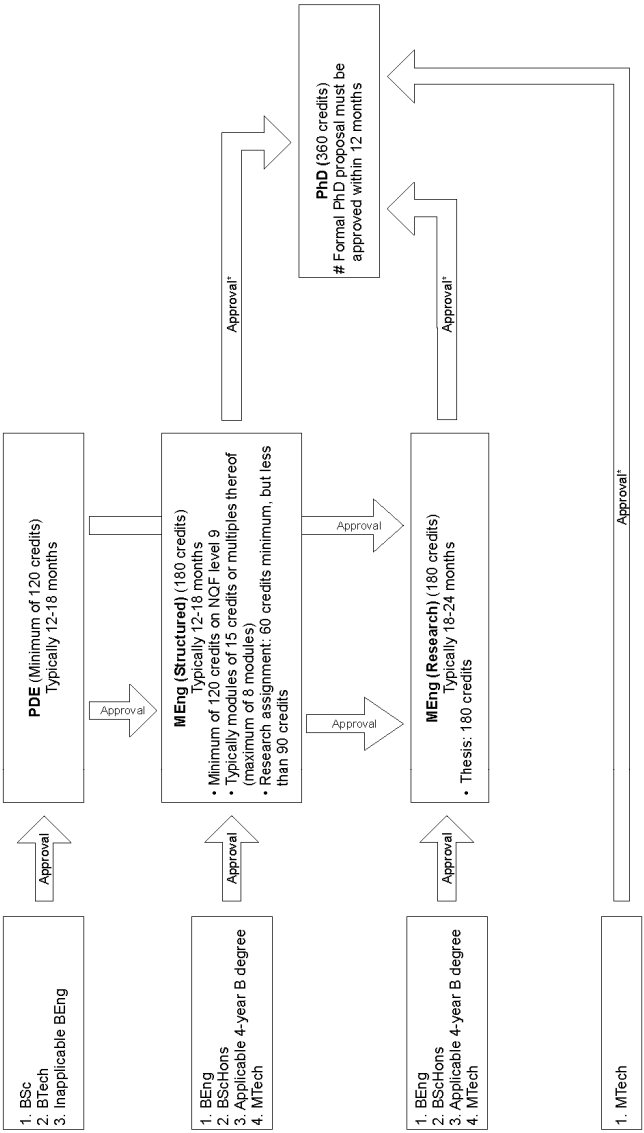
PhD [360 SAQA credits]

Year of Enrolment	1	2	3	4	5	6	7	8
Full-time Enrolment					X			
Part-time Enrolment								X

Key:

	Normal duration of programme
	Final year of concessional registration
X	Must apply for readmission to degree
	Not Applicable

QUALIFICATION AND ADMISSION MODEL FOR POSTGRADUATE PROGRAMMES IN THE FACULTY OF ENGINEERING



* **Approval**: Strictly based on research output.

\# Departments may require a formal assessment after one year

1 credit = 10 hours of work

7. Awards and Prizes

The most important awards and prizes that are unique to the Faculty of Engineering are listed below. Consult Part 2 of the Calendar for details regarding other prizes and bursaries for which engineering students may be considered.

7.1 GENERAL

7.1.1 *The Dean's Award for Outstanding Achievement*

The Dean's Award for Outstanding Achievement may be awarded to a student whose undergraduate and postgraduate performance has been outstanding. The period of study is usually limited to eight consecutive years of study. In order to qualify for this award, the candidate must also have performed exceptionally well as a researcher besides having an excellent study record. The acceptance for publication by a reputable international professional journal, of at least one professional journal article of which the candidate must be the first author, and contributions to the published proceedings of one or more international conferences, will typically be required.

The award, which is not necessarily made every year, includes a silver medal and a cash prize. The departments nominate candidates and the Faculty Committee decides who will be the recipient of the award.

7.1.2 *The ECSA Medal of Merit*

The ECSA Medal of Merit is awarded to the most deserving final-year BEng student in the Faculty for the year.

7.1.3 *The Jac van der Merwe Prize for Innovation*

The Jac van der Merwe Prize for Innovation may be awarded to a final-year student whose project or thesis affords the greatest evidence of ingenuity or originality of thought. It is sponsored by MultiChoice, and includes as cash prize of R30 000.

7.1.4 *Academic Colours*

Academic colours for outstanding BEng achievement is awarded by the Students' Representative Council.

7.1.5 *Lecturer of the Year*

This award, in the form of a medal, goes to a lecturer who has made his/her mark in the Faculty.

The award is made in recognition of good teaching, an influence in shaping the Faculty's students and a contribution to the development of the Faculty's programmes and/or laboratories.

Departments nominate candidates annually. The Faculty Committee makes the award on the grounds of the motivations supplied by the departments.

7.1.6 *Upcoming Researcher of the Year*

This award, in the form of a medal, goes to a lecturer or researcher who, over the preceding number of years, made exceptional progress in the field of research. The Research Advisory Committee recommends this candidate to the Faculty Committee. The Faculty Committee endorses this award.

7.1.7 *Honorary Member of the Faculty*

This award, in the form of a certificate, may be made each year to up to three people from outside the Faculty who rendered exceptional service to the Faculty over a long period and who promoted the Faculty's interests.

The departments nominate candidates. The Faculty Committee makes the award on the grounds of the motivations supplied by the departments.

The awards are announced at the meetings of the Advisory Board. The certificates are handed over at an Advisory Board meeting or any other suitable occasion.

7.2 CIVIL ENGINEERING

7.2.1 The Bergstan South Africa Prize of R1 250 for the best first-year student in Civil Engineering.

7.2.2 The Bergstan South Africa Prize of R1 800 for the best second-year student in Civil Engineering.

7.2.3 The Bergstan South Africa Prize of R2 500 for the best third-year student in Civil Engineering.

7.2.4 The Western Cape Branch of SAICE Prize of R3 000 for the student who has contributed most to the advancement of Civil Engineering.

7.2.5 The SA Institute of Steel Construction Prize of R1 500 for the most deserving student in Steel Construction.

7.2.6 The Concrete Society of Southern Africa Prize of R1 000, plus one year's membership fees to the Association, for the best thesis, or the most deserving student in Concrete Technology.

7.2.7 The AURECON Prize of R2 000 for the best final-year project.

7.2.8 The WSP SA Civil and Structural Engineers (Pty) Ltd Prize of R1 000 for the most deserving postgraduate student in Transport Engineering.

7.2.9 The WSP Africa Coastal Engineers (Pty) Ltd Prize of R1 000 for the most deserving final-year student in Hydraulic Engineering.

7.2.10 The AURECON Prize of R1 500 for the most deserving student in Transport Science.

7.2.11 The GLS Prize of R2 000 for the best thesis/dissertation on Water Engineering.

7.2.12 The AURECON Prize of R1 500 for the most deserving student in Environmental Engineering.

7.2.13 The Marius Louw Medal and the AURECON Prize of R3 500 for the best final-year student in Civil Engineering.

7.2.14 The SANRAL Prize of R1 000 for the best final-year project in Pavement Engineering.

7.2.15 The Pretoria Portland Cement Prize of R1 200 for the most deserving work in the field of Concrete Engineering.

7.2.16 The HL Reitz Medal and the AECOM Prize of R5 000 for the best postgraduate student in Civil Engineering.

7.2.17 The Murray & Roberts Construction (Pty) Ltd Prize of R1 750 for the best second-year student in the module Informatics in Civil Engineering.

7.2.18 The Murray & Roberts Construction (Pty) Ltd Prize of R1 750 for the best third-year student in the module Informatics for Civil Engineers.

7.2.19 The Murray & Roberts Construction (Pty) Ltd Prize of R1 750 for the best postgraduate student in the module Informatics for Civil Engineers.

7.2.20 The Melis & Du Plessis Prize of R3 000 for the most deserving undergraduate or postgraduate student in Geotechnics.

7.2.21 The Manfred Kloos Prize of R1 500 for the most deserving postgraduate student in Port and Coastal Engineering.

7.2.22 The UWP Consulting (Pty) Ltd Prize of R1 500 for the best final-year student in Transportation Engineering.

7.2.23 The ITS Prize of R1 500 for the best final-year project in Road Safety.

7.2.24 The Institute for Water and Environmental Engineering Prize of R2 500 for the most deserving final-year student in Advanced Design (Hydraulics)

7.2.25 The Haw & Inglis Civil Engineering (Pty) Ltd Prize of R3 000 for the best master's student in Civil Engineering.

7.3 ELECTRICAL AND ELECTRONIC ENGINEERING

Merit Certificates are awarded to students who:

- Pass a specific undergraduate year with an average above 75%.
- Obtain a postgraduate degree or diploma with distinction.

7.4 INDUSTRIAL ENGINEERING

7.4.1 The SAIIE Floating Trophy and SENROB Prize for the best achievement in manufacturing subjects and assignment.

7.4.2 The Lecturers' Prize for professional excellence in Industrial Engineering.

7.4.3 The John Thompson Prize for the best postgraduate student in Industrial Engineering.

7.4.4 The IBi Prize for the best third-year student in Industrial Engineering.

7.4.5 The SASOL Prize for the best postgraduate study in Industrial Engineering that is of relevance to Sasol.

7.4.6 The SASOL Prize for the final-year student who has produced the best project in Industrial Engineering.

7.4.7 The Indutech Prize for the best undergraduate thesis with an innovation approach.

7.4.8 The Lecturers' Prize for professional excellence in Industrial Engineering at postgraduate level and for excellence as an industrial engineer.

7.4.9 The Decision-making and Analysis Prize for the best student in Mathematical and Operations Research subjects in all four years.

7.4.10 The Qmuzik Prize for the best final-year student, as nominated by other students.

7.4.11 The Qmuzik Prize for the best student in Information Systems and Programming.

7.4.12 The Departments Prize for best thesis poster.

7.4.13 The Ergopak Prize for excellent contribution to packaging automation.

7.4.14 The RPD Prize for the best thesis with an RPD theme.

7.4.15 Fraunhofer IWU-GCC Cooperative Laboratory Prize for the best thesis within the Fraunhofer IWU-GCC cooperative laboratory for joint research.

7.4.16 Altech ISIS Prize for the best postgraduate student with the most valuable addition to Information Technology and Systems Design.

7.4.17 LTS Prize for the best second year student in Industrial Engineering.

7.4.18 LTS Prize for the best student in Industrial Engineering over the full period of study of four years.

7.4.19 Fanie Neethling Prize for the best final-year project poster.

7.4.20 PRAGMA Prize for the best final-year project in Industrial Engineering.

7.4.21 Melroseatteridge Prize for the best postgraduate student in Engineering Management.

7.4.22 AFSA Prize for the best final-year project making use of aluminium.

7.4.23 SAIIE Shield, Medal and one-year subscription for the best student over four years.

7.5 MECHANICAL AND MECHATRONIC ENGINEERING

7.5.1 The AeSSA Prize for the best Mechanical final-year project in Aeronautics.

7.5.2 The SAIMechE Prize for the best and second-best final-year project presentations in Mechanical and Mechatronic Engineering.

7.5.3 The SAIMechE Shield for the best final-year project in Mechanical and Mechatronic Engineering.

7.5.4 The CAE Book Prize for the best final-year project in Automotive Engineering.

7.5.5 The Kröger Book Prize for the best final-year project in the field of Thermodynamics or Heat Transfer.

7.5.6 The Chairperson's Prize awarded to a Mechanical or Mechatronic Engineering student for an outstanding achievement as decided by the lecturers of the Department.

7.5.7 The SASOL Prize for the best second-year student in Mechanical Engineering.

7.5.8 The SASOL Prize for the best third-year student in Mechanical Engineering.

7.5.9 The SASOL Prize for the best final-year student in Mechanical Engineering.

7.5.10 The SASOL Prize for the best third-year Mechanical Engineering student in Design.

7.5.11 The SASOL Prize for the best postgraduate student in Mechanical Engineering.

7.5.12 The Aluminium Federation of South Africa's Prize for the best final-year project with aluminium.

7.5.13 The ITM Prize for the best second-year student in Mechatronic Engineering.

7.5.14 The ITM Prize for the best third-year student in Mechatronic Engineering.

7.5.15 The ITM Prize for the best final-year student in Mechatronic Engineering.

7.5.16 The ITM Prize for the best postgraduate student in Mechatronic Engineering.

7.5.17 The ITM Prize for the best poster presentation in a final-year project in Mechanical or Mechatronic Engineering.

7.5.18 The Arthur Child Award for an exceptional postgraduate student in Aeronautics.

7.5.19 The Element Six (Pty) Ltd and DST/NRF Centre of Excellence in Strong Materials prizes for excellence in Materials Science and Engineering for the best third- and final-year student in Mechanical Engineering with the highest average.

7.5.20 The AAT Composites Prize for the best final-year project in Composite Materials.

7.5.21 The Autodesk/Educad Prize for the best use of CAD (Inventor) in a final-year project in Mechanical or Mechatronic Engineering.

7.5.22 The MMW Prize for the most outstanding final-year student in the laboratory environment.

7.5.23 The MMW Prize for the most outstanding postgraduate student in the laboratory environment

7.5.24 The John Thompson Prize for Exceptional Performance in Mechanical Engineering.

7.5.25 The John Thompson Prize for the best final-year project in Thermal Energy Systems

7.5.26 The Centre for Renewable & Sustainable Energy Prize for the best final-year project in Renewable Energy

7.5.27 The Centre for Renewable & Sustainable Energy Prize for the best postgraduate project in Renewable Energy

7.5.28 The Nico Laubscher Prize for the best final-year project written in Afrikaans

7.5.29 The Heever Technologies Prize for the best final-year project in Biomedical Engineering

7.6 PROCESS ENGINEERING (CHEMICAL ENGINEERING AND MINERAL PROCESSING)

7.6.1 The SAIChE Silver Medal for the best final-year student in the Department of Process Engineering.

7.6.2 The SAIMM Prestige Prize for the best final-year student in the Department of Process Engineering with final-year project in Mineral Processing.

7.6.3 The SAIMM Prize for the best third-year student in Mineral Processing.

7.6.4 The SASOL Prize for the best third-year student in Thermodynamics (CE 317).

7.6.5 The SASOL Prize for the best student in Process Design (CE 414).

7.6.6 The SASOL Prize for the best final-year student in Process Control (CE 426).

7.6.7 Element Six / DST / NRF Medals in support of Material Science for the best third-year student and the best performance in Material Science – final year.

7.6.8 The Chairperson's Prize for a final-year student who has made a noteworthy contribution to the Department of Process Engineering.

7.6.9 The Minerals Education Trust Fund Prize for the best final-year project in the Department of Process Engineering.

7.6.10 The Jac van der Merwe Nomination Prize for the most innovative final-year project in the Department of Process Engineering.

7.6.11 The MINTEK Prize for the best graduating MEng student in the Department of Process Engineering.

7.6.12 The Centre for Process Engineering Prize for the best final-year project poster.

7.6.13 The Centre for Process Engineering Prize for the best final-year student in Design.

7.6.14 The GE Intelligent Platforms Prize for the best graduating PhD student.

8. Faculty Rules

8.1 REQUIREMENTS FOR A PASS

The requirements for a pass in a BEng degree programme are set out under the general promotion regulations of the University of the Calendar Part 1.

8.2 RENEWAL OF REGISTRATION: BEng STUDENTS

8.2.1

Students who followed the first year of study in a four-year BEng programme for one year (this therefore includes students in the second year of an Extended Degree Programme), will normally be allowed to continue as a student in a BEng programme only if during the year they acquired at least 0,6 HEMIS credits (see Section 8.2.3 for the definition of HEMIS credits) in prescribed modules of the first year, of which at least 0,2 HEMIS credits must be acquired from the modules Applied Mathematics B 124, Applied Mathematics B 154, Engineering Mathematics 115 and Engineering Mathematics.

8.2.2

Students in a four-year BEng programme who have not obtained at least the following number of HEMIS credits out of those prescribed for the degree programme after the number of years of study mentioned below, shall not be permitted to continue in his/her engineering programme at this University:

- After 2 years at least 1,4 HEMIS credits
- After 3 years at least 2,2 HEMIS credits
- After 4 years at least 3,0 HEMIS credits
- After 5 years at least 3,6 HEMIS credits
- After 6 years at least 4,2 HEMIS credits

8.2.3

One HEMIS credit is equivalent to the total required number of module credits that are prescribed in a specific year of the four-year BEng programme.

8.2.3.1

If, for instance, a student passes the module Control Systems 314(15) in the programme in Electrical and Electronic Engineering, with a total of 150 credits for the year, the student acquires 0,1 HEMIS credits.

8.2.3.2

In the third year of the programme in Industrial Engineering, the same module gives 1,02 HEMIS credits, because 147 credits are prescribed for the third year of that programme.

8.2.3.3

Attendance modules in which no examination is written, are not considered in the calculation of HEMIS credits.

8.2.4

A student in engineering who follows the Extended Degree Programme will only be admitted to the second year of the Extended Degree Programme if he/she has passed all the modules of the first year at a performance level as set out by the Faculty and, at the beginning of the academic year, communicated to the students.

8.2.5

Students that follow an Extended Degree Programme in Engineering who have not obtained at least the following number of HEMIS credits (Section 8.2.3 gives the definition of HEMIS credits; the information below considers the first year of the Extended Degree Programmes to be 1 HEMIS credit) out of those prescribed for the Extended Degree Programme after the number of years of study mentioned below, shall not be permitted to continue in his/her engineering programme at this University:

- After 2 years at least HEMIS 1.60 credits
- After 3 years at least HEMIS 2.40 credits
- After 4 years at least HEMIS 3.20 credits
- After 5 years at least HEMIS 4.00 credits
- After 6 years at least HEMIS 4.60 credits
- After 7 years at least HEMIS 5.20 credits

8.2.6

After two years of full-time study in a four-year BEng programme, students will normally not be allowed to continue their studies in the programme if they have not passed all the prescribed modules for the first year of study.

After three years of full-time study in an Extended Degree Programme in Engineering, students will normally not be allowed to continue their studies in the programme if they have not passed all the prescribed modules for the first two years of study.

8.2.7

After four years of full-time study in a four-year BEng programme, students will normally only be allowed to continue with the programme if they have passed all the prescribed modules of the first and second years of study.

After five years of full-time study in an Extended Degree Programme in Engineering, students will normally not be allowed to continue their studies in the programme if they have not passed all the prescribed modules for the first three years of study.

8.2.8

Normally students who have not successfully completed a four-year BEng degree programme after six years of full-time study, will not be allowed to continue. Students enrolled for an Extended Degree Programme who have not completed the programme after seven years of full-time study, will not be allowed to continue.

8.2.9

In spite of any other stipulations, students will normally only be allowed to study further if they obtained at least 0,4 HEMIS credits in the preceding year.

8.2.10

Students who interrupt their study in engineering at Stellenbosch University for whatever reason, must apply anew for admission to the degree programme and will again be subject to selection.

8.2.11

Students who have to repeat remaining modules must ascertain during registration as student that there are no test and exam clashes regarding the modules for which they enrol. In the event of clashes in the timetable, the necessary permission must be obtained.

8.3 APPLICATION FOR READMISSION

8.3.1
The written applications for readmission to the BEng degree programme, of students who cannot continue their studies in engineering at this University, will be considered by the Readmission Committee of the University for recommendation to the Executive Committee (Senate) only if such applications reach the Registrar before 10 January of the year in which students want to continue their studies.

8.3.2
A full statement of reasons why the student should be readmitted, with supporting documentation where applicable, must be provided with each application.

8.3.3
If their application for readmission is successful, students who have interrupted their studies for three or more years must submit a written application to the Registrar for recognition of the modules passed during the initial period of study.

8.4 REGISTRATION OF STUDENTS AND ADMISSION TO THE MODULES OF A FOLLOWING YEAR

The following Faculty rules apply in the case of students who follow a four-year or Extended BEng degree programme and who wish to attend and complete modules from more than one of the programme's years of study, provided that they meet the requirements for that specific module, and that there are no class, test or examination timetable clashes:

8.4.1
They are allowed to carry at the most 100% of the normal academic load per semester, (for exceptions see 8.4.4.2 below); and

8.4.2
They are not allowed to simultaneously follow modules chosen from more than two consecutive years of the degree programme (for example a first-year module may not simultaneously be followed with a third-year module).

8.4.3
They may in any given semester follow modules from more than one year of study of the relevant programme only if they have already passed, or are also following, all the modules of the more junior years (for example a module of the first semester of the third year of study may be followed only if all the modules of the first two years of study have either already been passed, or are also being followed in that semester).

8.4.4
The following exceptions apply to the rules mentioned above, in addition to the stipulation in the Examination and Promotion Provisions in the Calendar, Part 1, regarding repetition of a module:

8.4.4.1
In cases where lecture period clashes occur, the chairperson of the relevant department may permit students to follow a clashing module, subject to the conditions given in 8.4.1 to 8.4.3 above

8.4.4.2
Students who are able to follow the full programme in a semester, and who are still one module behind in that semester, but who perform satisfactorily otherwise, may be allowed to follow and complete the additional module on merit by the chairperson of the department, in consultation with the Dean.

8.5 ELECTRONIC POCKET CALCULATORS

Every engineering student must have an approved electronic pocket calculator from the first year. Only the prescribed type of pocket calculator may be used in tests and examinations for the first and second years of study, as well as when specifically required by lecturers. Details regarding the specifications of pocket calculators may be obtained from the Faculty of Engineering.

8.6 EXAMINATION AND PROMOTION PROVISIONS

8.6.1 *General*
Details concerning the general provisions with regard to examinations and the awarding and determination of final marks in modules are supplied in Part 1 of the Calendar. No marks are awarded in a module for which a student is not registered.

8.6.2 *Own Work*
Each item that a student hands in for marking (and which can contribute towards the value of the class mark or final mark), must be his/her own work. Another person may not have done part of it, unless the specific lecturer gave written consent for the specific item that students may use the work of their team members.

8.6.3 *Examination timetables*
The examination timetables for modules that are presented to students of the Faculty of Engineering are published centrally. It is the responsibility of all students to ensure, before registration at the start of the academic year, that there are no clashes on any of the abovementioned timetables regarding the modules for which they have registered.

8.6.4 *Test and Examination Scripts*
All written test and examination scripts must be done in ink.

8.6.5 *Representations regarding Test and Class Marks*
Students who question a test or class mark, may approach their lecturers or departmental chairperson. In all cases, a deadline of 7 calendar days applies after a test or class mark was announced. No representations will be considered after this deadline.

8.6.6 *Prerequisite, Prerequisite Pass and Corequisite Modules*
The prerequisite, prerequisite pass and corequisite modules for every undergraduate module presented in the Faculty of Engineering are provided under the syllabi in Chapter 5 of this part of the Calendar. Students must meet these requirements before they may register for a module.

8.6.7 *Dean's Concession Examination*
If an undergraduate final-year student requires, after his/her last examination or assessment, only one module, of 18 credits or less, for the conferral of his/her degree and was assigned a final mark for the relevant module during the particular academic year, he/she may submit an application for a dean's concession examination to the Faculty Secretary. The Faculty

Secretary will notify the student concerned whether his/her application was successful by way of an email to the student's university email address.

Modules that use project evaluation or only require satisfactory attendance are not considered for dean's concession examinations. Dean's concession examinations are only considered for modules that used flexible assessment or continuous assessment if the students involved only require (to pass the module) aspects that can be assessed by means of a written or oral assessment. Assignments or assessments that involve group work, are not considered for dean's concession examinations.

Dean's concession examinations are conducted on a date and at a time determined by the Dean.

If a student achieves a mark of 50% or more in a dean's concession examination for a module using the examination system, and if the student has met all the subminima applicable to the module, then his/her final mark is adjusted ot 50. If a student in a flexible assessment module achieved a final mark of 40 or 45 before the dean's concession examination, then the dean's concession examination is treated like an examination module. In other cases, a new mark is calculated for the student taking the previous tests and assessments into account. If this new mark is 50% or more, and all relevant subminima applicable to the module have been satisfied, then the student's final mark is adjusted to 50.

If a student does not pass the relevant module after the dean's concession examination, then the student's final mark that was awarded before the dean's concession examination, is retained after the dean's concession examination.

8.7 IMPROVEMENT OF A FINAL MARK

8.7.1

For modules where continuous assessment, flexible assessment or project evaluation is used, these modules' final marks must be submitted along with the final marks of the examination modules.

8.7.2

Students may improve their performance until the end of January in the case of modules for which only a satisfactory attendance is required, subject to the approval of the departmental chairperson of the module's home department.

8.7.3

In the case of modules in the final year in the Faculty of Engineering that use project evaluation, the departmental chairperson may offer final-year students who did not pass the relevant module the opportunity to improve their final mark at *any time after the normal round of examinations in November* by completing satisfactorily such work as is prescribed by the relevant department for the improvement of the final marks. The examiners may submit the improved final mark any time after the normal round of examinations for interim approval by the Executive Committee, provided that this concession is limited to no more than two modules per student.

8.7.4

In the case of similar modules of a non-final year in the Faculty of Engineering, or of students not in their final year, the improvement of the final mark must take place in the framework of the November or June examinations respectively, and the specific dates for handing in final marks, if the normal round of examination is in June or November.

8.8 THESIS/PROJECTS

8.8.1
During the final year of a BEng programme students must submit an independent piece of work on any subject in their chosen field. The nature of the work must be determined in collaboration with the relevant department.

8.8.2
It may be expected of final-year students to work on their projects in the laboratories of the relevant department during the vacations of their final year, over and above the time allocated in the timetable for this purpose.

8.9 IT INFRASTRUCTURE

8.9.1 *Purpose*
The Faculty's information technology infrastructure resides mainly in the Engineering Faculty Computer-user Area (FIRGA). It provides to all engineering students, in support of their academic activities, facilities for numerical and digital modelling, computer-aided engineering, information dissemination, communication and documentation.

8.9.2 *Payment*
All engineering students pay an annual levy for access to the IT infrastructure, with the exception of a few postgraduate students who do not study on campus and who are specifically exempted from this obligation.

8.9.3 *Approved Hardware*
Only hardware that has been approved by the University's Division for Information Technology may by connected to the network. Incompatible hardware can put the Faculty's whole network out of service!

8.10 MISUSE OF IT INFRASTRUCTURE

The misuse of the IT infrastructure is strictly forbidden. Misuse includes:

8.10.1
Unauthorised access to computers or servers.

8.10.2
Unauthorised use of software programs and the use of illegal software.

8.10.3
Unauthorised copying of computer programs or the violation of copyright.

8.10.4
Unauthorised access to and/or copying or changing of system files, including configuration, user and password files.

8.10.5
Harassment of others by displaying indecent material or sending unwelcome messages.

8.10.6
Interception of network traffic and wrongful reading of e-mail.

8.10.7
Any form of fraud via the network, including the use of another person's password.

8.10.8
Playing of computer games over the network.

8.10.9
Any action resulting in the system being overloaded with information, such as chainletter messages, spam, etc.

8.11 CORRECT USE OF IT INFRASTRUCTURE

8.11.1 *E-mail and Network Etiquette*

- Keep your automatic message received function active: confirmation of receipt is useful to the sender, thereby creating an expectation of a reaction/answer.
- Read your e-mail regularly and answer all e-mails which are not intended for general distribution.
- Use good language and avoid aggression in messages.
- Do not attached large files to e-mails as they misuse disc space. Rather use file (attachments) transfer protocols, such as ftp, to send large documents as attachments.
- Do not use (e-mail) distribution lists for non-academic purposes for informing large groups of people of bazaars, entertainment, etc. Rather use the Campus News or the University's Daily Bulletin.

8.11.2 *Communal Computer-user Areas*

- Leave your workstation in the general computer users' areas neat, as you would like
- to find it.
- Complete the fault report forms, which are kept in the front of the room, so that faulty apparatus can be attended to as soon as possible.
- Do not run long programs unmanned with messages that the computer must be left alone.
- Make positive suggestions that will improve the functionality of the system.

Also refer to Part 1 of the Calendar for the general university policy.