MISSION STATEMENT

UCT aspires to become a premier academic meeting point between South Africa, the rest of Africa and the world. Taking advantage of expanding global networks and our distinct vantage point in Africa, we are committed through innovative research and scholarship, to grapple with the key issues of our natural and social worlds. We aim to produce graduates whose qualifications are internationally recognised and locally applicable, underpinned by values of engaged citizenship and social justice. UCT will promote diversity and transformation within our institution and beyond, including growing the next generation of academics.

Foundation statement underpinning the mission statement

Our research-led identity is shaped by a commitment to:

- academic freedom as the prerequisite to fostering intellectual debate and free injury;
- ensuring that research informs all our activities including teaching, learning and service in the community;
- advancing and disseminating knowledge that addresses the key challenges facing society – South African, continental and global;
- protecting "curiosity driven" research;
- nurturing and valuing creativity in the sciences and arts including the performing and creative arts;
- stimulating international linkages of researchers and research groupings;

We strive to provide a superior, quality educational experience for undergraduate and postgraduate students through:

- providing an intellectually and socially stimulating environment;
- inspired and dedicated teaching and learning;
- exposure to the excitement of creating new knowledge;
- stimulating the love of life-long learning;
- the cultivation of competencies for global citizenship;
- supporting programmes that stimulate the social consciousness of students;
- offering access to courses outside the conventional curricula;
- attracting a culturally and internationally diverse community of scholars;
- guaranteeing internationally competitive qualifications;
- offering a rich array of social, cultural, sporting and leadership opportunities;
- providing an enabling physical and operational environment.

In advancing UCT as an Afropolitan university, we will

- expand our expertise on Africa and offer it to the world;
- extend our networks on the continent, along with our global connections and partnerships;
- promote student and staff exchanges and collaborative research and postgraduate programmes;
- engage critically with Africa's intellectuals and world views in teaching and research;
- contribute to strengthening higher education on our continent.

We strive to provide an environment for our diverse student and staff community that:

- promotes a more equitable and non-racial society;
- supports redress in regard to past injustices;
- is affirming and inclusive of all staff and promotes diversity in demographics, skills and backgrounds;
- offers individual development opportunities to all staff;
- is welcoming as a meeting space for scholars from Africa and around the world.

UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT (UNDERGRADUATE)

2012

Postal Address: University of Cape Town
Private Bag X3
7701 RONDEBOSCH

Dean's & Faculty Offices: Room 600, MenziesBuilding
Engineering Mall
Upper Campus

Office Hours: Mondays to Fridays: 08h30 - 12h30; 13h30 - 16h30

Fax: (021) 650 3782

Telephones:

Dean's Office	(021) 650 2702
Faculty Office	(021) 650 2699
Accounts and Fees	(021) 650 1704
Admissions	(021) 650 2128

Internet:

UCT's Home Page	http://www.uct.ac.za
Engineering & Built Environment Home Page	http://www.ebe.uct.ac.za
Dean's Office	ebe-dean@uct.ac.za
Faculty Office	ebe-faculty@uct.ac.za
International Academic Programmes Office	int-iapo@uct.ac.za

The Registrar's and General Enquiries offices are located in the Bremner Building and remain open during the lunch hour. The Admissions Office and Student Records Office are located in the Student Administration Building, Middle Campus, and are open from 08h30 to 16h30. The Cashier's Office is located in Kramer Building, Middle Campus, and is open from 09h00 to 15h30.

This handbook is part of a series that consists of

Boo1:	Undergraduate Prospectus
Book 2:	Authorities and information of record
Book 3:	General Rules and Policies
Book 4:	Academic Calendar and Meetings
Book 5:	Student Support and Services
Books 6-11:	Handbooks of the Faculties of Commerce, Engineering & the Built Environment, Health Sciences, Humanities, Law, Science
Book 12:	Student Fees
Book 13:	Bursary and Loan Opportunities for Undergraduate Study
Book 14:	Financial assistance for Postgraduate Study and Postdoctoral Research

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The University has made every effort to ensure the accuracy of the information in its handbooks. However, we reserve the right at any time, if circumstances dictate (for example, if there are not sufficient students registered), to

(i) make alterations or changes to any of the published details of the opportunities on offer; or

(ii) add to or withdraw any of the opportunities on offer.

Our students are given every assurance that changes to opportunities will only be made under compelling circumstances and students will be fully informed as soon as possible.

Teaching and Learning Charter

Mutual Commitment
Benefiting from the opportunities of education requires a mutual commitment on the part of both student and teacher.

Students should understand that, by accepting the offer of a place at the University, they undertake responsibility for their own learning. This requires that they attend classes, tutorials, practicals and other scheduled activities and prepare assignments to the best of their ability, handing in work on time. Students should be considerate to the needs of others in their behaviour in lectures and tutorials. They should act with honesty and integrity, ensuring that work that they hand in is their own, that all the sources that they use are properly acknowledged, and that they respect and follow the rules and procedures for formal examinations.

Good teachers bring enthusiasm, originality and flair to their work. Good teaching is best fostered in a collegial atmosphere where codes of practice provide a baseline standard for professionalism, rather than serving as a prescriptive and proscriptive list of requirements. While Heads of academic departments are formally responsible to Senate for teaching and learning in their departments, individual members of the academic staff are accountable for their contribution to the university's educational mission. Teachers should understand that, by accepting employment on the academic staff of the University, they undertake to provide all reasonable assistance to students to enable them to succeed in their studies. This requires that they deliver lectures and other scheduled classes and make every reasonable effort to make alternative arrangements if they are unable to do so. Teachers should be available for student consultations at reasonable and clearly-advertised times, and should hand back student work timeosly, and with appropriate comment. Teachers' expectations of students should be clearly set out in course outlines, available before the course starts. Required reading and other preparation should be clearly specified, and teachers should ensure that such materials are available to students in the Library, in text books that are available, and in authorized course readers. Methods of evaluation and assessment that will be used in the course must be defined and described in the course outline and followed in the course. Expectations of students in formal examinations must be set out, and such formal examinations must have a fair and reasonable relationship with the ground covered in the course. Consequently: Students should make a formal undertaking, as part of the process of admission to the University, to take responsibility for their own learning, to respect the requirements of the courses for which they register, and to take part in the academic life of the University with integrity and honesty.

Academic staff undertake to

- provide clearly written course outlines, setting out what is expected of students for the complete course, that are available well in advance of the beginning of the course, to allow students adequate time to prepare;
- provide lists of required and recommended reading for courses, in advance of the beginning of the course, and to establish that this material is in the University Library, in local bookshops (by timeous submission of reading lists), or in course readers (with copyright clearance, and within agreed policy for course levies);
- set out a clear and well designed system of assessment for the course, which defines what is expected of a student, and the relative value of different coursework, test and examination components; set clear and consistent DP requirements for courses, consistently enforced;
- present lectures and tutorials in a clear manner, explaining technical terms where appropriate;
- establish a fair and consistent approach to hearing requests for concessions and re-marking of assignments, and for leave of absence from lectures (where attendance is compulsory), tutorials and other class sessions;
- adhere to an agreed and published timetable for lectures, tutorials and other teaching sessions, that respects the need of students to plan their class attendance and study time;

ensure that they, and other teaching staff involved in their courses, are available to meet with students at advertised office hours, and interact with students without discrimination or favouritism;

return work submitted for assessment within a reasonable period of time, with adequate and appropriate comments and other forms of evaluation, and ahead of formal examinations, so that students can incorporate feedback in their examination preparation;

ensure consistent marking of examination papers and, for large classes, effective moderation of examination marking by the lecturer concerned;

Organize a written evaluation for each course, allowing students to express their views freely and, if they wish, anonymously, and build on the outcomes of such evaluations in adapting the course for the future.

Postgraduate students have particular needs, and the relationship between postgraduate students and their supervisors is set out in a parallel policy, which should be read in conjunction with this Teaching and Learning Charter.

Guide to the usage of this Handbook

The following is a general overview of the structure of this Handbook for the guidance of users. The contents are organised in a number of different sections (see below) each of which has a particular focus. The sections are interlinked by cross-references where relevant.

(a) *General Information:* This section includes information on the professional status and recognition of the Faculty's degrees, its links with professional bodies and the list of qualifications offered. It also includes lists of the various prizes, medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.

(b) *Rules for degrees:* This section covers the Faculty rules for each of the various degree programmes. These rules should be read in conjunction with the general University rules in the General Rules and Policies Handbook (Handbook 3). Students are expected to acquaint themselves with the rules in both Handbooks and to check annually whether the rules or curriculum requirements have changed since the last edition. *Important rules:* All students must familiarise themselves with the Degree Rules in this Handbook. In addition, students must refer to Handbook 3, General Rules and Policies and particularly take note of the following:

rules relating to registration and examinations;
rules relating to changes of curriculum;
rules relating to leave of absence;
rules on Academic Conduct, N.B. the rules concerning dishonest conduct and plagiarism.

Detailed information on the undergraduate entrance requirements can be found in the University Prospectus. The PhD Degree rules are published in *Handbook 3, General Rules and Policies.*

(c) *Departments and Programmes:* This section contains entries for each department in the Faculty. Each lists members of staff, a summary of laboratory, workshop and other facilities, the research entities, and the programmes of study administered by each department. The curriculum for each programme (list of required courses) is set out in table form. The curriculum tables must be read together with (cross-referenced to) the lists of courses in the Courses Offered section which is described under (e) below.

(d) *Centres/Units established in the Faculty* and *Centres, Departments, Schools and Units Established in other Faculties:* There are entries for the principal Faculty entities/units which do not fall directly under academic departments e.g. the Centre for Research in Engineering Education and the Continuing Professional Development Programme and entries for the centres, units and departments in other faculties which offer courses for students registered in the Faculty. This is cross referenced to the list of courses offered in section (e).

(e) *Courses Offered:* The full list and descriptions of courses offered by the Faculty, both undergraduate and postgraduate, is set out in this section in alpha-numeric order (i.e. based on the course code prefix) which identifies the department offering the course and the course number. The courses offered by other faculties which are more commonly taken by students in the Faculty of Engineering & the Built Environment are also listed and described. N.B. A key (guide) to the course code system, the credit system and terminology (definitions) is set out at the beginning of this section.

GENERAL INFORMATION

Officers in the Faculty

Academic

Dean of the Faculty:
Professor FW Petersen, PrEng BEng MEng PhD *Stell* MSAIChEf

Personal Assistant to the Dean:
Ms J Baron

Deputy Deans:
Associate Professor NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE Mem IAHR Mem IAHS Mem IWA
Professor STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAAE ASSAfI
Professor V Watson, BA(Hons) *Natal* MCRP*Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

Assistant Deans:
Professor JM Case, BSc(Hons) *Stell* HDE*Cape Town* MEd *Leeds* PhD *Monash* MASSAf
Associate Professor ME Dlodlo, BSEE BS *Geneva* MSc *Kansas* PhD *Delft* FZweIE MIEEE

Heads of Departments:
Architecture, Planning and Geomatics:
Associate Professor A Steenkamp, MArch *Pret* PrArch

Chemical Engineering:
Professor JCQ Fletcher, BSc(Eng)Chem PhD*Cape Town* MACS FSAAE

Civil Engineering:
Professor A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) DIC PhD *London* CEng FIStructE FZweIE MASSAf FIABSE FSAAE

Construction Economics and Management:
Professor KS Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

Electrical Engineering:
Emeritus Professor BJ Downing, MSc *Bradford* PhD *Sheffield*

Mechanical Engineering:
Professor C Redelinghuys, BIng(Hons) *Stell* MS *Stanford* PhD *Stell* MSAIMechE MAIAA

Associate Professor and Convener Professional Communication Studies:
J English, BA MPhil *Cape Town* PhD *Glasgow Caledonian*

Academic Administration

Faculty Manager (Academic Administration):
Ms G Valodia, BA (Hons) HDE *Cape Town*

Undergraduate Manager (Academic Administration):
Ms D Chuter, BA HDE *Cape Town*

Senior Administrative Officer (Postgraduate Studies):
Ms M Mitchell, BSocSci *Cape Town* BA(SocSci)(Hons) *UNISA*

Administrative Officer and Statistician:
Mr K Salman

Administrative Assistants:
Mr D April
Ms B Davids
Mrs J Rumbelow
Vacant x 2

Senior Secretary - Receptionist:
Ms S Reizenburg

Faculty Assistant:
Mrs S Adams

Clinical Psychologist

Ms N Ahmed, MA (Clinical Psychology) MA (Research Psychology) *Cape Town*

Communications, Marketing and Development

Manager:
Ms M Hilton

Finance

Faculty Finance Manager:
Mr B Daubenton, HND Civil EngineeringStructures *Cape Technikon*

Assistant Faculty Finance Manager:
Ms N Ngubo

Senior Finance Officer:
Mrs M Hyland

Finance Officer:
Ms A Burmeister, BA *UNISA*

Human Resources

Human Resources Officer:
Ms Z Matthews, BAdmin *UWC*

IT and Facilities

Manager:
Ms E le Roux

Student Councils

The Engineering & the Built Environment Student Council in the Faculty represents the interests of the student body. The EBESC and its counterparts in other faculties are concerned with promoting the academic and social interests of the students they represent. The 2011/2012 Chair is Vusi Baleni (blnvus001@myuct.ac.za) and the Vice-Chair is Dean Rynhoud (deanrynhoud@hotmail.com). Further information concerning the Council is obtainable from the EBESC Office, Room 337 Menzies Building.

A Faculty Postgraduate Student Council represents the specific interests of postgraduate students. The 2011/2012 Chair and Vice Chair are to be announced. They can be contacted at room 338 Menzies Building.

Postgraduate Centre

The Postgraduate Centre is situated in the OttoBeitBuilding, Upper Campus. This state-of-the-art facility houses the executive committee of the Postgraduate Students Association (PGSA) as well as the Postgraduate Funding Office. The centre is equipped with IT facilities and includes a seminar room. This facility is open to all Master's and Doctoral students as well as postdoctoral research fellows. Postgraduates are encouraged to make full use of this centre, in particular, the Funding Office, which administers all postgraduate bursaries and scholarships. The Postgraduate Centre may be contacted at gradcentre@uct.ac.za. or visited at www.pgfo.uct.ac.za.

Distinguished Teachers

The University has instituted a Distinguished Teacher's Award in recognition of the importance of excellence in teaching at all levels in the University. The following current members of the Faculty staff have received this award.

Mr F Carter	(School of Architecture, Planning and Geomatics)	2007
Professor JM Case	(Chemical Engineering)	2007

Fellows in the Faculty

The Council of the University has established Fellowships for members of the permanent academic staff in recognition of original distinguished academic work of such quality as to merit special recognition. The following is a list of Fellows who are currently on the Faculty's staff:

Professor MG Alexander	(Civil Engineering)
Professor D Dewar	(Architecture, Planning and Geomatics)
Professor GA Ekama	(Civil Engineering)
Emeritus Professor CT O'Connor	(Chemical Engineering)
Professor H Rüther	(Architecture, Planning and Geomatics)
Professor V Watson	(Architecture, Planning and Geomatics)

Lecture timetable

The lecture timetables are published separately by the department concerned from where they are obtainable at Registration.

Minimum Requirements for Admission

Refer to rule FB 1, in the section on Degree Rules, for the minimum formal entrance requirements for the bachelors degrees offered in the Faculty of Engineering & the Built Environment.

The minimum requirements for admission for Postgraduate Diploma, Honours and Master's degree programmes in the Faculty of Engineering & the Built Environment are set out in the rules for the appropriate postgraduate diplomas/degrees. The PhD requirements are set out in Handbook 3 of this series.

Further detailed information on Faculty entrance requirements can be found in the *Undergraduate*

Prospectus. Refer to the University's web page: http://www.uct.ac.za

Scholarships, Prizes, Class Medals and Dean's Merit List

Scholarships/Awards

Details of scholarships and awards available are given in the Financial Assistance for Postgraduate Studies and Financial Assistance for Undergraduate Studies Handbooks available from the Registrar. The following is a selected list of scholarships and awards. Note that the scholarships on offer and the values are subject to change without notice.

Architecture, Planning and Geomatics

Architecture and Planning

Hugh and Win Walker Scholarships: Awarded with preference for degrees in Architecture and, thereafter, Planning undertaken at UCT. Applications to the Postgraduate Scholarships Office/Undergraduate Funding Office.

National Development Fund for the Building Industry Postgraduate Scholarship: Applications to the Director, National Development fund for the Building Industry, Box 1619, Halfway House, 1685, by 2 January.

South African Council for the Architectural Profession: For First year BAS students. Applications to SACAP by 31 March - via the Head of the First Year Studio. Applications to the Director, National Development fund for the Building Industry, Box 1619, Halfway House, 1685, by 2 January.

Geomatics

Twamley Undergraduate Scholarship (R1 000, tenure 1 year): Awarded on the basis of the most outstanding academic performance at the end of the First Year of study, provided that the nominee shall have met the requirements for inclusion in the Dean's Merit List.

Twamley Postgraduate Scholarship (R3 000 pa, tenure 3 years maximum): Awarded on the recommendation of the Chair of Surveying on the basis of academic achievement and other appropriate experience for postgraduate study in Geomatics.

Construction Economics and Management

Association of Construction Project Management (ACPM) Scholarship: R2500 for a South African holder of UCT's Department of Construction Economics & Management's BSc Hons in Quantity Surveying or BSc Hons in Construction Management degree at UCTwho meets the entrance requirements for the MSc(Project Management) programme and has financial need. Applications to the Admin Officer, Need-based Bursaries, Post-graduate Funding Office, Otto Beit building, Upper Campus, UCT. ACPM must be kept appropriately informed. (This is not a prize but an award to a worthy student in need on financial aid and must, therefore,be administered by UCT's Funding Office.)

Construction Education Sector Training Authority (CETA) Bursaries: Awarded to students entering full-time postgraduate studies. Applications to be submitted by 31 August to CETA, PO Box 644, Bedfordview 2008.

National Research Foundation: Awarded on merit for Honours, full/part-time Master's and Doctoral Study. Applications to be submitted to the Postgraduate Scholarships Office by 15 August for Honours and 31 December for Master's study and 30 April for Doctoral study.

National Research Foundation: NRF Prestigious Awards: Awarded on merit for full-time registered Master's or Doctoral Studies. Applications to be submitted by 30 June (internal) or 31 July (agency).
NRF Grantholder Bursaries: Applications to be submitted by 28 February (internal) or 31 March (agency).

Louw, Tobie, Bursary - BSc(Hons)(QS) Students: Awarded for Postgraduate study in Quantity Surveying. Applications to be submitted to the Prizes and Awards Committee, Association of South African Quantity Surveyors, PO Box 3527, Halfway House, 1685 by, 31 January

Quantity Surveyor's Research Award - BSc(Hons)(QS) Students: Prestige award for research work into technical and managerial problems in the building industry. Applications to be submitted to the Prizes and Awards Committee, Association of South African Quantity Surveyors, PO Box 3527, Halfway House, 1685, by 15 June.

Queen Elizabeth II Jubilee Fund Scholarship: Awarded to Bachelor's and taught Master's students who are members of the CIOB. Applications to be submitted to the Scholarship Secretary, Professional and Technical Directorate, CIOB, Englemere, Kings Ride, Ascot, Berkshire, SL5 7TB, England.

Engineering

General

Klaus-Jurgen Bathé Scholarships (R10 000 available for one or more award - value variable; tenure 2 years maximum): Awarded to students in the final 2 years of study who show evidence of high intellectual power and commitment to the achievement of excellence in the field of Engineering.

Council Postgraduate Scholarship (R2 000 pa, tenure 2 years): Awarded on the results of the examinations for the degree of BSc(Eng) or BSc(Geomatics), based on honours points. Candidates should have obtained First Class Honours and intend to continue with the study of engineering or geomatics.

E D Steytler Memorial Scholarship (Undergraduate) (R1 100, tenure 1 year): Awarded to the student obtaining the highest weighted average in the First Year examinations.

Twamley Undergraduate Scholarship (R1 000, tenure 1 year): Awarded on the basis of the most outstanding academic performance at the end of the First Year of study.

Civil Engineering

Christopher Robertson Scholarship (Undergraduate) (R2 500 pa, tenure 1 year): Awarded to the student in Civil Engineering who has made the most progress in the Third Year of studies. (Where there is a choice between candidates of equal merit, preference is for those with fewer scholarships and to whom the value of the award would be advantageous).

Ninham Shand Scholarship (Postgraduate) (7 500 x 2, tenure 2 years): Awarded on examination results for the BSc(Eng) Civil degree. The candidate should have obtained Honours and intend to undertake further study.

Chris van Breda Scholarship (Postgraduate) (R8 500 pa, tenure 2 years): Awarded on final examination results for the BSc(Eng) Civil degree. The candidate should have obtained Honours and intend to undertake further study.

Mechanical Engineering

Duncan McMillan Scholarship (Undergraduate) (R500, tenure 1 year renewable for a

maximum of 3 years): Awarded annually to the First Year Mechanical Engineering student gaining the highest weighted average, subject to the holder maintaining satisfactory progress and conduct.

Class Medals

Architecture, Planning and Geomatics

Class medals may be awarded to students who have shown special ability in the course. They are only awarded where special merit should be recognised. Only one medal may be awarded in a course. Any student who repeats a course will be ineligible for a medal in that course. Class medals may be awarded in the following courses:

APG1016F Geomatics
APG2039W Design and Theory Studio II
APG3037W Design and Theory Studio III

Construction Economics and Management and Engineering

Class medals may be awarded to the best students in each of the following first year core courses: CHE1004W, CIV1004W, CON1004W, CON1011F, CON1012S, CON1018W, CON1019F/S, EEE1004W, MEC1002W and MEC1004W.
Class medals are also awarded to each of the second, third and (where applicable) fourth years of study to students with the best weighted average in core, core-elective, elective and optional courses in the following programmes:

Chemical Engineering
Civil Engineering
Construction Management
Construction Studies
Electrical Engineering
Electrical and Computer Engineering
Electro-Mechanical Engineering
Geomatics
Materials Science
Mechanical Engineering
Mechatronics
Property Studies
Quantity Surveying

Prizes

The following prizes may be awarded at the discretion of the Faculty. The prize offerings and values are subject to change without notice.

General

David Haddon Prize: R300 for the purchase of books for the best Architecture or Quantity Surveying student in the subject Professional Practice (APG4044S or CON4034W).

Joseph Arenow Prizes: (two x R1000) (i) for the best Master's dissertation in the Faculty of Engineering & the Built Environment (ii) for the best PhD thesis in the Faculty of Engineering & the Built Environment.

Architecture, Planning and Geomatics

Aluminium Federation of South Africa Award: R1000 for the best project in the final year of BAS or BAS(Hons)entailing the use of aluminium.

ArcelorMittal South Africa Prize: R1000 for the best innovative design using ArcelorMittal South Africa Steel Products.
Association of ConsultingTown and Regional Planners Prize: R1000 and certificate for the best dissertation in the MCRP programme.

Barry Heyman Prize: R5000 for the first year MArch(Prof) student who shows the greatest progress in Architectural Design in the MArch(Prof) programme.

Cape Institute for Architecture Measured Drawing Prize: R500 for Measured Drawings of old works in the Cape Province.

Cape Institute for Architecture Prize: R750 for the best student graduating in the MArch(Prof) programme.

Cape Institute for Architecture Prize: R750 for the best student in Design and Theory Studio II.

Cape Institute for Architecture: R750 for the best student in Design and Theory Studio III.

Cement and Concrete Institute Prize: Book and R1000 voucher for the best use of concrete in final year design in the BAS programme.

Cement and Concrete Institute Prize: Book and R1000 voucher for the best use of concrete in final year design in the MArch(Prof) programmes.

Clay Brick Association Prize: R250 for the purchase of books to the student of Architecture who has made best use of bricks in his or her design work.

Corobrik Prize: R500 for the best project entailing the innovative use of clay bricks from work done in 2nd year.

Corobrik Prize: R500 for the best project entailing the innovative use of clay bricks from work done in 3rd year.

Essay Prize: R50 awarded to the BAS(Hons) student who produces the best essay.

General JBM Hertzog Prize: R750 awarded annually to the best final year student in the MArch(Prof) programme.

Gibbs St Pol Landscape Architects Prize: R1000 and a certificate awarded to a BAS student for the finest BAS Major Project exploring Landscape Architecture.

Helen Gardner Travel Prize: R10 000 awarded by UCT to a student who has completed the third year of the BAS degree but who has not yet been admitted to the BAS(Hons) degree. Applications to the Director, School of Architecture and Planning.

Holm Jordaan Architects & Urban Designers: R500 gift voucher for a Project of Merit that deals with sustainability and/or environmental issues in BAS.

Holm Jordaan Architects & Urban Designers: R500 gift voucher for a Project of Merit that deals with sustainability and/or environmental issues in BAS(Hons).

Institute of Landscape Architects of South Africa Prize: R300 book prize for the best Landscape Design Studio Portfolio in the first year of the Master of Landscape Architecture Programme

Institute of Landscape Architects of South Africa Prize: R500 and certificate for the best student in the second year in the Master of Landscape Architecture Programme.
Institute of Landscape Architects of South Africa Prize: R300 book prize for the best Landscape Architecture dissertation in the second year of the Master of Landscape Architecture Programme.

Ivor Prinsloo Prize: R450 for the best essay in Architectural Theory in the BAS(Hons) programme.

Ivor West Memorial Prize: R500 for the best second or third year Geomatics student.

John Perry Prize: R400 for the best work done in the third year of study of the BAS degree.

Molly Gohl Memorial Prize: R750 for books or instruments to the best woman student completing the third year of study of the BAS degree.

OVP Associates Prize: R500 book voucher and certificate for the best student in first year in the Master of Landscape Architecture programme.

Reuben Stubbs Award: A certificate for any project exhibiting an expression of structural integrity, economy of materials, and considered a worthwhile contribution to the integration of Structure and Design.

South African Geomatics Institute (WC) prize: for the best final year student in cadastral surveying, land tenure and town planning.

South African Institute of Architects prize: R500 for the best MArch Professional Student.

SACAP (South African Council for the Architectural Profession): Medal for the best Architecture student: for work done over six years.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best first year student in the MCRP and MCPUD programmes.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best overall student work in 2nd year MCRP and MCPUD programmes.

South African Planning Institute Prize: R1000 and certificate for the most improved student over the 2 year MCRP & MCPUD curricula.

Urban Design Institute of South Africa (Western Cape) Prize: R1000 awarded to the top student in first year subject to a minimum achievement of passing with distinction.

Urban Design Institute of South Africa (Western Cape) Prize: R1000 awarded to the top student in second year subject to a minimum achievement of passing with distinction.

Construction Economics and Management

The African Challenge Book Prize: R2000 for the best Graduating Student in BSc (Hons)(QS) - to be assessed over the four years of the programme.

Association of Project Management Book Prize: R2500 for the best overall student in the first year of the MSc(Project Management) programme based on the grade point average after one year of registration on a full curriculum load of four modules.

Association of South African Quantity Surveyors Gold Medal: The Faculty nominates a candidate for this national award for the best quantity surveying graduate at any accredited South

African university offering a degree in quantity surveying. Awards are not necessarily made each year.

Association of South African Quantity Surveyors Prizes: R800, R1000, R1200 and R1500 for the best student in each year of study, respectively, for the BSc(Construction Studies) and the BSc(Hons) in Quantity Surveying.

Association of South African Quantity Surveyors Western Cape Chapter Committee Prize: R1000 to the best all-round student in the final year of study of the BSc(Hons) in Quantity Surveying.

Bell-John Prize: R1500 for the best all-round student registered for BSc(Construction Studies) or BSc(Hons) in Quantity Surveying in any year of study.

Bernard James and Partners Prize: R1000 for the BSc(Hons) in Quantity Surveying student (or team) obtaining the highest award (Minimum First Class Pass) in Research Project (CON4047W).

The Chartered Institute of Building (CIOB) Prize: R1000 for the final year BSc(Hons) Construction Management student who has achieved the highest average overall mark.

The Chartered Institute of Building (CIOB) Book Prize: R2000 for MSc Project Management student who has achieved the highest average overall mark.

Clay Brick Association Prizes: Two of R2000 and R1500 respectively for the best and second best students collectively in the subjects of Construction Technology 1, 2, 3 (CON1004W, CON2006W, CON3012W).

DVPM Prize: R1500 academic book voucher for the best overall student in the second year of study while registered on a full curriculum load who has completed all the coursework requirements for the degree of MSc Project Management.

George Strachan Prize: R200 for the best final year student in the BSc(Hons) in Construction Management.

Grinaker-LTA Book Prizes: R1000 for the best student registered for the BSc(Hons) in Construction Management (CON4031F, CON4038F, CON4039S and CON4040S) (Minimum First Class Pass); R1000 for the best student registered for the BSc(Hons) in Quantity Surveying in the subject of Measurement and Design Appraisal III (CON4032F and CON4037S) (Minimum First Class Pass).

Master Builders Association of the Western Cape Prize (for South African Students): R750 plus shield for the best BSc(Construction Studies) in the third year of study; R750 for the best BSc(Construction Studies) in the second year of study; R750 for the best BSc(Hons) student in Construction Management.

Old Mutual Properties Prize: R300 voucher for the best all round student in the second year of study for the BSc(Property Studies) degree.

PMSA(WC) Prize: R4500 academic book voucher for the dissertation in MSc(Project Management) which, in the opinion of a select committee of PMSA (WC), is highly relevant to the project management profession. The award includes an invitation to an event hosted by PMSA (WC) at which the recipient will be given the opportunity to present the findings of his/her research to leading stakeholders in the industry to which it applies. The decision of the award will be made in the sole discretion of PMSA (WC) based on an assessment from a pool of 3 dissertations submitted for consideration by UCT.

Robin Marten Prize: (value to be announced) for the student with the highest average final year examination results for the third (final) year of the BSc(Property Studies) and the BSc(Hons) Property Studies degrees, taken together, subject to a minimum average of 65% having been achieved each year. In the event of a tie, the student with the higher average for the Property Valuation courses within the two year period should be selected.

Mbata, Walters and Simpson Prize: R400 for the best all round student in third year of study for the BSc(Construction Studies) degree.

Engineering

General

ECSA Medal of Merit: for the best student graduating with the degree of BSc(Eng).

ESKOM Award (R500) and entry into the ESKOM National Awards Competition: for the best Engineering BSc(Eng) graduate over the 4-year degree curriculum.

George Menzies Prize: R500 awarded on the results of the final examination to the best student in either Geomatics or Civil Engineering.

John Martin Prize: R1500 for the best first year student in the ASPECT Programme.

Sammy Sacks Memorial Prize: R500 for the best classwork in MEC1002W Engineering Drawing.

Chemical Engineering

4th Year Book Prize for South African Institute for Mineral & Metalurgy: (Textbook) for best student in Mineral Processing for CHE4050

Chevron Prize for Chemical Engineering Design: R5000 for the student with the best overall performance in the course CHE4036Z.

Gerda van Rosmalen Award: (Book Prize) for the most promising CHE3066 Chemical Engineering student.

Malan Chemical Engineering Medals: for the best students in each of the Second (bronze), Third (silver) and Final (gold) Years.

Malan Prize: (Perry's Chemical Engineering Handbook) for the most promising First Year student.

Omnia Prize: R2000 for the student pair completing the final year project (CHE4045Z) of the highest standard.

SA Institution of Chemical Engineers' Silver Medal: for outstanding performance in project and practical courses.

SASOL Achievement Medal and R1000: for the best third year student completing the course CHE3046F Chemical Engineering Thermodynamics II.

SASOL Achievement Medal and R1500: for the best fourth year student completing the courses CHE3054S Reactor Design II and CHE4042F Process Dynamics and Control.

Civil Engineering

Arcus Gibb Prize for Transportation Engineering: R500 for the best undergraduate student in the field of Transport Studies.

Concrete Society of SA Award: R500, certificate, a book and a year's membership of the Concrete Society for outstanding work in the field of concrete technology.

Grinaker-LTA Prize: R2000 for the best thesis in the final year.

Jeffares & Green Award: R750 for the Fourth Year Civil Engineering student with the highest overall achievement in professional communication.

Joint Structural Division of SAICE and IStructE Prize: R2000 for academic achievement in the field of structural engineering; with preference for final year Civil Engineering students.

Liebenberg and Stander Prize: R1000 for the graduating student with the best achievement over four years of study.

Ninham Shand Prize for Water Engineering: R1000 for the student with the highest aggregate score in the courses CIV2036F, CIV2038S, CIV3038F, CIV3041S.

PD Naidoo & Associates Prize: R3500 (to be shared by members of the winning team) for the design team that delivers the best design project in the final year BSc(Eng) course CIV4035D Design Project.

PPC Prize: R500 and book for the best undergraduate concrete design project or dissertation on concrete technology.

DC Robertson Memorial Prize: (donated by the Western Cape Branch of the South African Institution of Civil Engineering): R500 for the student submitting the best work in the final year design project.

SA Institute of Steel Construction Prize: R1200 for the best structural steel design submitted in the final year as part of the coursework.

South African Institution of Civil Engineering Professional Practice Prize: R500 for the best overall individual performance in the CIV4033Z Professional Practice course.

Electrical Engineering

Peralex Electronics prize: R1000 for the best student in EEE3017W.
Peralex Electronics prize: R1000 for the best student in EEE4001F.
Peralex Electronics prize: R1000 for the best student in EEE4084F.
Siemens Prize: R2500 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

Mechanical Engineering/Electro-Mechanical Engineering

AAT Composites Award: (R1000) for best project for MEC4061F/Z Research Project involving use or application of composite materials.

Albert Wessels Prize for Best First Year Student in the Department of Mechanical Engineering:R5000plus a certificate for the first year student with the highest grade point average.

Albert Wessels Prize for Best Second Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the second year student with the highest grade point average.

Albert Wessels Prize for Best Third Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the third year student with the highest grade point average.

Albert Wessels Prize for Best Fourth Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the fourth year student with the highest grade point average.

Aluminium Federation of South Africa Prize: (R1000) for the best thesis in MEC4061F/Z Research Project or MEC4091S Research Project involving the use or application of aluminium.

Element Six (Pty) Ltd and DST/NRF Centre of Excellence in Strong Materials Prize: Gold Medal and letter of commendation for excellence in materials science & engineering for the best student in third year and for the best student in fourth year or Honours.

SAI Mech Eng Award: Floating trophy and certificate for the best student in the Mechanical Engineering design and laboratory project in the Final Year of study.

SAIRAC Prize: (R1000): for the student with the best performance in the course MEC4062Z Air Conditioning and Refrigeration.

SASOL Achievement Medal and R750: for the best second year student in the course MEC2020W Design I.

SASOL Achievement Medal and R1000: for the best third year student in the course MEC3050W Mechanical Design.

SASOL Achievement Medal and R1500: for the best fourth year student completing the course MEC4087Z Failure Analysis.

SASOL Achievement Medal and R2000: for the postgraduate student who produces the best published paper in the field of metallurgy/materials/corrosion science.

SASOL Achievement Medal and R2000: for the best Master's dissertation in the field of Mechanical Engineering.

Dean's Merit List

The Dean's Merit List, which is published annually, contains the names of students whose academic performance over the year is meritorious and hence worthy of recognition. Students who qualify for inclusion in the List receive a letter of commendation from the Dean. The List is posted on the notice boards and published in the Dean's Circular and the newspaper of the Student Council. The academic records of students are endorsed to record their achievements in qualifying for inclusion on the List. To be eligible for the Dean's Merit List a student must pass the prescribed courses for which he or she is registered for the year in question; a student registered for a four year degree must be in the First; Second or Third year of study; and a student registered for a three year degree must be in the First, or Second year of study. The criteria for inclusion in a particular year are as follows:

an ASPECT student must be registered for not less than 96 credits and obtain a weighted average of not less than 75 per cent;

a student in any other undergraduate programme must be registered for not less than 132 credits of approved course work for the year in question and obtain a weighted average of not less than 70%.

Professional Status and Recognition of Degrees

Architecture, Planning and Geomatics

Architecture and Planning

The Bachelor of Architectural Studies (BAS) degree provides the necessary grounding for entry into a professional architectural course or into postgraduate programmes in city and regional planning, urban design or landscape architecture. The programme merits exemption from Part 1 of the Royal Institute of British Architects', and the Commonwealth Association of Architects', own examination in Architecture.

The BAS(Hons) qualification introduces an honours degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for admission into the Master of Architecture (Professional) (NQF level 8).

The MArch (Professional) qualification introduces a master's degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for statutory registration as a Candidate Architect with the South African Council for the Architectural Profession (SACAP), in terms of the Architectural Professions Act 2000 (Act No 44 of 2000). To attain registration as Professional Architect, the candidate must complete a two-year period of practical experience in an architectural office and pass a registration examination set by SACAP.

Both the degrees of Master of City and Regional Planning (MCRP) and Master of City Planning and Urban Design (MCPUD) are recognised for professional accreditation purposes by the South African Planning Institute (SAPI). Registration with the Council, which is a statutory requirement to practise, can occur after two years of supervised practical experience. The MCRP programme has provisional accreditation from the Royal Town Planning Institute.

Landscape Architecture : The Master of Landscape Architecture (MLA) is a professional degree. Eligibility of graduates for membership of the South African Council for Landscape Architects Profession (SACLAP) will be dependent upon firstly, a further two years training under a professional landscape architect, and the successful completion of the Council's professional examination.

Information Regarding Special Qualifying Examination for Foreign Architects wishing to obtain registration as an architect within South Africa.

(a) An applicant for registration may be recommended by the Council for admission to the Special Qualifying Examination. The nature and extent of the examination shall be determined in each case by the Council after consideration of all available evidence with regard to the standard and quality of the candidate's qualifications. If necessary, the Council may interview an applicant or require him or her to sit a written test in order to come to a decision as to the standard of the qualification. Only qualifications requiring a minimum of four years full-time study in architecture at a university or like educational establishment will be considered to be of a standard sufficient to give admission to the Special Qualifying Examination. An applicant who obtains a recommendation from the Council may be required to attend lectures and/or practical training at a university of his or her choice and to pass the examination(s) set by the University. The University or body conducting the Special Qualifying Examination shall determine when the examination(s) shall be held and when the fees are to be paid. A candidate who completes the examination(s) will be furnished with a certified statement to that effect.

(b) All applicants who have not passed a qualifying examination recognised in terms of Section 19(2)(b) and 19(7)(c)(ii) of the Architects' Act 1970 must apply to the South African Council

for Architects for admission to the Special Qualifying Examination. The following courses of action may be adopted: An applicant who, in the opinion of the Council, cannot be admitted to the Special Qualifying Examination shall be referred to the University of his or her choice which will decide what will be required of him or her in order to graduate.

Geomatics

The Education Advisory Committee of the South African Council for Professional and Technical Surveyors, recognises the BSc(Geomatics) degree as a suitable theoretical qualification for the conditions set out in Section 20 of Act 40 of 1984, for registration as a Professional Land Surveyor, Professional Surveyor in the categories of Engineering and Photogrammetry and as a Professional Geoinformatics Practitioner. In addition to the degree, a graduate wishing to register in any of the above categories is required to undergo a period of practical training (at present about 15 months) with a practising Professional and to undertake a test of professional competence. ProfessionalLand, Engineering and Photogrammetric Surveyors, as well as Professional Geoinformatics Practitioners, enjoy a status equivalent to that of an Associate Member or Fellow of the Royal Institution of Chartered Surveyors in most parts of the world.

Institutes of Professional Land Surveyors

Holders of a degree in Geomatics, after completing an articleship of about 15 months and passing a practical test of professional competency and an examination, may proceed to registration as a Professional Surveyor. The registering body is the South African Council for Professional and Technical Surveyors, PO Box 62041, Marshalltown, 2107.

Registered surveyors, at their request, will be admitted to membership of the South African Geomatics Institute.

Construction Economics and Management

The BSc(Construction Studies) degree and the BSc(Hons) degrees in Quantity Surveying and Construction Management are accredited by the Chartered Institute of Building (CIOB), South African Council for the Quantity Surveying Profession (SACQSP) and the Royal Institution of Chartered Surveyors (RICS). In addition the BSc(Hons) in Construction Management degree is accredited by the Chartered Institute of Building (UK) and the Royal Institution of Chartered Surveyors. The difference, from an accreditation point of view, between the BSc(Construction Studies) degree and the BSc(Hons) degrees in Quantity Surveying and Construction Management is that the requirements in respect of post graduation professional in-service training done prior to registration with the accrediting organisation will differ.

The BSc(Property Studies) degree and BSc(Hons) in Property Studies degrees are accredited by the South African Council for the Property Valuers Profession (SACPVP) and the Royal Institution of Chartered Surveyors (RICS).

The significance of accreditation is that graduates of these degrees are exempted by the accrediting bodies from having to take any further university-level exams before being allowed to take the Assessment of Professional Competence (APC) or being admitted to the Professional Interview (PI).

Association of South African Quantity Surveyors (ASAQS)

Graduates in Quantity Surveying and Construction Management are eligible for corporate membership of the Association of South African Quantity Surveyors.

Address: The Director, ASAQS, PO Box 3527, Halfway House, 1685.

South African Council for the Quantity Surveying Profession (SACQSP)

The BSc in Construction Studies together with the BSc(Hons) in Quantity Surveying and Construction Management degrees are accredited by the South African Council for the Quantity Surveying Profession as fulfilling all the academic requirements for registration as Quantity Surveyors (in terms of the Quantity Surveyors Profession Act No 49 of 2000 as amended). The BSc in Property Studies, together with the BSc(Hons) in Property Studies, enjoys similar accreditation.

Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Quantity Surveyor before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Quantity Surveyor.
Address: The Registrar, South African Council for the Quantity Surveying Profession, PO Box 3527, Halfway House, 1685.

The Royal Institution of Chartered Surveyors (RICS)
Graduates in Quantity Surveying, Construction Management and Property Studies are eligible to register with the Royal Institution as Probationers. Thereafter, a period of three years in-service training must be undertaken under the supervision of an approved mentor before being admitted to the Assessment of Professional Competence leading to membership of the Institution. Graduates of the MSc Programmes in Property Studies and Project Management enjoy similar accreditation.
Address: The Secretary-General, RICS, 12 Great George Street, Parliament Square, LondonSW1P 3AD, England.

Chartered Institute of Building (CIOB)
Graduates in Construction Management and Quantity Surveying are admitted to the Graduate Class of the Chartered Institute without further examination. Thereafter, a period of three years in-service training must be undertaken before being admitted to the Professional Interview leading to membership of the Institute. Address: The Secretariat, CIOB, Englemere, Kings Ride, Ascot, BerkshireSL5 8BJ, England.

South African Council for the Project and Construction Management Professions (SACPCMP)
The South African Council for the Project and Construction Management Professions registers professionals and candidates in the project and construction management professions. Application will be made for accreditation of the BSc(Hons) programmes in Construction Management and Quantity Surveying, and the MSc in Project Management, once they have formulated their education framework. Address: The Registrar, South African Council for the Project and Construction Management Professions, PO Box 653141, Benmore 2010.

The South African Council for the Property Valuers Profession (SACPVP)
The BSc in Property Studies together with the BSc(Hons) in Property Studies are accredited by the South African Council for Valuers as fulfilling all the academic requirements for registration as a valuer in terms of the Property Valuers Profession Act No. 47 of 2000 as amended. Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Professional Valuer before being registered with the Council as a Professional Valuer.
Address: The Registrar, SACPVP, PO Box 114, Menlyn 0063.

Property Council of South Africa (PROCSA)
The Property Council of South Africa (PROCSA), founded in 1999, is an umbrella body for a number of property-related organisations in South Africa. The role of PROCSA as a registering authority is unclear at present, but application will be made to the relevant SA authority for accreditation of the BSc and BSc(Hons) degrees in Property Studies in future, if appropriate.
Address: The Director, PROCSA, PO Box 78544, Sandton 2146.

Engineering

The current BSc(Eng) degrees in Chemical, Civil, Electrical, Electrical and Computer, Electro-Mechanical, Mechanical Engineering and Mechatronics are accepted by the Engineering Council of South Africa (ECSA) as fulfilling all the academic requirements for registration as a Professional Engineer. In terms of the Washington Accord signed in June 2000, of which South Africa is a signatory, the Faculty's engineering qualifications have been recognised by professional engineering accrediting bodies in the United States of America, Canada, Australia, New Zealand, the United Kingdom, Ireland and Hong Kong.
In terms of the Engineering Profession Act (Act No 46 of 2000), ECSA has stipulated a minimum

period of three years' approved practical training and experience after graduation under the guidance of a Professional Engineer before a candidate may register as a Professional Engineer. This period may be shortened by up to one year in recognition of successful postgraduate degree work. It is of the utmost importance that every graduate should register immediately as a candidate engineer.
The University of Cape Town enjoys a special relationship with the Association of Commonwealth Universities. The curricula, systems and standards of engineering education at the University conform to the general pattern of the British universities and professional institutions. The degrees are therefore widely recognised.
The better known of the British and South African professional institutions are listed below. Graduates are eligible for exemption from the written Associate Membership examinations of the British institutions, as detailed below, but in all cases a period of approved professional work is required before admission to corporate membership. Student membership of these institutions is generally available to undergraduates. Information on other professional engineering bodies is available from the relevant department in the Faculty.

The Institution of Chemical Engineers
Graduates in Chemical Engineering are eligible for exemption from the Membership Examination. Address: 165-189 Railway Terrace, Rugby. CV21 3HQ, United Kingdom.

The South African Institution of Chemical Engineers
Graduates in Chemical Engineering may be admitted to membership, without further examination. Address: PO Box 808, Pinegowrie, 2123.

The Institution of Civil Engineers
Graduates in Civil Engineering are eligible for exemption from Parts I and II of the Associate Membership examinations, and must satisfy the requirements of the Professional interview for admission to corporate membership. Address: Great George Street, Westminster, London SW1 P3AA.

The South African Institution of Civil Engineering
Graduates in Civil Engineering are eligible for corporate membership once they are registered as Professional Engineers. Address: Postnet Suite 81, Private Bag X65, Halfway House, 1685.

The Institution of Structural Engineers
Graduates in Civil Engineering are eligible for exemption from all but the final Design examinations. For admission to Corporate Membership, Graduates must sit and pass the Chartered Membership (Part 3) examination, entitling them to register with the UK Engineering Council as Chartered Structural Engineers. Address: 11 Upper Belgrave Street, London, SW1.

The Institution of Engineering and Technology (IET)
Membership of the IEE is open to everyone with a professional interest in electrical, electronic, information and manufacturing engineering. Student membership is open to any student studying engineering or IT. The following categories of membership are available: Member, Fellow, Student and Affiliate. Address: URL://www.iee.org/membership/

The South African Institute of Electrical Engineers (SAIEE)
Graduates in Electrical Engineering may be admitted to membership, without further examination. Address: 18a Gill Street, Observatory, Johannesburg, 2198.

The South African Institution of Mechanical Engineers
Graduates in Mechanical Engineering may be admitted to membership, without further examination. Address: PO Box 34008, Rhodes Gift, 7707.

The South African Institution of Certificated Engineers
Holders of the Government Certificate of Competency are members of this Institution. Graduates in the relevant branches of the engineering profession are eligible for extensive exemptions, depending upon the degree of practical experience achieved. In South Africa a Government Certificate of Competency is mandatory for persons responsible for the supervision of industrial plant exceeding a specified size. Address: 18a Gill Street, Observatory, Johannesburg, 2198.

Degrees and Diplomas Offered in the Faculty

Degrees

Bachelor of Architectural Studies ..... BAS
Bachelor of Architectural Studies (Honours) ..... BAS(Hons)
Bachelor of Science in Construction Studies ..... BSc(ConstStudies)
Bachelor of Science in Engineering ..... BSc(Eng)
Bachelor of Science in Geomatics ..... BSc(Geomatics)
Bachelor of Science in Property Studies ..... BSc(PropStudies)
Bachelor of Science (Honours) in Geographical Information Systems ..... BSc(Hons)(GIS)
Bachelor of Science (Honours) in Construction Management ..... BSc(Hons)(CM)
Bachelor of Science (Honours) in Materials Science ..... BSc(Hons)(Mat Sc)
Bachelor of Science (Honours) in Property Studies ..... BSc(Hons)(PropStudies)
Bachelor of Science (Honours) in Quantity Surveying ..... BSc(Hons)(QS)
Master of Architecture ..... MArch
Master of Architecture (Prof) ..... MArch(Professional)
Master of City Planning and Urban Design ..... MCPUD
Master of City and Regional Planning ..... MCRP
*Master of Industrial Administration ..... MIndAdmin
Master of Engineering ..... MEng
*Master of Engineering Management ..... MEngMan
Master of Landscape Architecture ..... MLA
*Master of Science in Applied Science ..... MSc(ApplSc)
*Master of Science in Construction Economics and Management ..... MSc(CEM)
Master of Science in Engineering ..... MSc(Eng)
Master of Science in Project Management ..... MSc(ProjMgmt.)
Master of Philosophy ..... MPhil
Master of Philosophy ..... MPhil
Master of Science in Property Studies ..... MSc(PropStudies)
Doctor of Philosophy ..... PhD
Doctor of Architecture ..... DArch
Doctor of Science in Engineering ..... DSc(Eng)

Diplomas

Postgraduate Diploma in Project Management ..... PGDip(ProjMgmt)
Postgraduate Diploma in Engineering ..... PGDipEng
Postgraduate Diploma in Engineering Management ..... PGDipEngMan
*Postgraduate Diploma in Industrial Administration ..... PGDipIndAdmin
*Postgraduate Diploma in Housing Development and Management ..... PGDip(HDM)
Postgraduate Diploma in Property Studies ..... PGDip(PropStudies)
Postgraduate Diploma in Transport Studies ..... PGDip(Transport Studies)

* No new intake from 2007 (to be discontinued).

RULES FOR UNDERGRADUATE DEGREES

The rules must be read together with the general rules for degrees and diplomas in Handbook 3 of this series.

Note: The offering of undergraduate programmes is subject to minimum student enrolment.

Minimum Formal Admission Requirements

BAS, BSc(ConstStudies), BSc(PropStudies), BSc(Eng) and BSc(Geomatics) candidates

FB1 A person who wishes to be considered as a candidate for one of the above mentioned degrees must hold:

(a) a National Senior Certificate endorsed by Umalusi to state that he or she has met the minimum admission requirements for degree study; or

(b) a senior certificate with matriculation endorsement issued by the South African Certification Council; or

(c) a certificate of complete or conditional exemption issued by the Matriculation Board; or

(d) a degree of this, or another university recognised for the purpose by the Senate.

NOTE: The above are the minimum formal requirements. Please note that meeting the minimum requirements does not assure an applicant of admission. For detailed information on the entrance requirements for each degree and information on the Alternative Admission Tests, refer to the University's Undergraduate Prospectus.

Duration of Degree

BAS, BSc(ConstStudies) and BSc(PropStudies) candidates

FB2.1 The curriculum shall extend over not less than 3 academic years of study.

BSc(Eng) and BSc(Geomatics) candidates

FB2.2 The curriculum shall extend over not less than 4 academic years of study.

Curriculum

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB3.1 A candidate must comply with the curriculum and course requirements prescribed by Senate which are published in the Programmes of Study and Courses Offered sections of this Handbook.

FB3.2 A candidate must complete approved courses of a value of not less than 576 credits in the case of the degrees which have a minimum duration of 4 years and not less than 432 credits in the case of degrees which have a minimum duration of 3 years. Rule FB3.1 above also applies.

FB3.3 A candidate's curriculum in each year shall be subject to the approval of the Dean and the Head of the Department administering the Degree Programme for which the candidate is registered.

FB3.4 When registering for courses a candidate shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. A candidate shall inform the Head of the Department in writing of any clash of courses (lectures/tutorials/practicals etc) arising from adherence to this Rule immediately it becomes apparent that such a clash exists. Except with the permission of the Head of Department, a candidate may not be permitted to register for a course which clashes with another in the lecture timetable. In the event of such a clash precedence shall be given,

for registration purposes, to courses which are being repeated or undertaken in arrears.

FB3.5 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

Credit for and Exemption from Courses

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB4.1 A candidate may be granted credit for and/or exemption from a course or courses in accordance with the provisions of Rules GB2 and GB3, as the case may be.

FB4.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Progress through the Degree

FB5 AA candidate's academic year of study shall be determined on the basis of the year in which he or she is expected to graduate.

Method of Assessment

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB6.1 *General*

Courses are assessed by formal examination, by review or by satisfactory performance of the duly performed certificate (DP) requirements. If a course is assessed by formal examination or review, a student may be refused permission (DPR) to present himself/herself for the examination or review if he/she fails to satisfy the Senate that he/she has satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate.

FB6.2 *Formal Examination*

Assessment by formal examination may be by means of written and/or oral examination, tutorials, class tests, term papers, notebooks or other course assignments. An external examiner is appointed for each course assessed by examination.

FB6.3 *Duly Performed (DP) Certificate*

A DP certificate may be withheld unless (i) all parts of each project, tutorial and other assignments are completed to an acceptable standard and submitted for assessment at stipulated times; (ii) there is satisfactory attendance (as prescribed by Senate) and satisfactory participation in all sections of the course.

FB6.4 *Duly Performed (DP) Courses*

In courses where the DP certificate constitutes the final result, the candidate is required to satisfy the assessor that he or she has satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate. The result is published as an ungraded 'pass' (PA) or 'duly performed certificate refused' (DPR).

FB6.5 *Review*

Assessment by review consists of a review by the internal examiner(s) of the course work completed by means of written and/or oral class tests, tutorials, term papers, notebooks or other course assignments.

Supplementary Examinations

BSc(Eng) and BSc(Geomatics) candidates

FB7.1 Senate may permit a candidate to take a supplementary examination in the courses END1017F/S and END1018F/S. However, a supplementary examination will not be offered for any other course in a department established in the Faculty of Engineering &

the Built Environment.

FB7.2 Senate may permit a candidate to take a supplementary examination in a course offered by a department other than a department established in the Faculty of Engineering & the Built Environment, subject to supplementary examinations being offered by the department concerned.

Readmission Requirements

BAS candidates

FB8.1 A BAS candidate shall not be permitted to renew his or her registration except by permission of the Senate, if he or she:

(a) at the end of first year fails either APG1020W or APG1003W;
(b) fails any major course prescribed for second or third year, after having been registered twice for the course;
(c) fails in any semester to obtain a DP for either or both major courses;
(d) fails to complete the courses prescribed for first year within two years; the courses prescribed for second year within four years;

BSc(Eng) and BSc(Geomatics) candidates

FB8.2 Except by permission of the Senate a candidate may not renew his or her registration if:

(a) he/she is in his/her first year of registration at a tertiary institution, and in the courses recognised for the degree fails to obtain at least 80 credits or, if registered through the Academic Development Programme, ASPECT, to obtain at least 64 credits; or
(b) he/she is a transferee from another tertiary institution or another faculty, is in his/her first year of registration in the Faculty, and fails in the courses recognised for the degree to obtain at least 96 credits, or if registered through ASPECT, to obtain at least 80 credits; or
(c) he/she has re-registered in the Faculty after a break of one or more years, or is granted a concession to continue and fails in the courses recognised for the degree to obtain at least 96 credits in his/her first year of re-registration or, if first registered through ASPECT, to obtain at least 80 credits; or
(d) he/she, in any subsequent year of registration, fails in the courses recognised for the degree to obtain at least 192 credits over each successive two-year period, or if first registered through ASPECT, to obtain at least 160 credits over each successive two year period.

BAS, BSc(ConstStudies) and BSc(PropStudies) candidates

FB8.3 Except by permission of the Senate a candidate may not renew his or her registration if:

(a) he/she is in his/her first year of registration at a tertiary institution and in the courses recognised for the degree fails to obtain at least 72 credits; or
(b) he/she is a transferee from another tertiary institution or another faculty, is in his/her first year of registration in the Faculty, and fails in the courses recognised for the degree to obtain at least 80 credits; or
(c) he/she has re-registered in the Faculty after a break of one or more years, or is granted a concession to continue and fails in the courses recognised for the degree to obtain at least 80 credits in his/her first year of re-registration; or
(d) he/she, in any subsequent year of registration, fails in the courses recognised for the degree to obtain at least 160 credits over each successive two-year period.

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB8.4 For the purpose of Rules FB8.1, FB8.2 and FB8.3

(a) the credit count shall include supplementary (if offered) and deferred examinations;
(b) neither years registered nor credit points obtained in a previous year towards another qualification in another faculty or another institution will be counted;

(c) 'major' refers to the Design and Theory Studio and Technology courses in the BAS curriculum.

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB8.5 A candidate who has not been readmitted in terms of rule FB8.1, FB8.2 or FB8.3, who does not appeal, or whose appeal is unsuccessful, may be considered for readmission by the Senate, after an interval of at least one year, if he/she shows evidence of academic rehabilitation or evidence of significantly improved motivation to the satisfaction of the Senate.

Award of Degree with Distinction, Honours or First Class Honours

BAS candidates

FB9.1 In order to be awarded the degree with distinction, a candidate must obtain a first class pass in the Design and Theory Studio III Examination and a first class pass or a second class (Division 1) pass in one of the other Design and Theory Studio Examinations and three additional first class passes in BAS course work. The degree may only be awarded with distinction if completed in the minimum period of time.

BSc(Eng) and BSc(Geomatics) candidates

FB9.2 In order to be considered for the award of the degree with first class honours or honours, a student must (i) complete the requirements for the degree in the minimum time possible, and, (ii) for first class honours obtain at least a first class pass for the researchproject or, (iii) for honours, a minimum of a second class pass in the research project.

NOTES:

(a) The award of the honours or first class honours will be assessed on the basis of a student's credit weighted average for each or the four years of study, with a multiplication factor of 1 being applied to the credit weighted average of the first year, 2 for the second year, 3 for the third year and 4 for the fourth year. The overall weighted percentage mark required will be 65% for honours and 75% for first class honours.

(b) The research project is defined as one of APG4003/CHE4045/CHE4036/ CIV4044/EEE4022/MEC4061.

(c) In the case of students who have transferred from other faculties recognition will be given for those courses for which the student was granted credit - based on (a) above.

(d) In view of the difficulty of assessing cases of students who have transferred from other universities, the dean, in consultation with the departmental head concerned may recommend that a student be awarded the degree with honours/first class honours, if satisfied that this is merited.

The award of first class honours or honours is subject to Senate approval and Senate reserves the right to change the above system requirements.

BSc(ConstStudies) and BSc(PropStudies) candidates

FB9.3 In order to be considered for the award of the degree with distinction a candidate must obtain a minimum credit weighted average mark of 75% for the degree.

Exemption from or Modification of Rules

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB10 Any exemption or deviation from the rules requires the approval of Senate.

DEPARTMENTS IN THE FACULTY AND PROGRAMMES OF STUDY

ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following Undergraduate Degree Programmes:

Bachelor of Architectural Studies
Bachelor of Science (Geomatics)

The Architecture and Planning division of the School is situated in the CentlivresBuilding on the Upper campus, fronting onto University Avenue. The Geomatics division is located on level 5 of the MenziesBuilding.

Staff

Associate Professor and Director:
A Steenkamp, MArch *Pret* PrArch

Professors:
I Low, BArch *Cape Town* MArch(Urban Design) *Penn* PrArch MIArch CIA
J Noero, BArch *Natal* MPhil (Architecture) *Newcastle-Upon-Tyne* Hon DSc *Brighton* MIArch
E Pieterse, BA(Hons) *UWC* MA Development Studies *ISS* PhD *LSE*
V Watson, BA(Hons) *Natal* MCRP *Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

Adjunct AssociateProfessor:
S Townsend, PhD *Cape Town*

Emeritus Professors:
H Rüther, Dipl-Ing *Bonn* PhD *Cape Town* PrS*(SA)* FRSSAf FSAAE
F Todeschini, BArch *Cape Town* MCP MArch (Urban Design) *Penn* MIA MUDISA ArchSA

Associate Professors:
N Coetzer, BArch *Natal* MArch *Denver* PhD *London*
JL Smit, BSc(Surv) PhD *Cape Town*
JF Whittal, BSc(Surv) MSc(Eng) *Cape Town*, PhD *Calgary* PrL(SA) MIPLS *UWC*

Emeritus Associate Professor:
CL Merry, BSc(Surv) *Cape Town* PhD *New Brunswick* FAIG

Senior Lecturers/StudioMaster's:
M Abd El-Gelil, BSc MSc *Alexandria* MASc *Ryerson* PhD *York*
F Carter, BAS BArch MPhil *Cape Town* PrArch PRCPM MIA RIBA
C Hindes, BLA *Pret* MLArch
T Sanya, BArch *Makerere* MIP *Stuttgart* PhD *Oslo*
G Sithole, BSc Surveying(Hons) *Zimbabwe* MSc IGP *ITC(NL)* PhD *TU Delft(NL)* LSZ *Zimbabwe*
T Winkler, BSc(TRP) MUD *Witwatersrand* PhD *British Columbia*
N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand*

Lecturers:
F Isaacs, BArch *Cape Town* MIP *Stuttgart*
T Katzschner, BSocSc MCRP *Cape Town*
S Le Grange, BArch *Cape Town* M Urban Design *UC Berkeley*
SS Papanicolaou, BArch *Cape Town*
L Muller, BL *Pretoria* MA (Anthropology) *UNISA*

Part-Time Lecturers:
CJ Cooke, BADipTA *Witwatersrand* MIA Arch SA
R Cronwright, BA MC & RP MBA *Cape Town*TRP(SA) MSA/TRP
R Fisher, BSc (Min Eng) *London* BSc(Surv) *Cape Town* MPhil *Cantab*
T Klitzner, BArch *Cape Town* MLA *Penn*
BJ Oberholzer, BArch *Cape Town* MLA *Penn* MILA(SA)

Principal Technical Officer:
Mr D Matthee, NHD (Mechanical Eng.) ND (Surveying)

Chief Technical Officer:
Mr J Coetzee, NHD (Building Tech)

Technical Officer:
Mr P Chifamba

Photographic Technician:
Mr P Kanye

Administrative Officers:
Mrs J Meyer
Mrs JM Thompsett

Administrative Assistant:
Ms N Walker

Senior Secretaries:
Mrs V Daries
Ms N Pickover
Ms S Shaffie
Ms M Waglay

Print Room Manager:
Mr T Swarts

Departmental Assistant:
Mr N Stanley

Laboratory Attendant:
Mr S Smith

Technical Assistant:
Mr S Matthews

IT Liaison:
Mr L Coetzee

Bachelor of Architectural Studies (BAS)[EB012APG01]

The BAS degree is a stand alone exit degree which also provides for entry into a professional architectural programme or into postgraduate programmes in city and regional planning, urban design and landscape architecture. Streaming into the other career possibilities, such as construction and property economics provided for in other departments, is also possible. The assessment for this BAS degree and the entry requirements for the BAS(Hons) degree differ in as much as the BAS degree is an exit degree with a professional qualification and the BAS(Hons) is a graduate degree in architecture with specific emphasis on critical thought and a high level of competence in architectural design. As such, successful completion of the BAS degree does not guarantee entry into the BAS(Hons) degree. Application to the BAS(Hons) is through formal application and portfolio assessment. However, a limited number of places in the BAS(Hons) degree will be guaranteed for BAS graduates with a credit weighted average of 70% and above in the following courses: APG3000F; APG3001S; APG3023W and APG3037W. The degree has stature in its own right for entry into the job market in architectural and other design and planning offices, interior design, landscape architecture, property development and in the building industry and can lead to professional registration as a senior architectural technician.

In the introductory year the programme involves familiarisation with precedent, elementary design exercises and later the design of more sophisticated places, sites, buildings and complexes. Other major areas of study are building technology (construction, environmental control, structures, etc.), representation (manual and digital), communication (written and verbal) and history and theory of architecture and related disciplines. Studio programmes absorb approximately half of student time and energy, and many subsidiary courses or projects are closely linked. Studios have formal lectures, informal talks and theory of design seminars.

Studio furniture includes a work station for each student. All students are required to work in the studios during Design Studio classes, and may elect to work in the studios after-hours. All students must provide their own books and drawing equipment. Students should be prepared to have to purchase approximately R3000 worth of drawing equipment and materials in the first year. Students in upper years should budget for approximately R3500 per year for plan prints, photocopying, graphic and other materials.

Associate Professor and Programme Convener:
N Coetzer, BArch *Natal* MArch *Denver* PhD *London*

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG1003W	Technology I (major course)	24	05
APG1004F	History &Theory of Architecture I	12	05
APG1005S	History &Theory of Architecture II	12	05
APG1017F	Academic Development Class	0	05
APG1018S	Academic Development Class	0	05
APG1020W	Design &Theory Studio I (major course)	72	05
APG1021W	Representation I	24	05
	Total credits per year	**144**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
	History &Theory of Architecture II(a)	8	06
APG2003S	History & Theory of Architecture II(b)	8	06
APG2009F	Theory of Structures III	6	06
APG2011S	Theory of Structures IV	6	06

APG2021W	Technology II (Major Course)	24	06
APG2025W	Representation III	8	06
APG2038W	Environment &Services II	18	06
APG2039W	Design &Theory Studio II (Major Course)	74	06
APG2027X	Work Experience	0	06
	Total credits per year	**144**	**06**

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG3000F	History &Theory of Architecture V	8	07
APG3001S	History & Theory of Architecture VI	8	07
APG3023W	Technology III (major course)	24	07
APG3028X	Independent Research	0	07
APG3034W	Environment & Services III	6	07
APG3035F	Theory of Structures V	6	07
APG3036S	Management Practice Law III	12	07
APG3037W	Design & Theory Studio III (major course)	80	07
	Total credits per year	**144**	

NOTES:

(i) *Core courses are sequential.*

(ii) *The Theory of Structures courses (APG2009F, APG2011S, APG3035F) are sequential.*

(iii) Mandatory Fieldwork: *APG1003W Technology I, APG2021W Technology II, APG1020W Design and Theory Studio I, APG2039W Design & Theory Studio II and APG3037W Design & Theory Studio III, have a mandatory fieldwork component.*

(iv) *Non-core courses in a year may not lag behind core courses of the next year by more than twelve months.*

Bachelor of Science in Geomatics [EB019]

The courses given in the four year Geomatics programme comprise lectures, tutorials, laboratory sessions, computation and draughting sessions, and practical fieldwork. Students must show satisfactory performance in each aspect of the work in order to obtain a duly performed certificate. Students are required to complete approved courses of a value not less than 576 credits and to comply with the prescribed curriculum requirements. Students may choose a stream in Surveying, Geoinformatics or Planning. The Surveying stream is targeted at students wishing to register as a Professional Practitioner with the South African Professional and Technical Surveyors organisation (PLATO); the Geoinformatics stream is targeted at students wishing to work in the spatial information industry and for registration as a Professional Geoinformatics Practitioner with PLATO; the Planning stream enables students to obtain both a Master's degree in Planning (MCRP) and a BSc(Geomatics) degree in five years and is targeted at students wishing to work as a Professional Planner.

The design of the degree is outcomes based, with a strong emphasis on the ability to plan, execute and report on Geomatics projects with demonstrated knowledge of underlying theory and the ability to critically analyse the project outputs. The degree is designed to meet the challenges of geomatics practice in the African and developing world context as well as in the developed world, while maintaining international standards of teaching and research.

Department of Land Affairs Bursaries: The Department of Land Affairs offers bursaries to students who are South African citizens to study in on of the following fields:
National Diploma in Cartography
National Diploma in Surveying
BSc in Geomatics/Land Surveying

National Diploma in Land Management
Diploma in Town and Regional Planning
BSc in Town and Regional Planning
Geomatics Information System (GIS)
Applicants are expected to study in any accredited South African tertiary institution. They will be expected to enter into a contract with the Department. The bursary is for a full programme, but annually renewable based on performance results. It also covers tuition and registration, 10 % of tuition and registration as book fees, accommodation and meals.

Facilities: Lectures are supported by field and laboratory work. The principal facilities available for laboratory and field use are:

Surveying: Standard survey equipment such as theodolites, tacheometers, levels and other items are available for field and laboratory work in all types of engineering, topographical and cadastral surveys. Global Positioning System (GPS) to support Static and RTK teaching and research, electronic theodolites, electromagnetic distance measurement equipment and gyro-theodolites are also available. A number of survey control points on and in the vicinity of the University campus provide the basis for a variety of field practicals, and vehicles are available for field work off the campus.

Geographic Information Systems: Computation facilities include access to the Faculty's microcomputer laboratories as well as the Geomatics computer laboratory, which consists of twenty eight workstations. The workstations in the Geomatics computer laboratory run ESRI's ArcGIS, and QGIS Open Source software in support of the GIS courses. There is also an operational ArcGIS Server to allow for web mapping services.

Geodesy: There are facilities for undertaking fundamental geodetic surveys, gravity surveys and levelling, and control network adjustment. Research interest in geodesy is centred currently on measurement and modelling of the earth's gravity field, vertical datums and networks and satellite positioning. A two-computer laboratory is established for dedicated GPS processing.

Photogrammetry and Remote Sensing: The Geomatics computer laboratory has ERDAS and Inpho Photogrammetry Suite software installed for use in these courses. These are both industry leading products which provide extensive digital image processing functionality. There is also a variety of in-house software and Open Source software available to support ongoing remote sensing and photogrammetric research activities. Digital SLR and video cameras form the basis for image capture for both research and practical assignments.

Streams in Geomatics: There are three streams in the Geomatics programme, and streaming only takes place at the start of year three. However, if the Geoinformatics stream is a possible choice, then certain first and second year courses must be taken to allow that option. You will be counselled at registration, but also think about whether you may want to take environmental and geographical science or computer science to third year level prior to registration as these options may affect your courses in first year.

Bachelor of Sciencein Geomatics : Surveying Stream [EB019APG09]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG1016F	Geomatics I	18	05
CSC1015F	Computer Science I A (recommended only for those with		

	prior computing or experience)	18	05
APG1015S	Programming for Geomatics	18	05
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
STA1000S	Statistics	18	05
	Elective	36	
	Total credits per year	**140**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG2014S	Geomatics II	24	06
APG2015F	Geographic Information Systems I	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
APG2018X	Geographic Information Systems Camp	4	06
MAM2083F	Vector Calculus for Engineers	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	General Physics A	18	05
PHY1032S	General Physics B	18	05
APG2019X	Practical Training I	0	06
	Total credits per year	**148**	

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3014X	Control Survey Camp	4	07
APG3016C	Surveying II	12	07
APG3017D	Surveying III	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
APG3033W	Land & Cadastral Survey Law	16	07
CON2027F	Real Property Law	16	06
APG3015X	Practical Training I	0	07
	Total credits per year	**148**	

Fourth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG4001S	Geodesy.	24	08
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	Research Project	40	08
APG4005F	Engineering Surveying & Adjustment	18	08
APG4006S	Geomatics Practice & Land Management	12	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
MEC4042Z	Industrial Management	8	08
CHE3062S	Professional Communication Studies	12	07
	Total credits per year	**180**	

Bachelor of Science in Geomatics : Planning Stream [EB019APG10]

Programme Convener:
S Motala, BSc(Surv) *Natal* MSc(Eng) *Cape Town*PrL(SA)

First, Second and Third Year Core Courses are as in the Surveying Stream.

Fourth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG4003Z*	Research Project	40	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
APG4020F	Planning Theory and Practice	8	08
APG4021F	Urban Systems	12	08
APG4022F	Planning Project A	32	08
APG4023S	Urban Development Processes	12	08
APG4024S	Planning & Governmental Systems	12	08
APG4025S#	Regulatory and Legal Framework	12	08
APG4028F	Aspects of City Design	12	08
APG4029F	Natural Systems	12	08
	Total credits per year	**156**	
***APG4003Z**	*to be co-supervised by Geomatics and Planning academic staff*		
#APG4025S	*may be substituted by additional options by those students not continuing with the Fifth Year, i.e. exiting with the BSc(Geomatics) in Planning only.*		

Fifth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
	Fifth Year MCRP Core Courses	160	

Bachelor of Science in Geomatics : Geoinformatics Stream [EB019APG11] Computer Sciece or Environmental and Geographical Science Major

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements. Students must choose a core elective option, which must be approved by the Programme Convener.

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CSC1015F	Computer Science I A	18	05
*or***APG1015S**	Programming for Geomatics	18	05
APG1016F	Geomatics I	18	05
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
STA1000S	Statistics	18	05
	Elective	18	
	Elective Core (eg 2nd Semester Computer Science, 1st year EGS)	18	
	Total credits per year	**158**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG2014S	Geomatics II	24	06
APG2015F	Geographic Information Systems I	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
APG2018X	Geographic Information Systems Camp	4	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	Physics of Natural Systems A	18	05
PHY1032S	Physics of Natural Systems B	18	05
APG2019X	Practical Training I	0	06
	Total credits per year	**148**	

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3016C	Surveying II	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
CON2027F	Real Property Law	16	06
APG3015X	Practical Training II	0	07
	Elective core (2nd Year Computer Science or EGS)	48	
	Total credits per year	**164**	

Fourth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	GeomaticsProject	40	08
APG4006S	Geomatics Practice & Land Management	12	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
CHE3062S	Professional Communication Studies	12	07
MEC4042Z	Industrial Management	8	06
	Elective Core (e.g. 3rd Year Computer Science or EGS)	72	08
	Total credits per year	**188**	

Elective Courses
Students must take a sufficient number of elective courses which, together with the core and elective core courses, will comprise a total of not less than 576 credits.

A list of recommended electives is given below. It should be noted that timetable clashes might prevent the student from taking some of these courses, and that some of them have prerequisites not listed here.

Bachelor of Science in Geomatics : Geoinformatics Stream [EB019APG11] Geology Major

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements. Students must choose a core elective option, which

must be approved by the Programme Convener.

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CSC1015F	Computer Science I A	18	05
or **APG1015S**	Programming for Geomatics	18	05
APG1016F	Geomatics I	18	05
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
CEM1000W	Chemistry	36	05
GEO1006S	Introduction to Minerals, Rocks & Structures	18	05
	Total credits per year	**158**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG2014S	Geomatics II	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	Physics of Natural Systems A	18	05
PHY1032S	Physics of Natural Systems B	18	05
STA1000S	Statistics	18	05
GEO2001F	Mineralogy & Crystallography	24	06
APG2019X	Practical Training I	0	06
	Total credits per year	**162**	

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG2015F	Geographic Information Systems I	24	06
APG2018X	Geographic Information Systems Camp	4	06
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3016C	Surveying II	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
CON2027F	Real Property Law	16	06
GEO2004S	Physical Geology	24	06
APG3015X	Practical Training II	0	07
	Total credits per year	**168**	

Fourth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	Geomatics Project	40	08
APG4006S	Geomatics Practice & Land Management	12	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
CHE3062S	Professional Communication Studies	12	07
GEO3001F	Stratigraphy & Economic Geology	36	07
GEO3005F	Petrology & Structural Geology	36	07
MEC4042Z	Industrial Management	8	08
	Total credits per year	**188**	

Elective Courses
Students must take a sufficient number of elective courses which, together with the core and elective core courses, will comprise a total of not less than 576 credits.

A typical programme of elective core courses for the CSC and EGS majors in this stream is given below. It should be noted that timetable clashes may prevent the student from taking some of these courses.

Major in Computer Science EBE019APG11]

First Year Courses

Number	Course	HEQF Credits	HEQF Level
CSC1015F	Computer Science 1015	18	05
CSC1016F	Computer Science 1016	18	05

Second Year Courses

CSC2001F	Computer Science 2001	18	06
CSC2002S	Computer Science 2002	18	06

Third Year Courses

Number	Course	HEQF Credits	HEQF Level
CSC3002F	Computer Science 3002	18	07
CSC3003S	Computer Science 3003	18	07

Major in Environmental and Geographical Science [EBE019APG11]

First Year Courses

Number	Course	HEQF Credits	HEQF Level
GEO1009F	Introduction to Earth & Environmental Sciences	18	05
EGS1003S	Geography, Development & Environment	18	05

Third Year Courses

Number	Course	HEQF Credits	HEQF Level
EGS2013F	The Physical Environment	24	06
EGS2014S	Contemporary Urban Challenges	24	06

Fourth Year Courses

Number	Course	HEQF Credits	HEQF Level
EGS3020F	Environmental Change & Challenge	36	07
***or* EGS3021F**	Sustainability & the Environment	36	07
EGS3012S	Atmospheric Science	36	07
***or*EGS3022S**	Geographic Thought	36	07

Major in Geoiformatics (for Science students only) [EBE019APG11]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CSC1015F	Computer Science I A	18	05
or **APG1015S**	Programming for Geomatics	18	05

APG1016F	Geomatics I	18	05
MAM1000W	Mathematics I	36	05
or			
MAM1004F	Mathematics 1004	18	05
STA1000S	Statistics	18	05
	Total credits per year	**72**	

Note:
One year of mathematics (MAM100W) is required. Alternatively, one semester of mathematics (MAM1004F) and one semester of statistics (STA1000S or equivalent) will suffice.

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG2015F	Geographic Information Systems I	24	06
APG2018X	Geographic Information Systems Camp	4	06
APG2026F	Elementary Surveying	16	06
APG3012S	Geomatics III	24	07
	Total credits per year	**68**	

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
APG3011S	Geographic Information Systems II	24	07
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
	Total credits per year	**52**	

Curriculum for Technikon/University of Technology Transferees to the Bachelor of Sciencein Geomatics [EB019APG08]

1) Transferees must hold a Technikon/University of Technology National Diploma in Surveying and must have obtained:
   (a) An average of at least 70% in all prescribed final year University of Technology subjects.
   (b) A minimum of 75% for Mathematics II at the University of Technology.
   (c) A minimum of 70% for Physics I at the University of Technology.
2) Students who satisfy the criteria listed above may be granted 144 credits (for the first year) and may be exempted from the courses: APG1016F, APG2016W, APG2017X, APG2019X, CHE3062S, PHY1031F and PHY1032S.
3) Such students will be required to take the following courses (or their equivalents) in their first year of registration:

Number	Course	HEQF Credits	HEQF Level
APG2014S	Geomatics II	24	06
CSC1015F	Computer Science	18	05
or			
APG1015S	Programming for Geomatics	18	05
APG2015F	Geographical Information Systems	24	06
APG2018X	Geographical Information Systems Camp	4	06
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05

   Plus at least **60 credits** of elective courses
4) After completing the above courses, students will be required to complete the prescribed

Third and Fourth years of study.

5) Students with a BTECH in surveying will need to have each course assessed for credit and/or exemption towards the BSc Geomatics degree.

Course descriptions are set out in the section on Courses Offered. Certain descriptions of optional courses, which are not contained in this Handbook, may be found in the Handbook of the Faculty of Science.

CHEMICAL ENGINEERING

The Department offers the following Degree Programme:

BSc(Eng) Programme in Chemical Engineering

The Department of Chemical Engineering is situated in the Chemical Engineering Building, which is at the Groote Schuur campus. Access to the Building is from South Lane, off Ring Road.

Website: www.chemeng.uct.ac.za

Staff

Professor and Head of Department:
JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE

Professors:
JM Case, BSc(Hons) *Stell* HDE*Cape Town* MEd *Leeds* PhD *Monash* MASSAf
M Claeys, Dipl.Ing (Chem Eng) DIng *Karlsruhe*
DA Deglon, BSc(Eng) *Witwatersrand* MBA PhD*Cape Town* MSAIMM
J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAIChE MSAIMM
STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAAE ASSAfI
AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* MSAIChE
KP Möller, BSc(Eng)Chem PhD*Cape Town*
E van Steen, MSc(Eng) *Eindhoven* PhD *Karlsruhe* FSAIChE (Director of Postgraduate Studies)

Emeritus Professor:
CT O'Connor, PrEng BSc *Unisa* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM FSAIChE FSAAE FRSSAf

Associate Professors:
J Petersen, BSc(Eng)Chem *Witwatersrand* PhD *Cape Town* MSAIMM
HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTH Aachen* MSAIChE MSESSA

Adjunct Professor:
PJ Harris, BSc(Hons) PhD *Witwatersrand* MSACI

Honorary Professor:
JG Petrie, BSc(Eng)Chem *Cape Town* MSc(Eng) *Houston* PhD *Cape Town* MSAIChE

Senior Lecturers:
A Isafiade, BSc(Hons) *Ilorin* MSc(ChemEng) *IFe*PhD*Cape Town*
A Mainza, BSc(Eng)Chem *UNZA* PhD *Cape Town*
SH Minnaar, BSc(Hons) MBA PhD *Free State*
R Rawatlal, BSc(Eng) Chem PhD *UKZN* (Director of Undergraduate Studies)

Honorary Senior Lecturers:
W Böhringer, Diplom-Chemiker *Karlsruhe*
MC Harris, BSc(Eng)Chem MSc(Eng) *Cape Town*

Part-time Senior Lecturers:
ME Dry, MSc *Rhodes* PhD *Bristol*
RP van Hille, BSc(Hons) PhD *Rhodes* SASM
ME Williamson, MA PhD *Cantab* MIChem.ECEng

Part-time Lecturers:
SM Marr, BSc(Eng)Chem *Durban* MSc(Eng)Chem *Cape Town*
HR Heydenrych, BSc(Eng)Chem MSc(Eng) *Cape Town*

Academic Development Lecturer:
To be appointed.

Principal Scientific Officer:
Mr EW Randall, BSc*Cape Town*

Chief Technical Officers:
Mr P Dobias
Mr HJ Macke, Dip Mechanical Engineering Technician

Technical Officer:
Mr G de la Cruz

Analytical Laboratory Staff:
Ms H Divey, Dip Medical Technology
Ms S Mbula, Dip Analytical Chemistry
Ms S Vasic, Dip Analytical Chemistry

Building Supervisor:
Mr E Matthews

Administration Manager:
Mrs R September, Nat Dip HRM BTech HRD *CPUT*

Administrative Staff:
Mrs B Cloete (UG Administrative Assistant)
Mrs J Broadley (Senior Secretary)
Mrs D de Jager (AO to the Head of Department)
Ms N Dili (Receptionist)
Mrs R Maree (PG Administrative Officer)
Mrs A Warrin (Finance Assistant)

The Department offers both undergraduate and postgraduate programmes in chemical engineering. The undergraduate programme draws top school leavers from South Africa and further afield, with an annual intake of approximately 110 students. Graduates from this programme are highly sought-after in a wide variety of industries. The Department has dynamic research programmes and students who have obtained satisfactory results in their undergraduate courses are encouraged to return for postgraduate study. The Department's research activities are at present centred on:

- Minerals processing research focused on the flotation of ores using various cell technologies
- Catalysis research aimed at the synthesis and characterisation of heterogeneous catalysts and their evaluation for a wide variety of reactions and reactor types
- Biological leaching of mineral ores, with work concentrated on the fundamental processes involved
- Bioprocess engineering focused on biocatalysis bioreactor design, process kinetics and the recovery of biological products

Environmental process engineering, both at a conceptual and a practical level
Process synthesis featuring the application of pinch technology to heat and mass transfer systems as well as the control of process systems
Crystallisation and precipitation research focusing on metal recovery in mineral processing and metal removal for environmental protection
Educational research aimed at improving the quality of undergraduate teaching and learning
Process modelling and optimisation.

Bachelor of Science in Engineering in Chemical Engineering [EB001CHE01]

A four-year undergraduate chemical engineering degree is offered which prepares graduates for careers in the chemical, metallurgical, and process industries. There is a limited amount of specialisation in the areas of minerals processing, bioprocess engineering, catalytic processing, crystallisation and process modelling, and environmental process engineering. The degree focuses on the development of technical expertise, problem-solving, teamwork and communication skills, and is accredited by the Engineering Council of South Africa.

Practical training in the operation of laboratory and pilot scale equipment is given during the second and third years, while the fourth year research project emphasises chemical engineering fundamentals. Chemical Engineering Design is addressed in all years of study, culminating in an integrated plant design in the final year.

Senior Lecturer and Programme Convener:
R Rawatlal, BSc (ENG) Phd *UKZN*

A candidate shall comply with the prescribed curriculum requirements set out below.

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CEM1000W	Chemistry 1000	36	05
CHE1004W	Engineering I	32	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
MEC1002W	Engineering Drawing	16	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
	Total credits per year	**148**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CEM2007F	Chemistry 2007	24	06
CEM2008S	Chemistry 2008	24	06
CHE2031F	Material & Energy Balances	20	06
CHE2032Z	Design of Chemical Processes	8	06
CHE2033W	Chemical Engineering Laboratory I	4	06
CHE2035S	Thermodynamics I	12	06
CHE2040S	Fluid Flow & Heat Transfer	20	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
	Total credits per year	**144**	

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CHE3040S	Solid Fluid Operations	12	07
CHE3044F	Reactor Design I	12	07
CHE3046F	Thermodynamics II	12	07
CHE3049W	Chemical Engineering Laboratory II	16	07
CHE3050S	Chemical Process Unit Design	6	07
CHE3053S	Separation Processes	13	07
CHE3054S	Reactor Design II	13	07
CHE3062S	Professional Communication	12	07
CHE3063F	Mass Transfer	16	07
MAM3080F	Numerical Methods	12	07
	Total credits per year	**124**	
CHE3000X	Practical Training		07

Fourth Year Core Courses

Students must be in their final year of study. 16 credits of electives are considered as part of the regular programme and should be taken in the first semester. A concession to take an additional 16 credits per semester will be considered. This may consist of more electives or outstanding core courses. A concession for carrying more than one core course per semester will not be considered.

Number	Course	HEQF Credits	HEQF Level
CHE4029Z	Professional Communication Studies	8	08
CHE4036Z	Chemical Engineering Design	28	08
CHE4042F	Process Dynamics & Control	16	08
CHE4045Z	Chemical Engineering Project	32	08
CHE4048F	Business, Society & Environment	20	08
CHE4049F	Process Synthesis & Equipment Design	20	08
	Total credits per year	**124**	

Elective Courses

Students need to complete at least 48 credits of elective courses. At least 16 of these credits need to be from the Liberal Arts group; and 16 credits need to be completed in the EBE specialisation group. The final 16 credits can be taken from any course offered at UCT for which the student meets the prerequisites, subject to the approval of the Programme Convener.

Liberal Arts Group

This group consists of courses typical of studies in the Humanities. A list of courses satisfying this requirement is available from the Academic Administration Officer in the Department of Chemical Engineering, and is provided to students during registration.

EBE Specialisation Group

This group consists of the following courses offered by the Department of Chemical Engineering:

Number	Course	HEQF Credits	HEQF Level
CHE3035S	Bioprocess Technology I	8	07
CHE3039S	Catalysis	8	07
CHE3064S*	Mineral and Metallurgical Processing I	8	07
CHE3065S	Numerical Simulation for Chemical Engineers	8	07
CHE3066S	Crystallisation & Precipitation	8	07
CHE4024F	Introduction to Environmental Process Engineering	8	08
CHE4050F*	Mineral & Metallurgical Processing II	8	08
EEE4103F+	Nuclear Power Sources	12	08

*** CHE3064S and CHE4050F are compulsory for mining-house bursars.**
+ EEE4103F is compulsory for ESKOM bursars.

Alternatively, students may wish to take any EBE course at or above the 3rd year level for which they meet the prerequisites. Students may also wish to consider selected 5 level courses for which they meet the prerequisites. Such courses must be approved by the Programme Convener.

Conversion Programme for Bachelor of ScienceGraduates to Bachelor of Science in Engineering in Chemical Engineering [EB001CHE01]

The entrance requirements are as follows:

1. For the 2-year programme: A BSc degree in minimum time with above 60% in Mathematics II and Chemistry II, with majors in Mathematics or Applied Mathematics or Physics or Computer Science or Chemistry or Biochemistry, and an average of above 60% in the final year.
2. For the 3-year programme: A BSc degree in minimum time with Mathematics II and Chemistry II and majors as above.

The following curriculum is applicable to BSc graduates who have been accepted into the conversion programme.

First Year of Conversion Programme (2-year programme)

Number	Course	HEQF Credits	HEQF Level
CHE1000Z	Introduction to Chemical Engineering	16	05
CHE2031F	Material & Energy Balances	20	06
CHE2032Z	Design of Chemical Processes	8	06
CHE2033W	Chemical Engineering Laboratory I	4	06
CHE2035S	Thermodynamics I	12	06
CHE2040S	Fluid Flow & Heat Transfer	20	06
CHE3044F	Reactor Design I	12	07
CHE3049W	Chemical Engineering Laboratory II	16	07
CHE3053S	Separation Processes	13	07
CHE3054S	Reactor Design II	13	07
CHE3062S	Professional Communication Studies	12	07
MAM3080F	Numerical Methods	12	07
MEC1003F	Engineering Drawing	8	05
	Total credits per year	**172**	
CHE3000X	Practical Training		

Second Year of Conversion Programme (2-year programme)

Number	Course	HEQF Credits	HEQF Level
CHE3040S	Solid-Fluid Operations	12	07
CHE3046F	Thermodynamics II	12	07
CHE3063F	Mass Transfer	16	07
CHE4029Z	Professional Communication Studies	8	08
CHE4036Z	Chemical Engineering Design	28	08
CHE4042F	Process Dynamics & Control	16	08
CHE4045Z	Chemical EngineeringProject	32	08
CHE4048F	Business, Society & Environment	20	08
CHE4049F	Process Synthesis & Equipment Design	20	08
	Total credits per year	**164**	

First Year of Conversion Programme (3-year programme)

Number	Course	HEQF Credits	HEQF Level
CHE1000Z	Introduction to Chemical Engineering	16	05
MEC1003F	Engineering Drawing	8	05
CHE2031F	Material & Energy Balances	20	06
CHE2032Z	Design of Chemical Processes	8	06
CHE2033W	Chemical Engineering Laboratory I	4	06

CHE2035S	Thermodynamics I	12	06
CHE2040S	Fluid Flow & Heat Transfer	20	06
	Humanities Electives	16	
	Total credits per year	**104**	

Second Year of Conversion Programme (3-year programme)

Number	Course	HEQF Credits	HEQF Level
CHE3040S	Solid-Fluid Operations	12	07
CHE3044F	Reactor Design I	12	07
CHE3046F	Thermodynamics II	12	07
CHE3049W	Chemical Engineering Laboratory II	16	07
CHE3050S	Chemical Process Unit Design	6	07
CHE3053S	Separation Processes	13	07
CHE3054S	Reactor Design II	13	07
CHE3062S	Professional Communication Studies	12	07
CHE3063F	Mass Transfer	16	07
MAM3080F	Numerical Methods	12	07
	Total credits per year	**124**	
CHE3000X	Practical Training	0	07

Third Year of Conversion Programme (3-year programme)

Number	Course	HEQF Credits	HEQF Level
CHE4036Z	Chemical Engineering Design	28	08
CHE4042F	Process Dynamics & Control	16	08
CHE4045Z	Chemical Engineering Project	32	08
CHE4048F	Business, Society & Environment	20	08
CHE4049F	Process Synthesis & Equipment Design	20	08
CHE4029Z	Professional Communication Studies	8	08
	Total credits per year	**124**	

Access Programme for Technikon/University of Technology Transferees [EB001CHE01]

The entrance requirements are as follows:
A National Diploma in Chemical Engineering achieved in minimum time, with a 70% overall average and 75% in each of the two Mathematics courses. (It is necessary to have qualified for matriculation exemption or the NSC endorsed for degree studies before commencement of the National Diploma programme.)
Students accepted on to this programme will be credited with the following courses:
CHE1004W, CHE2032Z, CHE2033W, CHE3000X, CHE3049W, and all elective courses. This leaves the majority of each year's core courses to complete, and is therefore nominally a four year programme. Students may choose however to register as occasional students in the year prior to entering the programme, and to write the MAM1017S, MAM1018S, CEM1000W, PHY1012S and PHY1013S end of year examinations through self-study. Should these courses all be passed, the student will be able to enter into the second year of the programme.

Course descriptions are set out in the section Courses Offered. The course code abbreviation for Chemical Engineering is CHE.

CIVIL ENGINEERING

The Department offers the following Undergraduate Degree Programme:

BSc Engineering Degree in Civil Engineering

The Department is housed in the Snape Building, situated on the top terrace of the Upper campus. The building consists of a three-storey block, containing offices, lecture theatres and drawing offices, separated from a laboratory block by a grassed quadrangle. The laboratories and workshops are equipped for teaching and research and cover a total floor area of about 3000m².

Staff

Professor and Head of Department:
A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng FIStructE FZweIE MASSAf FIABSE FSAAE

Professors:
MG Alexander, PrEng BSc(Eng) MSc(Eng) PhD *Witwatersrand* FSAICE FSAAE, MASSAf MICT
GA Ekama, BSc(Eng) PhD*Cape Town* SFWISA FRSSAf FSAAE MASSAf MWEF MIWA

Associate Professors:
NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE Mem IAHR Mem IAHS Mem IWA
R Behrens, BA MCRPPhD*Cape Town* TRP (SA) MSAPI
R Del Mistro PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP*Cape Town* PhD *Pret*
P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang*
UK Rivett, Dipl-Ing *München* PhD *Cape Town*
M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* MSAICE MSASITS
JE van Zyl, BEng MEng *Rand Afrikaans* PhD *Exeter*

Emeritus Associate Professors:
MO de Kock, PrEng BSc(Eng) *Cape Town*
RO Heckroodt, MSc DSc *Pret* Dip Ceram *Leeds* FSAIMM FI Ceram (UK)
FA Kilner, PrEng MA *Oxon* MSc(Eng) *London* DIC
ADW Sparks, PrEng BSc(Eng) *Natal* MSc(Eng) *Witwatersrand* MICE FSAICE MOpResSocSA MRoySocSA CEng

Senior Lecturers:
H Beushausen, Dipl-Ing *HAW Hamburg* MSc(Eng) PhD *Cape Town*
D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*
S Skatulla, Dipl-Ing *Karlsruhe* PhD *Adelaide*

Academic Development Senior Lecturer:
NS Wolmarans, MScEng *Cape Town*

Research Officers:
H Schalekamp, BAS BArch MPhil *Cape Town*

Part-time Lecturer:
CB Prisman, BA LLB *Cape Town*

Honorary Research Associates:
V Collis, PrEng PrArch BSc(Eng) *Cape Town*
LA Kane, BEng *Wales(Cardiff)* MSc(Eng) *Cape Town*
M Santhanam, BTech *IIT Madras* MS *Purdue* PhD *Purdue*

Principal Technical Officer:
Mr CJ Nicholas

Laboratory Manager/Principal Scientific Officer:
Mr N Hassen

Water Quality Laboratory Manager:
Vacant

Laboratory Technician:
Vacant

Administrative Officers:
Ms AB Dalwai, BSocSc *Cape Town*
Ms R Geswindt

Research Administrative Assistants:
Ms AEI Semler
Ms E Yelverton

Administrative Assistant:
Ms I Ncube

Purchaser:
Ms A Courie

Secretary:
Ms C Wright

Departmental Assistants:
Mr C May
Mr H Mafungwa
Mr T Moyana
Mr E Witbooi

Laboratory Facilities

The Structures Laboratories have facilities for studying the mechanical behaviour of structural components, models and materials. They contain a number of testing machines for static and dynamic loading and feature special floors with closely-spaced anchor bolt holes, as well as ample open spaces for full-scale testing of structural elements and structural assemblies.

The Hydraulics Laboratory is equipped with a 1.5 x 1.5 x 14m tank, a 600 mm wide wave flume, a 300mm wide tilting channel flume, and a 600mm wide tilting channel flume. It also contains various teaching aids.

The Geotechnical Engineering Laboratories consist of areas for teaching and research in soil and rock mechanics. A special test pit is available for research on full size structural members embedded in soils. A fully computerised stress-path triaxial facility is also available.

The Concrete Materials Laboratory contains equipment and controlled temperature and humidity rooms for studying properties of concrete, cement and aggregates.

The Water Quality Engineering Laboratories are equipped with constant temperature rooms and apparatus for chemical, biochemical and bioprocess investigations into waste water treatment. Laboratory scale activated sludge, and anaerobic digestion units are operated for developing design criteria for full-scale plants.

Bachelor of Science in Engineering in Civil Engineering [EB002CIV01]

Associate Professor and Programme Convener:
P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang*

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements (which may exceed 576). Note: The core courses listed below, plus one elective course of 16 or more credits, constitute the courses recognised for the degree in terms of Rule FB8.2. DP and examination requirements to pass the core courses are set out in the course information sheets issued at the start of all Civil Engineering core courses.

The curriculum has a strong foundation in the natural sciences, mathematics and applied mechanics. From the second year of study, students are introduced to courses in structural engineering and materials, water engineering (hydraulics and water quality), geotechnical engineering, and urban engineering, including transportation. In the final year, the two major courses of Design Project and Research Report allow students to integrate their knowledge and develop advanced problem-solving skills.

Professional aspects are covered by courses in communication and civil engineering practice.

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CEM1008F	Chemistry for Engineers	16	05
CIV1004W	Engineering I	32	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
MAM1042S	Engineering Statics	16	05
MEC1002W	Engineering Drawing	16	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
	Total credits per year	**144**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CIV2011F	Mechanics of Materials	16	06
CIV2031S	Structural Engineering I	16	06
CIV2034S	Spatial Data Acquisition & Management	16	06
CIV2035X	Civil Engineering Camp	4	06
CIV2037F	Experimental Methods & Statistics	16	06
CIV2039S	Geotechnical Engineering I	16	06
CIV2040S	Fluid Mechanics	8	06
GEO1008F	Geology for Engineers	12	05
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**148**	

CIV2020X	Practical Experience	0	06

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CIV3031F	Structural Engineering II	16	07
CIV3035S	Structural Engineering III	16	07
CIV3042F	Geotechnical Engineering II	16	07
CIV3043F	Hydraulic Engineering	16	07
CIV3044F	Engineering Hydrology	8	07
CIV3045F	Transportation Planning	16	07
CIV3046F	Water Treatment	12	07
CIV3047S	Urban Water Services	12	07
ECO1007S	Economics for Engineers	16	05
	Elective	18	
	Total credits per year	**146**	

Fourth Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CIV4031F	Structural Engineering IV	16	08
CIV4035C	Design Project	24	08
CIV4041F	Professional Practice	16	08
CIV4042F	Waste Water Treatment	12	08
CIV4043F	Urban Design & Management	16	08
CIV4044S	Research Project	48	08
EGS1005F	Introduction to Environmental Assessment & Management	12	05
	Total credits per year	**144**	

Elective Courses

The core curriculum changes from time to time and it is the responsibility of each student to check the accumulating total of core course credits he or she has completed at any stage, in order to determine any shortfall from the minimum number of 576 credits and the courses required for graduation. Any shortfall must be made up with elective course credits (usually 16 credits).

In the final year of study students may get a concession to take a maximum of 16 credits per semester over and above the published fourth year core curriculum. This may consist of outstanding courses from prior years or additional electives.

It is a requirement of the Engineering Council of South Africa (ECSA) that all engineering graduates be exposed to complementary studies which, *inter alia*, 'broaden a students perspective in the humanities and social sciences in order to understand the world in which engineering is practised'. To this end, every prospective graduate must take at least one course from a list of approved electives that will be made available to the student at the beginning of each year. This core elective will ordinarily be undertaken in the second half of the third year. It is the responsibility of the student when proposing electives to ensure that there are no lecture, practical or examination timetable clashes for courses so offered.

Programme for Technikon/University of Technology Transferees to Bachelor of Science in Engineering in Civil Engineering (CE) [EB002CIV01]

The Senate criteria for granting course credits and exemptions to Technikon/University of Technology transferees entering the BSc(Eng) Civil Engineering degree programme require Technikon/University of Technology students to have obtained a matriculation exemption or the

NSC endorsed for degree studies before they started their National Diploma studies, an average of at least 70% for all prescribed final year subjects and a minimum of 75% for Mathematics II in the National Diploma examinations. Students who satisfy these criteria will be granted credits and be exempted from the following courses; CIV1004W, MAM1042S, MEC1002W, CIV2011F, CIV2020X, CIV2034S and CIV2042F. Such Students will be required to register for the following courses in their first year at UCT:

Number	Course	HEQF Credits	HEQF Level
CEM1008F	**Chemistry for Engineers**	16	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
CIV2031S	Structural Engineering I	16	06
CIV2035X	Civil Engineering Camp	4	06
CIV2037F	Experimental Methods & Statistics	16	06
CIV2040S	Fluid Mechanics	8	06
ECO1007S	Economics for Engineers	16	05
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**152**	

After completing the above courses, subject to rule FB8.2, students will be required to complete the remainder of all prescribed Second Year, Third Year, Fourth Year courses. In addition students will be required to do an elective course.

CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following Undergraduate degree programmes:

BSc Degree Programmes in
Construction Studies
Property Studies

The Department is housed in CentlivresBuilding, situated at the southern end of University Avenue opposite the RobertLeslieBuilding. The building consists of a five-storey block, containing offices, lecture theatres, the Built Environment Library and the CAD Laboratory. The Building is shared with the School of Architecture, Planning and Geomatics.

Staff

Professor and Head of Department:
KS Cattell, BSc(QS) *UPE* MPhil*Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

Professor:
PA Bowen, BSc(QS) BCom *Natal* MSc(Construction Management) *Heriot-Watt* PhD *UPE* PrQS PMAQS FRICS FCIOB PrCM PrCPM MAACE PrValuer

Associate Professors:
KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MAACE ICIOB MSAFMA
F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

Emeritus Professors:
BG Boaden, BSc(QS) *Witwatersrand* MBA *British Columbia* PhD *Witwatersrand*
AJ Stevens, MSc(Building) *Cape Town* PhD *UPE*

Adjunct Professors:
GJ Paddock, BA LLB *Cape Town* AAArb
GJ Snyman, BCom MCom *Stell* PhD *Cape Town* FCIOB FIHSA

Senior Lecturers:
E Edwardes, BSc BSc(QS) MSc(Project Management) *Pret* PrQS PMAQS
K Evans, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS
CI Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA*
K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS
J Marks, MBA *Cape Town*
MW Massyn, BSc(Building) *UPE* FCIOB
RPT McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*
MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*
A Windapo, BSc(Building*) IfE* MSc(Construction Management) PhD *Lagos* FNIOB

Academic Development Lecturer:
E Hurst, BA(Hons) MA *Nottingham* PhD *Cape Town*

Departmental Manager:
Mrs E Koch

Administrative Officer:
Mrs M Fagodien (Postgraduates)

Administrative Assistant:
Mrs B Stoffberg (Undergraduates)

Reception and General Administration:
Ms P Mabai
Ms A Parenzee

Departmental Assistant:
Mr B Baron

Undergraduate Programmes

Please note that the offering of all undergraduate programmes is subject to a minimum student enrolment. A subminimum of 40% applies to the examination and coursework components of all undergraduate courses with a CON course code.

Bachelor of Science in Construction Studies [EB015CON04]

The curriculum of the 3-year BSc in Construction Studies programme equips graduates to: use computer packages for computer-aided draughting presentation, scheduling and information processing; manage and prepare tender and contractual documents relating to building work; estimate cost and undertake financial management of construction projects; manage the construction of buildings and related infrastructure; manage the human resources within a construction firm; understand and evaluate economic issues concerning the construction sector and the construction firm at both a micro and macro level; understand the time value of money and apply discounted cash flow techniques for evaluating alternative property investments; communicate with construction professionals concerning spatial concepts, financial issues and construction assembly problems.
The aims of the programme are: to provide employable management graduates to the construction industry; to fully satisfy the criteria for accreditation in terms of the requirements of the Chartered Institute of Building (CIOB), the South African Council for the Project and Construction Management Professions (SACPCMP), the Royal Institution of Chartered Surveyors (RICS), and the South African Council for the Quantity Surveying Profession (SACQSP).

Associate Professor and Programme Convener:
KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MAACE ICIOB MSAFMA

A candidate shall complete approved courses of a value not less than 450 credits and shall comply with all the prescribed curriculum requirements (which may in any given year exceed 450 credits).

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CIV1006S	Building Science I	16	05
CON1004W	Construction Technology I	32	05
CON1010S	Construction Information Systems	8	05
BUS1036F	Evidence-based Management	18	05
ECO1010F	Microeconomics	18	05
ECO1011S	Macroeconomics	18	05
MEC1002W	Engineering Drawing	16	05
STA1001F	Statistics 1001	18	05
	Total credits per year	**144**	
CON1007X	Practical Training		05

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
ACC1006S	Financial Accounting I	18	05

APG2026F	Elementary Surveying	16	06
CML1001F	Business Law I	18	05
CML2005F	Labour Law	18	06
CON1019S	Professional Communication Studies	16	05
CON2006W	Construction Technology II	32	06
CON2020S	Construction Management I	16	06
CON2022W	Measurement & Design Appraisal I	16	06
	Total credits per year	**150**	
CON2013X	Practical Training		06

Third Year Core Courses

Number	Course		Credits
CON3012W	Construction Technology III	32	07
CON3030S	Construction Costing	16	07
CON3031W	Measurement & Design Appraisal II	32	07
CON3032W	Applied Contract Law I	12	07
CON3033F	Property Studies I	16	07
CON3038W	Construction Management II	32	07
CON3043W	Cost Engineering under Uncertainty	16	07
	Total credits per year	**156**	
CON3023X	Practical Training	0	07

Bachelor of Science in Property Studies [EB017CON03]

The curriculum of the 3-year BSc in Property Studies programme equips graduates to: manage tender and contractual documents relating to building work; undertake financial analysis and financial management of property developments; undertake the valuation of fixed property; manage the human resources within a property firm; understand and evaluate economic issues concerning the property sector and the property firm at both a micro and macro level; communicate with construction and property professionals concerning spatial concepts, financial issues and construction assembly problems; inter-relate with colleagues and successfully manage and/or participate in team working situations; appreciate social and commercial business values within the context of codes of professional conduct and legal liability; construct solutions which relate to practical real-life problems and resolve disputes using appropriate methods; frame research questions, identify, collect and collate primary and secondary data sources and be aware of quantitative analysis methods; and understand the legal framework within which the property development, property valuation and property management processes occur.

The aims of the programme are to provide employable graduates to the property industry; and to satisfy the criteria for accreditation in terms of the requirements of the South African Council for the Property Valuers Profession (SACPVP) and the Royal Institution of Chartered Surveyors (RICS).

Associate Professor and Programme Convener:

KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MAACE ICIOB MSAFMA

A candidate shall complete approved courses of a value not less than 432 credits and shall comply with all the prescribed curriculum requirements (which may in any given year exceed 432 credits).

First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CON1011F	Property Studies I A	16	05
CON1012S	Property Studies I B	16	05
CON1015S	Property Information Systems	8	05
CON1017S	Property Investment Mathematics I	8	05
CON1018W	Building Technology I T	16	05
BUS1036F	Evidence-based Management	18	05
ECO1010F	Microeconomics	18	05

ECO1011S	Macroeconomics	18	05
STA1000S	Statistics 1000	18	05
STA1001F	Statistics 1001	18	05
	Total credits per year	**154**	

Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
ACC1006F/S	Financial Accounting I	18	05
BUS2020F	Business Finance	18	06
CML1001F	Business Law I	18	05
CON2024S	Property Studies II A	16	06
CON2027F	Real Property Law I	16	06
CON2029S	Measurement	8	06
CON2030F	Property Investments Mathematics II	8	06
CON2031S	Property Studies II B	16	06
	Total credits per year	**118**	

Elective Core Courses

Courses totalling a minimum of 34 credits must be chosen from the following:

Number	Course	HEQF Credits	HEQF Level
BUS2010F/S	Marketing I	18	06
CML2005F	Labour Law	18	06
CON1020F/S	Management & Enterprise	18	07
ECO2003F	Microeconomics II	18	06
ECO2004S	Macroeconomics II	18	06
STA2020F	Business Statistics	18	06

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CML2010S	Business Law II	18	06
CON1019F	Professional Communication Studies	16	05
CON3034F	Property Studies III A	16	07
CON3035S	Property Studies III B	16	07
CON3036W	Property and Contract Law	16	07
CON3040W	Cost Engineering I T	16	07
CON3041F	Property Studies III C	16	07
	Total credits per year	**114**	

Elective Core Courses

Courses totalling a minimum of 34 credits must be chosen from the following:

Number	Course	HEQF Credits	HEQF Level
ACC1012S	Business Accounting	18	05
ACC2022F/S	Management Accounting I	18	06
BUS2010F/S	Marketing I	18	06
CML2001F	Company Law	18	06
CON1020F/S	Management & Enterprise	18	07
CML2005F	Labour Law	18	06
CON3044S	Globalisation & the Built Environment	18	07
ECO2003F	Microeconomics II	18	06
ECO2004S	Macroeconomics II	18	06
STA2020F	Business Statistics	18	06
STA3022F	Research & Survey Statistics	18	07
	Approved Elective(s)	18	

Course descriptions are set out in the section Courses Offered. The course code abbreviation for Construction Economics and Management is CON.

ELECTRICAL ENGINEERING

The Department offers the following Undergraduate Degree programmes:

Bachelor of Science in Engineering Degree Programme in
Electrical Engineering
Electrical and Computer Engineering
Mechatronics

The Department of Electrical Engineering is located on the 4th floor of the MenziesBuilding on the Groote Schuur Campus, Rondebosch. It can be accessed via Library Road.

Website: www.ee.uct.ac.za
Email address: eleceng@uct.ac.za
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Staff

Emiritus Professor and Head of Department:
BJ Downing, MSc *Bradford* PhD *Sheffield*

Professors:
M Braae, MSc(Eng) *Cape Town* PhD *UMIST*
CT Gaunt, BSc(Eng) *Natal* MBL *SA* PhD *Cape Town* FIET FSAIEE
MR Inggs, PrEng BSc(Hons) *Rhodes* PhD *London* MIEEE

Part-time Professors:
HA Chan, BSc *HKU* PhD *Maryland* SMIEEE
P Pillay, CEng BSEng *UDW* MSc(Eng) *Natal* PhD *Virginia Tech* FIET FIEEE
T Magedanz, PhD *Berlin*

Emeritus Professors:
G de Jager, MSc *Rhodes* PhD *Manchester* MBL *SA* MIEEE
SG McLaren, CEng BSc(Eng) PhD *Cape Town* MSAIEE
A Petroianu, Dipl Ing *USSR* Dr Ing *Bucharest* FIEEE VDE CIGRÉ
KM Reineck, CEng Dip Eng *Cologne* DipEIEng *Dunelm* PhD *Newcastle* VDE FIET

Associate Professors:
SP Chowdhury, BEE(Hons) MEE PhD(Engg) *Kolkata* CEng FIET MIEEE FIE FIETE MCSI
ME Dlodlo, BSEE BS *Geneva* MSc *Kansas* PhD *Delft* FZweIE MIEEE
KA Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ MIEEE MSAIEE
MA Khan, MSc(Eng) PhD *Cape Town* MIEEE MSAEE
AJ Wilkinson, BSc(Eng) *Cape Town* PhD *London*

Emeritus Associate Professor:
JR Greene, MSc(Eng) *Cape Town* MIEEE

Adjunct Associate Professor (part-time):
M Malengret, BSc(Eng) *Natal* MSc(Eng) PhD *Cape Town* M(SA)IEE

Visiting Professors:
F Anderson, MSc *Georgia Te*
C Baker, BSc(Hons) PhD *Hull*
H Griffiths, BA *Oxon* PhD DSc *London*
K Woodbridge, BSc(Hons) *Sussex* DPhil

Hon Research Associates:
J Collins, MSc *Oxon*
BT Farrimond, BA *Oxon* MSc(Computer Science) *Manchester*
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S Chowdhury, BEE(Hons) PhD(Engg) *Kolkata* MIET SMIEEE MIE
OE Falowo, BEng MEng*Akure* PhD *Cape Town* MIEEE
A Mishra, BE (*REC India*) PhD *Edinburgh*
A Murgu, MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD (Appl Math) *Jyväskylä* MIEEE
F Nicolls, MSc(Eng) PhD *Cape Town*

Lecturers:
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I Khan, MSc(Eng) *Cape Town* MIEEE
SI Ginsberg, MSc(Eng) *Cape Town*
MS Tsoeu, MSc(Eng) *Cape Town*
RA Verrinder, MSc(Eng) *Cape Town*MIEEE
S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town*

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MJE Ventura, PrEng BSc(Maths, Physics) BSc(Eng) *Cape Town* BSc(Hons) *Pret* MIEEE MSAIEE

Principal Technical Officers:
Mr S Schrire
Mr AC Wozniak, BSc(Eng) *Cape Town*

Senior Technical Officers:
Mr P Daniels
Mr D De Maar

Technical Officers:
Mr P Bizimana
Mr P Titus

Departmental Manager:
Ms J Buxey

Administrative Officer (Undergraduate):
Ms K van Wyk

Finance Assistant:
Ms ME Joubert

Administrative Assistant (Postgraduate):
Ms N Moodley
Part-time Administrator:
Ms C Koonin

Receptionist:
Ms E Waqu

Departmental Assistant:
Mr B Daniels

The activities of the Department cover a wide field both at undergraduate and postgraduate level. The Department regards laboratory work as of significant importance and a range of dedicated laboratories exist. These are in the fields of Control and Process Control, Data Communications, Digital Systems and Computers, Electrical Machines and Transformers, Electronics and Telecommunications, Image Processing, Instrumentation, Microwave, Radar, Power Electronics and Power Systems.

The undergraduate programmes endeavour to provide the student with an education in *Electrical Engineering* with a range of specialisations, in *Electrical and Computer Engineering* and in *Mechatronics.*

Bachelor of Science in Engineering in Electrical Engineering (EE) [EB009EEE01]

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements.

Professor and Programme Convener:
M Braae, MSc(Eng) *Cape Town* PhD *UMIST*

The BSc(Eng) Degree in Electrical Engineering covers a wide range of activities and disciplines. Students are able to select final year courses which allow some degree of specialisation in one or more disciplines such as Acoustics, Control & Instrumentation, Digital Systems, Electronics, Nuclear Engineering, Power Electronics and Machines, Power and Energy Systems, Signal & Image Processing and Telecommunications.

The first 3 years of the degree are quite general and cover the fundamentals of the Electrical Engineering disciplines.

First Year Core Courses (EE)

Number	Course	HEQF Credits	HEQF Level
CAS1001S	Culture, Identity & Globalization in Africa	8	05
CSC1017F	Computer Science for Engineers	16	05
EEE1004W	Engineering I	32	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
MAM1042S	Engineering Statics	16	05
MEC1003F	Engineering Drawing	8	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
	Total credits per year	**144**	
EEE1000X	Practical Training		05

Second Year Core Courses (EE)

Number	Course	HEQF Credits	HEQF Level
EEE2035F	Signals & Systems I	12	06
EEE2036S	Probability & Statistical Design in Engineering	12	06
EEE2038W	Fundamentals of Electrical Engineering	24	06

EEE2039W	Fundamentals of Electronic Engineering	36	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
MEC2043F	Electrical & Mechanical Materials	12	06
PHY2010S	Electromagnetism for Engineers	16	06
	Total credits per year	**144**	

Third Year Core Courses (EE)

A maximum of 24 second year credits can be carried concurrently with Third Year EEE courses.

Number	Course	HEQF Credits	HEQF Level
EEE3017W	Digital Electronics	16	07
EEE3055F	Electromagnetic Engineering	20	07
EEE3057S	Power Engineering	20	07
EEE3068F	Electronic Circuits	12	07
EEE3069W	Control Engineering	20	07
EEE3073S	Professional Communication Studies	12	07
EEE3083F	Communications System & Network Design I	12	07
EEE3086F	Signals & Systems II	12	07
MEC2026S	Project Management	8	06
	Total credits	**132**	
EEE3000X	Practical Training		07

Third Year Optional Courses (EE)

Number	Course	HEQF Credits	HEQF Level
EEE3064W	Digital Electronics & Microprocessors	16	07
EEE3085S	Communication System & Network Design II	12	07
	Total credits	**144**	

Fourth Year Core Courses (EE)

Number	Course	HEQF Credits	HEQF Level
EEE4006F	Professional Communication Studies	8	08
EEE4022S/F	Final Year Project	40	08
EEE4036C/A	Electrical Engineering Design	8	08
EEE4051F	New Venture Planning	8	08
MEC4054Z	Quality Reliability & Maintenance Management	12	08
MEC4063C	Industrial Ecology	8	08

Fourth Year Elective Core Courses (EE)

Choose three or more courses (60 credits) from the following:

At least one course (20 credits) from:

Number	Course	HEQF Credits	HEQF Level
EEE4087F	Mobile Broadband Networks	20	08
EEE4089F	Power Distribution & Transmission Networks	20	08
EEE4093F	Process Control & Instrumentation	20	08

And further courses from:

Number	Course	HEQF Credits	HEQF Level
EEE4001F	Digital Signal Processing	20	08
EEE4088F	Wireless Communication Systems Design	20	08
EEE4090F	Power Systems Analysis Operation and Control	20	08
EEE4099F	Electrical Machines & Power Electronics	20	08
EEE4101F	Nuclear Power Engineering	20	08
	Total credits per year	**144**	

Students cannot register for the following courses in the same year as these courses are timetabled in the same periods:

EEE4001F and EEE4089F; EEE4087F and EEE4090F; EEE4088F and EEE4099F.

Fourth Year Optional Courses (EE)
Students must select three or more of the elective-core courses above plus additional optional courses listed below to bring their credit totals to at least 576 credits.

Number	Course	HEQF Credits	HEQF Level
EEE4080C	Electrical Machines & Drives	8	08
EEE4096S	Neural Fuzzy & Evolving Systems	8	08
EEE4100X	Practical Training	0	08
HUB4045F	Introduction to Medical Imaging & Image Processing	12	08
	Total degree credits	**576**	

Programme for Technikon/University of Technology Transferees to Bachelor of Science in Engineering in Electrical Engineering (EE) [EB009EEE01]

The Senate criteria for granting course credits and exemptions to Technikon/University of Technology transferees entering the BSc(Eng) Electrical Engineering degree programme require Technikon students to have obtained a matriculation exemption or the NSC endorsed for degree studies before they started their National Diploma studies, an average of at least 70% for all prescribed final year subjects and a minimum of 75% for Mathematics IIA and Mathematics III in the New National Diploma examinations. Students who satisfy these criteria may be granted 144 credits (for the First Year) and may be exempted from all first year courses. Suitably qualified University of Technology transferees holding the Bachelor of Technology degree are granted 144 credits plus credit and exemption for EEE2038W, EEE2039W, EEE2035F, EEE2036S and MEC2043F. They will be required to complete MAM2083F, MAM2084S, PHY2010S plus all 3rd year and 4th year core courses and sufficient optional courses to make up the total of 576 credits minimum. If applicants do not meet the basic science knowledge area required by ECSA they will need to register for 1st year Physics PHY1012F or PHY1024F or PHY1031F.

Conversion Programme for Bachelor of Science graduates to Bachelor of Science in Engineering in Electrical Engineering (EE) [EB009EEE01]

Suitably qualified Science (BSc) graduates entering the BSc(Eng) Electrical Engineering degree programme are granted 288 credits and are required to complete specific courses amounting to a value not less than 288 credits in 2 years. Science graduates who do not satisfy the required entry criteria for the 2-year programme may follow a 3 year programme prescribed by the Department.

Bachelor of Science in Engineering in Electrical and Computer Engineering (EC) [EB022EEE02]

Emeritus Professor and Programme Convener:
BJ Downing, MSc *Bradford* PhD *Sheffield*

Electrical and Computer Engineering is an interdisciplinary branch of engineering which combines a fundamental study in electrical engineering with computing. Many universities and other institutions world-wide are now offering courses or degrees in Electrical and Computer Engineering, and it is increasingly recognised that the combination of electrical engineering and computer studies equips graduates with an excellent basis upon which to build valuable engineering roles in modern industry. Apart from receiving a thorough grounding in both electrical engineering and computing, the Electrical and Computer Engineering student at UCT will gain a foundation of understanding in physical science, advanced engineering mathematics, microcomputer technology and systematic engineering design.

The Electrical and Computer engineer in industry may require expertise across a broad range of engineering disciplines, and will be especially well-suited to a career in networking, control &

instrumentation, power systems and telecommunications. Electrical and Computer engineers may also become involved in fields such as bio-medical engineering, machine vision, power electronics and machines, or signal and image processing.

The Electrical and Computer Engineering Programme is administered as a distinct Programme within the Department of Electrical Engineering, and student advice specific to the needs of Electrical and Computer Engineering undergraduates is available to students on the Programme.

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements.

First Year Core Courses (EC)

Number	Course	HEQF Credits	HEQF Level
CAS1001S	Culture, Identity & Globalization in Africa	8	05
CSC1015F	Computer ScienceIA	18	05
CSC1016S	Computer Science IB	18	05
EEE1004W	Engineering I	32	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
MEC1003F	Engineering Drawing	8	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
	Total credits per year	**148**	
EEE1000X	Practical Training	0	05

Second Year Core Courses (EC)

Number	Course	HEQF Credits	HEQF Level
CSC2001F	Computer Science 2A	24	06
CSC2002S	Computer Science 2B	24	06
EEE2026S	Basic Electrical Engineering II	20	06
EEE2035F	Signals and Systems I	12	06
EEE2036S	Probability and Statistical Design in Engineering	12	06
EEE2040F	Basics Electrical Engineering I	24	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
	Total credits per year	**148**	

Third Year Core Courses (EC)

Number	Course	HEQF Credits	HEQF Level
CSC3023F	Computer Science 3023	24	07
EEE3044S	Energy Conversion & Utilization	8	07
EEE3064W	Digital Electronics & Microprocessors	16	07
EEE3073S	Professional Communication Studies	12	07
EEE3074W	Embedded Systems	20	07
EEE3081F	Control Engineering A	10	07
EEE3084W	Communication System & Network Design	24	07
EEE3086F	Signals & Systems II	12	07
MEC2026S	Project Management	8	06
	Total credits per year	**134**	
EEE3000X	Practical Training	0	07

Third Year Optional Courses (EC)
Note: These are pre-requisites for Fourth Year Elective Core Courses.

Number	Course	HEQF Credits	HEQF Level
***EEE3063F**	Transmission Lines	10	07
****EEE3082S**	Control Engineering	10	07
	Total credits per year	**144**	

* Pre-requisite for EEE4088F
** Pre-requisite for EEE4093F

Fourth Year Core Courses (EC)

Number	Course	HEQF Credits	HEQF Level
EEE4006F	Professional Communication Studies	8	08
EEE4022S/F	Final Year Project	40	08
EEE4036C/A	Electrical Engineering Design	8	08
EEE4051F	New Venture Planning	8	08
EEE4084F	Digital Systems	20	08
MEC4054Z	Quality Reliability & Maintenance Management	12	08
MEC4063C	Industrial Ecology	8	08
	Total credits	104	

Fourth Year Elective Core Courses (EC)
Choose two courses from the following:

Number	Course	HEQF Credits	HEQF Level
EEE4001F	Digital Signal Processing	20	08
EEE4087F	Mobile Broadband Networks	20	08
***EEE4088F**	Wireless Communication Systems Design	20	08
****EEE4093F**	Process Control & Instrumentation	20	08
	Total credits	144	

* Requires EEE3063F as a pre-requisite
**** Requires EEE3082S as a pre-requisite

Fourth Year Optional Courses (EC)

Number	Course	HEQF Credits	HEQF Level
EEE4100X	Practical Training	0	08
HUB4045F	Introduction to Medical Imaging & Image Processing	12	08
	Total degree credits	576	

Select other optional courses to bring the credit total to at least 576 credits.

Bachelor of Science in Engineering in Mechatronics (ME) [EB011EEE05]

Programme Convener:
F Nicolls, MSc(Eng) PhD*Cape Town*

Mechatronics is an interdisciplinary branch of engineering which combines a fundamental study in mechanical engineering with light-current electrical engineering. Many universities and other institutions world-wide are now offering courses or degrees in Mechatronics, and it is increasingly recognised that this combination of mechanical and electrical engineering studies equips graduates with an excellent basis upon which to build valuable engineering roles in modern industry.

Apart from receiving a thorough grounding in both electrical and mechanical engineering, the Mechatronics student at UCT will gain a foundation of understanding in physical science, advanced engineering mathematics, electro-mechanical control theory, microcomputer technology, systematic engineering design and some principles of engineering management. In addition, the Mechatronics

Programme offers final-year optional courses in related fields, such as bio-medical engineering, power electronics and machines and industrial management.
The Mechatronics engineer in industry may require expertise across a broad range of engineering disciplines, and will be especially well-suited to a career in light manufacturing or process control. Mechatronics engineers may become involved in fields such as instrumentation, automation, robotics, bio-medical engineering or machine vision. The Mechatronics Programme at UCT aims to equip its graduates with a solid and broad-based engineering education, including the skills in design and the knowledge of computers and other digital systems hardware, that will be necessary for a successful future career in any of these environments. The Mechatronics Programme is administered as a distinct Programme within the Department of Electrical Engineering, and student advice specific to the needs of Mechatronics undergraduates is available to students on the Programme. Some students currently on the Programme enjoy industrial sponsorship, in the form of bursaries.

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements.

First Year Core Courses (ME)

Number	Course	HEQF Credits	HEQF Level
CAS1001S	Culture, Identity & Globalization in Africa	8	05
CSC1017F	Computer Science for Engineers	16	05
EEE1004W	Engineering I	32	05
MAM1017F	Engineering Mathematics A	16	05
MAM1018S	Engineering Mathematics B	16	05
MAM1042S	Engineering Statics	16	05
MEC1003F	Engineering Drawing	8	05
PHY1012F	Engineering Physics A	16	05
PHY1013S	Engineering Physics B	16	05
	Total credits per year	**144**	
EEE1000X	Practical Training	0	05

Second Year Core Courses (ME)

Number	Course	HEQF Credits	HEQF Level
EEE2035F	Signals & Systems I	12	06
EEE2036S	Probability & Statistical Design in Engineering	12	06
EEE2038W	Fundamentals of Electrical Engineering	24	06
EEE2039W	Fundamentals of Electronic Engineering	36	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
MEC2022S	Thermofluids I	16	06
MEC2043F	Electrical & Mechanical Materials	12	06
	Total credits per year	**144**	

Third Year Core Courses (ME)

Number	Course	HEQF Credits	HEQF Level
EEE3017W	Digital Electronics	16	07
EEE3031S	Energy Utilisation	10	07
EEE3061W	Mechatronics Design I	12	07
EEE3068F	Electronic Circuits	12	07
EEE3069W	Control Engineering	20	07
EEE3073S	Professional Communication Studies	12	07
MEC2023F	Dynamics 1	16	06
MEC2025F	Mechanics of Solids	12	06
MEC2026S	Project Management	8	06
MEC3031S	Dynamics II	16	07
MEC3035S	Computer Integrated Manufacture & Robotics	8	07

	Total credits per year	**142**	
EEE3000X	Practical Trainng	0	07

Fourth Year Core Courses (ME)

Number	Course	HEQF Credits	HEQF Level s
EEE4006F	Professional Communication Studies	8	08
EEE4022S/F	Final Year Project	40	08
EEE4036C/A	Electrical Engineering Design	8	08
EEE4051F	New Venture Planning	8	08
EEE4093F	Process Control & Instrumentation	20	08
EEE4099F	Electrical Machines & Power Electronics	20	08
MEC4054Z	Quality Reliability & Maintenance Management	12	08
MEC4063C	Industrial Ecology	8	08
	Total credits per year	**124**	

Fourth Year Optional Courses (ME)

Number	Course	HEQF Credits	HEQF Level
EEE4001F	Digital Signal Processing	20	08
HUB2005F	Introduction to Medical Engineering	8	06
MEC3023F	Mechanics of Solids	12	07
MEC3068C	Functional Materials	8	07
EEE4100X	Practical Training		
	Total degree credits	**576**	

Select other optional courses in Electrical Engineering or Mechanical Engineering to bring the credit total up to 576 credits.

Course descriptions are set out in the section on Courses Offered. The course code abbreviation for Electrical Engineering is EEE.

MECHANICAL ENGINEERING

The Department offers the following Undergraduate Degree Programmes:

BSc(Eng) Degree Programmes in
Electro-Mechanical Engineering
Mechanical Engineering

The Department of Mechanical Engineering is situated in the Electrical & Mechanical Engineering, McMillan and MenziesBuildings on the Groote Schuur campus, fronting onto University Avenue. It can be accessed via University Avenue and Library Road.

Staff

Professor and Head of Department:
C Redelinghuys, BIng(Hons) *Stell* MS *Stanford* PhD *Stell* MSAIMechE MAIAA

Professor and Deputy Head of Department:
RD Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE

Professors:
KF Bennett, PrEng BSc(Eng) *Cape Town* MScCNAA PhD *Cape Town* FSAIMechE
CI Lang, BSc PhD *Cape Town*
GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE
RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE

Emeritus Professor:
J Gryzagoridis, PrEng BSc(Eng) *Lamar* MSc(Eng) *Texas A and M* PhD *Cape Town* MSAIMechE M(SA)IRAC M(SA)INT M(SAAM) M(N.YORK) ACAD.SCIENCES

Adjunct Professor:
ADB Yates, BSc(Eng) MSc(Eng) PhD *Cape Town* MSAIMechE

Honorary Professor:
D Karagiozova, PhD *Ukrainian Academy of Science*

Associate Professors:
BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* MSAIMechE
FJ Kahlen, Dipl-Ing *RWTH Aachen* MSc *Tennessee* PhD *Central Florida* SMAIAA
GS Langdon, BEng PhD *Liverpool* MIMechE CEng
AG Malan, PrEng BEmg (Mech) MEng (Mech) *Pret* PhD *Swansea*
K Ramesh, BEng(Hons) MTech PhD *Singapore* SMSME
CJ von Klemperer, BSc(Eng) MSc(Eng) PhD *Natal*

Senior Lecturers:
TJ Cloete, MIng *Stell*
C Findeis, NH Dip (Mech Eng) MSAIMechE
D Findeis, MSc(Eng) *Cape Town* MSAIMechE
S Marais, MSc(Eng) *Cape Town*
HT Pearce, BSc(Eng) *Cape Town* MS PhD *Illinois*
CB Shaw, BSc MPhil(EngMan) *Cape Town*
G Vicatos, PrEng BSc(MechElec)(Marine) *Newcastle* MSc(Aero) DIC *London* PhD *Cape Town*

Lecturers:
R Govender, BSc(Eng) MSc(Eng) *Cape Town*
EB Ismail, BSc(Eng) MScEng *Cape Town*
R Nkumbwa, BEng Msc *Coventry* MIET MSAIMechE MEIZ REng.
R Wood, DipEd *London* HDE *Unisa*

Part-Time Lecturers:
K Balchin, PrEng Pr Cert Eng BSc(Eng) MIndAdmin *Cape Town*
Adv J Evans, BA LLB *Cape Town*

Academic Development Lecturer:
BC Kloot, MSc(Eng) *Cape Town*

Teaching Assistants:
Mr D Bradley, PrEng BSc(Eng) *Cape Town* MSAIMechE MSAICertMEE
Mr F Benning, PrEng BSc(Eng) *Cape Town*
Mr J Coulter, BSc(Eng) *Cape Town*
Mr J D'Arcy-Evans, PrEng BSc(Eng) *London* MIMechE SAIRAC
Mr D Magnussen, PrEng BSc(Eng) *Natal* FSAIMechE
Mr H Nieuwmeyer, PrEng BSc(Eng) *Cape Town*
Mr A Schnehage, BSc(Eng) MBA *Cape Town*
Mr M Shelley, Dip(Eng) *Pret*
Mr P Vavruch, PrEng Ing. *Prague* MSAIMechE MICMEESA
Mr R Webber, C(Eng) Dipl(Eng) *Pret* MSAI MechE

Principal Technical Officers:
Mr J Mayer, Higher NatTech Dipl MechEng
Mr G Newins

Chief Technical Officers:
Mr H Emrich
Mr P Smith
Mr H Tomlinson

Chief Scientific Officer:
Ms T Booysen, MSc(Eng)

Laboratory Attendants:
Mr G Doolings
Mr D Jacobs
Mr P Jacobs
Mr S Johannes
Mr W Slaverse

Workshop Apprentices:
Ms L Kortje
Mr T Newins
Ms P Stubbs

Administrative Officer:
Mrs CA Bloomer, BA HDE *Cape Town*

Administrative Assistant (Undergrad):
Ms S Walker

PA and Administrative Assistant (Postgrad):
Mrs S Batho

Bachelor of Science in Engineering in Electro-Mechanical Engineering [EB010MEC05]
Bachelor of Science in Engineering in Mechanical Engineering [EB005MEC01]

The undergraduate Bachelor of Science in Engineering degree programmes in Electro-Mechanical Engineering and Mechanical Engineering have a common first and second year Curriculum.

Common First Year Core Courses

Number	Course	HEQF Credits	HEQF Level
CEM1008F	Chemistry for Engineers	16	05
MAM1017F/S	Engineering Mathematics A	16	05
MAM1018F/S	Engineering Mathematics B	16	05
MAM1042S	Engineering Statics	16	05
MEC1002W	Engineering Drawing	16	05
MEC1004W	Engineering I	32	05
PHY1012F/S	Engineering Physics A	16	05
PHY1013F/S	Engineering Physics B	16	05
	Total credits per year	**144**	
MEC1000X	Practical Training	0	05

Common Second Year Core Courses

Number	Course	HEQF Credits	HEQF Level
EEE2030F	Electrical Engineering I	12	06
EEE2031S	Electrical Engineering II	12	06
MAM2083F/S	Vector Calculus for Engineers	16	06
MAM2084F/S	Linear Algebra and DEs for Engineers	16	06
MEC2020W	Design I	32	06
MEC2022S	Thermofluids I	16	06
MEC2023S	Dynamics I	16	06
MEC2025F	Mechanics of Solids	12	06
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**144**	
MEC2000X	Practical Training	0	06

NOTE:

(a) Unless otherwise published in the programme curriculum, a student may not register for more than 144 credits in any year of study.

(b) A student may only register for MEC4061F/Z in the final year of study. Students registering for MEC4061Z may register for one additional second semester (S course). Students registering for MEC4061F are expected to complete all the requirements for the degree in June of that same year and may register for one additional first semester (A or F) course.

Bachelor of Science in Engineering in Electro-Mechanical Engineering [EB010MEC05]

The Programme in Electro-Mechanical Engineering mainly comprises courses selected from the Electrical Engineering and Mechanical Engineering curricula. The Programme aims to provide an educational approach where emphasis is placed on integrated studies and on the production of graduates who are generalists, rather than specialists, in the broad area of professional engineering practice associated with the processing and manufacturing industries. It also aims to meet the increasing demand for engineers with cross-discipline skills, particularly in the fields of robotics,

flexible manufacturing and electromechanical power systems. Whilst encompassing a wide range of fundamental engineering science courses, predominantly from the disciplines of Electrical and Mechanical Engineering, the Programme's curriculum also includes important components from the field of Industrial and Project Management, that gives students in the later years some measure of choice in the selection of courses to meet their needs after graduation. The Electro-Mechanical Degree was originally developed at the request of a number of companies who felt that there was a need for a graduate of this nature. Many of these companies still offer several bursaries to students registered for the Programme.

Programme Convener:
TJ Cloete, MIng *Stell*

Following the common First/Second Years of Curriculum a candidate shall complete approved courses of a value required to bring the total to a minimum of 576 credits and shall comply with all the prescribed curriculum requirements.

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
EEE3044S	Energy Conversion & Utilization	8	07
EEE3061W	Mechatronics Design I	12	07
EEE3062F	Digital Electronics	12	06
EEE3070S	Measurement & Microprocessors	8	06
MAM2082F	Computer Programming in Matlab	8	06
MEC2026S	Project Management	8	06
MEC3023F	Mechanics of Solids	12	07
MEC3031S	Dynamics II	16	07
MEC3033F	Thermofluids II	20	07
MEC3035F	Computer Integrated Manufacture & Robotics	8	07
MEC3037S	Professional Communication Studies	12	07
MEC3050W	Design II	24	07
	Total credits per year	**148**	
MEC3000X	Practical Training		

Fourth Year Core Courses
NOTE: A student may only register for MEC4061F/Z in his/her final year of study. Students registering for MEC4061Z may register for only one additional second semester ("S" coded) course. Students registering for MEC4061F are expected to complete their studies in June of the same year and my register for only one additional first semester ("A" or "F" coded) course.

Number	Course	HEQF Credits	HEQF Level
EEE4013F	Control Systems	8	07
MEC4053Z	Measurement & Control in Engineering Systems	16	08
MEC4055Z	Design III	16	08
MEC4061F/Z	Individual Laboratory/Research Project	48	08

Fourth Year Core Complementary Studies Course

Number	Course	HEQF Credits	HEQF Level
MEC4063C	Industrial Ecology	8	08

Fourth Year Elective Complementary Studies Courses

Number	Course	HEQF Credits	HEQF Level
MEC4022Z	Industrial Law	8	08
MEC4042Z	Industrial Management	8	08
MEC4051F	New Venture Planning	8	08

MEC4054Z	Quality Reliability & Maintenance Management	12	08

Complementary studies courses cover those disciplines outside of engineering sciences, basic sciences and mathematics which: (a) are essential to the practice of engineering, including engineering economics, the impact of technology on society and effective communication; and (b) broaden a student's perspective in the humanities or social sciences to support an understanding of the world. Students must select a minimum of 34 credits of Complementary Studies courses made up as follows: two courses must be selected from the list of Elective Complementary Studies Courses above or one from outside of the Faculty of Engineering & the Built Environment and the Faculty of Science to fulfil the requirements of category (a); one 18 credit Complementary Studies course must be selected to fulfil the requirements of category (b) and must be taken from outside of the Faculty of Engineering & the Built Environment and the Faculty of Science. Courses other than those on the list of Elective Complementary Studies Courses above may only be taken with the approval of the Programme Convener.

Fourth Year Elective Core Courses
Any third or fourth level courses offered by the Departments of Mechanical or Electrical Engineering are suitable for inclusion as elective courses if the prerequisites for the courses are satisfied and they can be fitted into the timetable without clashes. These are listed in the 'Courses Offered' section of this handbook under EEE and MEC. Students must select sufficient elective courses to bring their total to at least 576 credits.

Bachelor of Science in Engineering in Mechanical Engineering [EB005MEC01]

The curriculum of this programme concentrates on instruction in the classical areas of solid mechanics, dynamics and thermofluids, accompanied by experimental verification. Communication skills are addressed through expert instruction and application in reports of experimentation and design. Design is made central to the curriculum where team and finally individual skills are developed. Curriculum flexibility in the third and final years of study, allows students the selection of courses that can provide an introduction to a career in Mechanical Engineering.

Senior Lecturer and Programme Convener:
D Findeis, MSc(Eng) *Cape Town* M(SA)IMech

Following the common First/Second Years of Curriculum a candidate shall complete approved courses of a value required to bring the total to a minimum of 576 credits and shall comply with all the prescribed curriculum requirements.

Third Year Core Courses

Number	Course	HEQF Credits	HEQF Level
EEE3044S	Energy Conversion & Utilisation	8	07
MAM2082F	Computer Programming in Matlab	8	06
MEC2026S	Project Management	8	06
MEC3023F	Mechanics of Solids	12	07
MEC3031S	Dynamics II	16	07
MEC3033F	Thermofluids II	20	07
MEC3037S	Professional Communication Studies	12	07
MEC3044S	Thermofluids III	12	07
MEC3045F	Experimental Methods	12	07
MEC3050W	Design II	24	07
	Total credits per year	**132**	
MEC3000X	Practical Training	0	07

Elective Core Courses:
At least one, but not more than two courses must be chosen from the following:

Number	Course	HEQF Credits	HEQF Level
MAM3080F	Numerical Methods	12	07
MEC3060F	Materials Under Stress	8	07
MEC3069S	Production Processes	8	07

NOTE: If only one 8 credit elective core course is selected at this stage, students will be 4 credits short of the norm of 144 credits per annum, and will obtain only 140 credits in this third year. They will then be required to undertake 148 credits in fourth year to bring their total to at least 576 for the degree.

Fourth Year Core Courses
NOTE: A student may only register for MEC4061F/Z in his/her final year of study. Students registering for MEC4061Z may register for only one additional second semester ("S" coded) course. Students registering for MEC4061F are expected to complete their studies in June of the same year and my register for only one additional first semester ("A" or "F" coded) course.

Number	Course	HEQF Credits	HEQF Level
MEC4055Z	Design III.	16	08
MEC4061F/Z	Individual Laboratory/Research Project	48	08
MEC4063C	Industrial Ecology	8	08
	Total credits per year	**72**	

Elective Core Courses:
Students must select sufficient Elective Core Engineering and Elective Complementary Studies Courses to bring their total to at least 576 credits. Of the courses selected, a minimum of 46 credits of Elective Core Engineering Courses must be chosen from the Fourth Year Elective Core Course List. In addition, students must select a minimum of 26 credits of Elective Complementary Studies Courses. Complementary Studies courses cover disciplines outside of engineering sciences, basic sciences and mathematics and can be split into two categories: (a) they are essential to the practice of engineering economics, the impact of technology on society, management and effective communication, and (b) broaden a student's persepctive in the humanities or social sciences to support an understanding of the world. Of the 26 elective complementary studies credits, at least 18 must fulfil the requirements of category (b). The balance may be selected from the Fourth Year Elective Complementary Studies Course List below, or can also be chosen from suitable courses offered outside the EBE and Science Faculties.

Fourth Year Elective Core Courses:

Number	Course	HEQF Credits	HEQF Level
EEE4013F	Control Systems	8	07
EEE4098F	Noise Control Engineering	12	08
EEE4103F	Nuclear Power Sources	12	08
MEC4035F	Fracture Mechanics	8	08
MEC4036C	Power Plant	8	08
MEC4045F	Numerical Methods in Heat and Fluid Flow	12	08
MEC4047F	Mechanical Vibrations	12	08
MEC4048F	Advanced Heat Transfer	12	08
MEC4049F	Turbomachines	8	08
MEC4062Z	Air Conditioning & Refrigeration	12	08
MEC4065F	Finite Elements in Mechanical Design	16	08
MEC4087Z	Failure Analysis	8	08
MEC4088Z	Manufacturing with Materials	12	08
MEC4092F	Internal Combustion Engines	12	08

MEC4094F	Applied Operations Engineering	20	08
MEC4095Z	Lean Operations	8	08
MEC4101C	Advanced Manufacturing & Nano Technology	8	08
MEC4102C	Hydraulics & Pneumatics	8	08

Elective Complementary Studies Courses:

Number	Course	HEQF Credits	HEQF Level
MEC4022Z	Industrial Law	8	08
MEC4042Z	Industrial Management	8	08
MEC4051Z	New Venture Planning	8	08
MEC4054Z	Quality, Reliability and Maintenance Management	12	08

Course descriptions are set out in the section Courses Offered. The course code abbreviation for Mechanical Engineering is MEC.

ACADEMIC DEVELOPMENT IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

ASPECT Co-ordinator:
HT Pearce, BSc(Eng) *Cape Town* PhD *Illinois*

ASPECT Deputy Co-ordinator:
P le Roux, BSc(Eng) PGDipEd(HES) *Cape Town*

Senior Lecturer:
TS Craig PhD *Cape Town*

Lecturers:
K Nathoo, BSc(Eng) MEngMan *Cape Town*
A Campbell, Bsc(Hons) Applied Maths HDE *Natal* MSc *UKZN*

Part Time Lecturer:
E Vicatos, BA(Hons) *Natal*

Administrative Staff:
Mrs L Nkomo

The ASPECT Programme [EB008] See plan codes below

The Academic Support Programme for Engineering in Cape Town (ASPECT) is designed for students who obtained the National Senior Certificate endorsed for degree studies or a Senior Certificate with matriculation exemption from schools that have not prepared them adequately for tertiary study/ The Programme proves a supportive environment that is sensitive to students' academic, social and emotional needs. The curriculum is planned so that the degree should take five years to complete.

In the first year, students register for threefull credit-bearing courses all counting towards the degree. These are Mathematics I, Physics I or Chemistry I, and Engineering I. These are the same courses as are taken by students registered for the 4 year degree. The Mathematics course istaught by staff in ASPECT; the Physics lectures are conducted by ASPECT staff, while the laboratory sessions are offered by the Physics department. Chemistry is taught in the Chemistry Department with an extra afternoon workshop run by an ASPECT staff member. Students also take an Introduction to Communication course, run by ASPECT staff.

Students who continue with engineering at UCT will complete, in their second year, the remaining first year courses, two second year courses in Mathematics, and up to two courses from the second year engineering curriculum. In the third year, students complete the remaining second year courses together with appropriate courses from the third year curriculum, while ASPECT continues to provide non-academic support and counselling. ASPECT staff will monitor and advise students while they complete the remaining degree requirements.

First Year Courses

Number	Course	HEQF Credits	HEQF Level
END1008Z	Introduction to Communication	8	05
END1017F	Mathematics 1017	16	05
END1018S	Mathematics 1018	16	05
PHY1014F	Engineering Physics A	16	05
PHY1015S	Engineering Physics A	16	05

CIV1004W	Engineering I (Civil) [EB008CIV01]	32	05
or			
EEE1004W	Engineering I (Electrical) [EB008EEE01/EB008EEE02/ EB008EEE05]	32	05
or			
MEC1004W	Engineering I (Mechanical) [EB005MEC01/EB005MEC05]	32	05

(The Engineering I course to be selected will depend on the engineering discipline that the student chooses.)

Engineering I and ASPECT plan codes:

CHE1004W	Chemical Engineering[EBE008CHE001]
CIV1004W	Civil Engineering [EB008CIV01]
EEE1004W	Electrical Engineering [EB008EEE01]
	Electrical & Computer [EB008EEE02]
	Mechatronics [EB008EEE05]
MEC1004W	Mechanical Engineering I [EB005MEC01]
	Electro-Mechanical Engineering [EB005MEC05]

Course descriptions are set out in the section Courses Offered. The course code abbreviation for ASPECT courses is END.

CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

The following pages list the centres, units, departments and schools in other faculties which offer courses or opportunities for research for students registered in the Faculty of Engineering & the Built Environment. (For further information on these centres, units, departments and schools refer to the Handbook of the Faculty concerned.)

Departments Established in the Faculty of Commerce

Accounting

Associate Professor and Head of Department:
M Graham, BBusScMCom*Cape Town* CA(SA) ACMA

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code ACC.

School of Economics

Professor and Director of the School:
J Fedderke, BCom(Hons) *Natal* MPhil PhD *Cantab*

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code ECO.

School of Management Studies

Head of Department:
S Kendal, BSc(Hons) MSc PhD*Cape Town* FASSA

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code BUS.

Centre and Department Established in the Faculty of Humanities

Centre for African Studies

Associate Professor and Director:
H Garuba, MA PhD *Ibadan*

The Centre for African Studies is housed in the HarryOppenheimer Institute Building, located on the Engineering Mall.

The course offered by the Centre for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code CAS.

Sociology

Associate Professor and Director:
D Cooper, BSc(Eng) *Cape Town* MSocSc PhD *Birmingham*

The Centre for African Studies is housed in the Robert Leslie Social Sciences Building, located on the University Avenue.

The course offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code SOC.

Philosophy

Professor and Head of Department:
D Benatar, BSocSc(Hons) PhD *Cape Town*

The course offered by the department for students registered in the Faculty of Engineering & the Built Environment is described in the Courses Offered section of this Handbook under the course code PHI.

Department Established in the Faculty of Law

Commercial Law

Associate Professor and Head of Department:.
R le Roux, BJuris LLB *UPE* LLM *Stell* PG Dip (Employment Law and Security Law) *Cape Town*
LLM Anglia Polytechnic Attorney and Conveyancer of the High Court

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment is described in the Courses Offered section of this Handbook under the course code CML.

Department Established in the Faculty of Health Sciences

Human Biology

Associate Professor and Head of Department:
LA Kellaway, Bsc(Hons) MSc PhD *Cape Town*

The programme in Biomedical Engineering is offered in the Faculty of Health Sciences Its activities are concentrated at postgraduate level and students may pursue the following qualifications:

Postgraduate Diploma in Health Care Technology Management
MSc(Med) Biomedical Engineering
MPhil
PhD

The Department of Human Biology also collaborates at an undergraduate level with departments in the Faculty of Engineering & the Built Environment, particularly Electrical Engineering and Mechanical and Materials Engineering. Courses offered are listed in the section (Undergraduate Courses - HUB).

Departments and Unit Established in the Faculty of Science

Astronomy

Professor of Astronomy and Head of Department:
RC Kraan-Korteweg, Diploma PhD Phil II *Basle*

Courses which may be taken by registered students in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code AST.

Chemistry

Professor and Head of Department:
SA Bourne, BSc(Hons) PhD *Cape Town* CChem MRSC MSACI
The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code CEM.

Computer Science

Associate Professor and Head of Department:
S Berman, BSc(Hons) *Rhodes* MSc PhD *Cape Town*

Courses which may be taken by registered students in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code CSC.

Electron Microscope Unit

Professor and Director:
BT Sewell, MSc *Witwatersrand* PhD *Lond*

The Electron Microscope Unit is housed in the RW James Building at 9 University Avenue and provides scanning and transmission electron microscopy facilities for staff and research students in all faculties. The Unit is equipped with two scanning and three transmission electron microscopes including a modern field emission TEM and SEM. Associated preparative, darkroom, light microscopy and library facilities are also provided. Enquiries regarding the use of these facilities are welcome.
Aspects of electron microscopy are offered to any University member who wishes to make use of the Unit's facilities for the purpose of research. The Unit is also able to provide information and advice on a wide range of microscopy related topics. More detailed information is available at http://sbio.uct.ac.za/webemu

Environmental and Geographical Science

Professor and Head of Department:
ME Meadows, BSc(Hons) *Sussex*, PhD *Cantab*, FSSAG

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course codes EGS and GEO. Refer also to the Science Faculty Handbook.

Geological Sciences

Associate Professor and Head of Department:
SH Richardson, BSc(Hons) *Cape* Town PhD *MIT*

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code GEO. Refer also to the Science Faculty Handbook.

Mathematics and Applied Mathematics

Associate Professor and Head of Department:
V Brattka, PhD *Hagen Germany*

The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code MAM. Refer also to the Science Faculty Handbook for details of other courses offered by the Department.

Physics

Professor and Head of Department:
DG Aschman, BSc(Hons) *Cape Town* DPhil *Oxon*

The courses offered by the above department for students registered in the Faculty of Engineering & the Built Environment are described in the section on Courses Offered under the course code PHY. Refer also to the Science Faculty Handbook.

Statistical Sciences

Associate Professor and Head of Department:
C Thiart, BSc Agric(Hons) *Stell* MSc PhD *Cape Town*

The courses offered by the above department for students registered in the Faculty of Engineering & the Built Environment are described in the section on Courses Offered, under the course code STA. For further information refer to Handbook of the Faculty of Science or Faculty of Commerce.

COURSES OFFERED

Note: The offering of courses is subject to minimum student enrolment and the discretion of the Head of Department concerned.

KEY TO COURSE ABBREVIATIONS, CODES AND TERMINOLOGY GUIDE TO THE CREDIT SYSTEM

Course Codes

ACC	Accounting
APG	Architecture, Planning and Geomatics
AST	Astronomy
BUS	Management Studies
CAS	Centre for African Studies
CEM	Chemistry
CHE	Chemical Engineering
CIV	Civil Engineering
CML	Commercial Law
CON	Construction Economics and Management
CSC	Computer Science
ECO	Economics
EEE	Electrical Engineering
EGS	Environmental & Geographical Science
END	Faculty of Engineering & the Built Environment
GEO	Geological Sciences
HUB	Human Biology
MAM	Mathematics & Applied Mathematics
MEC	Mechanical Engineering
PBL	Public Law
PHI	Philosophy
PHY	Physics
SEA	Oceanography
SOC	Sociology
STA	Statistical Sciences

Every course described in this Handbook has a course name and a corresponding course code. The code structure is uniform, and it gives important information about the course. The course code is an eight character code in the format AAAnnnnB, where

AAA represents the department offering the course;

nnnn is a number, where the first digit represents the year level of the course (no change) and the second, third and fourth digits represent a number between 000 and 999 which uniquely identifies the course at that level offered by that department (previously this was a number between 00 and 99);

B (the course suffix) represents the position in the year in which the course is offered (as before).

The following suffixes are used:

A	1st quarter course
B	2nd quarter course
C	3rd quarter course
D	4th quarter course
F	1st semester course

S	2nd semester course
H	half course taught over whole year
W	full course, year-long
L	Winter Term
M	Multiterm
U	Summer Term Sessions 1 and 2
J	Summer Term Session 1
P	Summer Term Session 2
X	not classified
Z	other
EWA	Examination without attendance at course

The following example shows how this works:
CIV2031S Structural Engineering
The code shows that this is a Civil Engineering course (CIV), of second year level (2031) and that it is a second semester (S) course.

The first numeral in the course code (see description of the credit code system above) enables one to distinguish between this Faculty's undergraduate and postgraduate courses as follows:

- levels 1 to 3 are all undergraduate courses;
- level 4 may be either undergraduate or postgraduate courses depending on the code prefix: level 4 CHE, CIV, EEE and MEC courses are undergraduate and so also are level 4 APG Geomatics courses; level 4 APG (other than Geomatics), and CON courses are postgraduate; level 5 and above are all postgraduate.

The courses listed in the following pages are in alpha-numeric order, based on the course code prefix and number. Thus, all the courses offered by a particular department are grouped together.

Courses: Guide To Terminology

Core courses: These courses form a central part of a Bachelor's degree programme. Inclusion of such courses in a curriculum is compulsory.
Co-requisites: A co-requisite course is one for which a student must be registered together with (i.e. concurrently) another specified course.
Elective core courses: This category comprises groups of courses from which the selection of one course or more is mandatory for a Bachelor's degree curriculum. Selection of these courses is made on the basis of specialisation (stream) or on the basis of interest.
Elective courses: Courses required for degree purposes (e.g. to make up required number of programme credits), but in which the choice of courses is left to the student, except that a broad field of study may be specified (eg Humanities courses), and subject to timetable constraints.
Major Course: A major course refers to the Design & Theory Studio and Technology courses in the BAS curriculum.
Optional courses: Any approved courses other than the core courses and those selected as elective core or electives in the curriculum of the student concerned. Selection of these courses is made on the basis of interest, subject to prerequisite requirements, timetable constraints and the permission of the heads of departments concerned. Such courses will be included in the student's credit total and in the computation of the credit weighted average.
Prerequisites: A prerequisite course is one which a student must have completed in order to gain admission to a specific other course.
Undergraduate course: This is a course which is required for a first qualification, eg a Bachelor's degree.
Postgraduate course: This is a course which is required for a higher qualification, eg a Postgraduate Diploma, Honours or a Master’s degree.

Credit System

The Faculty has adopted the Higher Education Qualifications Framework (HEQF) course credit system with effect from 2004. The Faculty's course credit ratings which were in effect prior to 2004 have been converted to HEQF course credits. This conversion involves multiplying the pre-2004 credit values by four. The HEQF system is based on the guideline that 10 notional hours of learning is equal to one credit. The Faculty's previous credit system was based on the guideline that 40 notional hours of learning is equal to one credit.

Lecture timetable

The lecture timetables are published separately by the department concerned from where they are obtainable at Registration.

ACC1006F/S FINANCIAL ACCOUNTING

18 HEQF credits at level 5; 4 lectures and 1 double tutorial per week.

Convener:

Prerequisites: NSC Mathematics 4 (50%), of D(HG), or B(SG).

Course outline: The objective of a business; business decisions, the flow of documentation in a business,the accounting system, recording business transactions,inventory, value-added tax, receivables and payables, introduction to GAAP and the IFRS Framework, definitions and recognition criteria and measurement bases, reporting financial information, preparing financial statements (income statement and statement of financial position).

Lecture times: Tuesday to Friday: Meridian, 6th.

DP requirements: Attendance at and submission of a minimum of 80% of tutorials AND a weighted average of at least 40% for class tests and satisfactory completion of project. Students who do not obtain a minimum of 50% in class tests will not automatically be granted a deferred exam on application.

Assessment: Tests and one project 35%, final 3 hour examination 65%.

ACC1012S BUSINESS ACCOUNTING

This course is a terminating course and does not lead to a 200 level course.

18 HEQF credits at level 5; 4 lectures and 1 double tutorial per week.

Convener:

Prerequisites: A minimum 40% final mark for ACC1006F/S Financial Accounting.

Objective: To provide students with an overview of published financial statements, analysis and interpretation of financial information, and an introduction to costing, budgeting, and taxation.

Course outline: Analysis and interpretation of financial information; company financial statements; costing; budgeting; taxation; and systems control.

Lecture times: Monday to Thursday: 6th.

DP requirements: A weighted average of at least 40% for class tests AND completion of project AND attendance at and submission of a minimum of 75% of tutorials. Students who do not obtain a minimum of 50% will not automatically be granted a deferred examination on application.

Assessment: Test(s)and 1 project 40%, final 3 hour examination 60%.

ACC2022F MANAGEMENT ACCOUNTING I

18 HEQF credits at level 6; 4 lectures and 1 double period tutorial per week.

Convener: Mr CC Smith.

Prerequisites: Pass in Financial Accounting 1A (ACC1006F/S).

Course outline: An introduction to the discipline of Management Accounting; the analysis of cost systems, cost classification, and cost behaviour; product costing including job costing and process costing; the allocation of costs from service departments; absorption and variable costing; activity

based costing; cost-colume-profit relationships, relevant costing and cost benefit analyses; budgeting systems; standard costing and flexible budgeting; financial performance measurement in business segments.

Lecture times:

DP requirements: A minimum weighted average of 40% for course work and a minimum of 75% attendance, including adequate preparation and participation in the designated tutorials.

Assessment: Course work 40%, final examination 3 hours 60%.

APG1003W TECHNOLOGY I

24 HEQF credits at level 5; 40 lectures, site visits, tutorials. First year undergraduate.

Convener: TBA.

Co-requisites: APG1020W.

Course outline: This course serves as an introduction to the basic principles and concepts of construction and structure, giving emphasis to the tectonic qualities and sustainability properties of architectural materials. Familiarity with technical terminology and technical drawing conventions are developed.

Lecture times: TBA.

DP requirements: 80% attendance and participation and 100% completion of all tutorials, assignments and projects.

Assessment: By written examination, *en-loge* test, and examination of portfolio of all tutorials, projects and assignments.

APG1004F HISTORY & THEORY OF ARCHITECTURE I

12 HEQF credits at level 5; 20 lectures, 16 tutorials. First year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: HATA I is a foundational course in architectural history and theory as understood through cultural studies. The course follows a chronology of World Architecture up until the beginning of the 19th Century. This chronology is occasionally interrupted and reframed by thematic content based on contemporary theoretical issues and architecture.

Lecture times: TBA.

DP requirements: 80% attendance and participation and 100% completion of all essays, tutorials and assignments.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG1005S HISTORY & THEORY OF ARCHITECTURE II

12 HEQF credits at level 5; 20 lectures, 16 tutorials. First year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: The course follows the chronology of major administrative and stylistic architectural shifts at the Cape until the early 20th Century and introduces theoretical readings pertinent to particular buildings, precincts and epochs. Students visit, analyse and then present their findings of their assigned local case studies to the class. These case studies form the basis of research for the final essay.

Lecture times: TBA.

DP requirements: 80% attendance and participation and 100% completion of all projects, tutorials and assignments.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG1015S PROGRAMMING FOR GEOMATICS

18 HEQF credits at level 5; 12 lectures, 12 practical/tutorial assignments. First year undergraduate.

Convener: Dr George Sithole.

Prerequisites:

Course outline: Course Aims: To provide students with competence in developing GIS/Geomatics applications using high-level programming languages and scripting for and customisation of Geographic Information System (GIS) and Geomatics applications. Furthermore, students are equipped with skills to develop algorithms for Geomatics and GIS problem solving as well as being competent in the use of GIS/Geomatics applications.

Course Content: Introduction - Computing in Geomatics and GIS, Programming paradigms, Essential concepts in programming, Input/Output and essential data formats, Structured programming, Extended data types, O-O programming, Trigonometric functions and examples in Geomatics, 2D Graphics, 3D Graphics, VB vs VB.Net, VB.Net vs C/C++ and Java.

Lecture times:

DP requirements: Completion of all tests and practical assignments with a minimum average of 50%.

Assessment: Tests, practical assignments counts 65% and tests count 35%.

APG1016F GEOMATICS I

18 HEQF credits at level 5; 60 lectures, 9 practical/tutorial assignments. First year undergraduate.

Convener: Associate Professor J Whittal.

Co-requisites: APG1015S or CSC1015F.

Course outline: Introduction to geomatics, principles of measurement science, geometry of spatial measurement, spatial data, reference systems and datums, coordinate systems, projections, spatial computations on the plane, surveying principles and instrumentation, representation of spatial data in two dimensions, interpretation of maps and plans in three dimensions, surveying software, spreadsheets, introduction to fields of geomatics and integrated systems.

Lecture times:

DP requirements: Class tests must be written and practicalassignments attended. Three specified assignments must be submitted for marking.

Assessment: Tests count 25% (subminimum 35%), practical assignments count 15%, , examination 3 hours 60% (sub minimum 40%).

APG1017F ACADEMIC DEVELOPMENT CLASS

0 HEQF credits at level 5; first semester, DP course. First year undergraduate.

Convener: TBA.

Co-requisites: APG1003W, APG1020W.

Course outline: A seminar based practical class to support the development of visual and verbal literacy, for students in need of academic support as a result of prior education inequities.

Lecture times:

DP requirements: None.

Assessment: Portfolio review of all project work.

APG1018S ACADEMIC DEVELOPMENT CLASS

0 HEQF credits at level 5; June vacation, DP course. First year undergraduate.

Convener: TBA.

Co-requisites: APG1003W, APG1020W or APG2039W, APG2021W.

Course outline: A tutorial based practical class in which individual learning difficulties evident in mid-year review are clarified and which provides academic support through the investigation of teaching techniques which develop the mainstream curriculum.

Lecture times:
DP requirements: None.
Assessment: Portfolio review of all project work.

APG1020W DESIGN & THEORY STUDIO I

72 HEQF credits at level 5; 1 theory and 1 design lecture and studio - 12 hours per week. First year undergraduate.
Convener: TBA.
Co-requisites: APG1003W.
Course outline: As a basic course for architecture, urban design and landscape architecture, its focus is on initiating the development of transferable design ability through the medium of architecture. Its primary objective is to introduce students to essential concepts, three dimensional spatialisation and inhabitation and to develop skills and techniques. Particular emphasis is paid to the development of productive working methods in design. The format of the course consists of short experimental exercises, longer projects and *en loge* tests.
Lecture times: TBA.
DP requirements: 80% attendance and participation. 100% completion of all projects and assignments.
Assessment: Theory of Design assignments and reports and/or *en-loge* design test, and examination of portfolio of all projects.

APG1021W REPRESENTATION I

24 HEQF credits at level 5; 80 lectures/tutorials. First year undergraduate.
Convener: TBA.
Co-requisites: APG1003W, APG1020W.
Course outline: A hands on course, divided between freehand, geometric drawing and digital drawing. While the aim is to introduce techniques and disciplines, once understood these are intended to enhance creativity rather than conformity. The freehand drawing tutorials will address drawing elements such as line, tone, mass, texture, measure and proportion, in wet and dry media. The geometric drawing tutorials will address the elelments of planar geometry as well as the projections and conventions useful to designers. The digital drawing, while introducing digital 2 & 3D visualisation in terms of view studies, material studies and lighting studies, will reiterate the visual and graphic understanding built up in the course.
Lecture times: TBA.
DP requirements: 80% attendance and participation and 100% completion of tutorials and assignments.
Assessment: By examination of portfolio of all projects and assignments.

APG2000F HISTORY & THEORY OF ARCHITECTURE III

8 HEQF credits at level 6; 20 lectures, 10 tutorials. Second year undergraduate.
Convener: TBA.
Prerequisites:
Course outline: The course focuses on architectural modernism and urbanism. The intention of the course is to give students an insight into the culture, tradition, programmes and movements of early modern architecture, as a global as well as local practice. The aim is to develop a critical understanding of the historical period.
Lecture times: TBA.
DP requirements: 100% completion of: tutorial assignments: seminar presentation, examination and/or essay; 80% attendance and participation in lectures and tutorials.
Assessment: By written examination as well as tutorials, presentations and/or essay.

APG2003S HISTORY & THEORY OF ARCHITECTURE IV

8 HEQF credits at level 6; 20 lectures, 10 tutorials. Second year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: This course is an introduction into postmodern architectural theory and practice. It examines the various responses to modernism after WWII and starts a debate with critical contemporary architectural concerns. It aims to offer students a meaningful framework to assess contemporary architectural issues.

Lecture times: TBA.

DP requirements: 100% completion of projects and assignments; seminar presentation on examination and an essay; 80% attendance and participation.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG2009F THEORY OF STRUCTURES III

6 HEQF credits at level 6; 20 lectures. Second year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: Understanding the concepts of load, equilibrium, bending, shear, compression, tension and torsional forces and stresses. Understand and be able to produce various structural concepts of horizontal spanning elements and vertical elements pertaining to buildings at and beyond residential scale. The concepts will show how the structure carries the loads (in all three directions), how it connects to the vertical structure and introduction to structural materials. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements include roofs, suspended floors and beams and their various evolutions. Fixed and pinned connections are introduced. Arches are developed into vaults and domes.

Lecture times: TBA.

DP requirements: 80% attendance, participation and 100% completion of all essays, assignments and tests.

Assessment: By written class tests and tutorials.

APG2011S THEORY OF STRUCTURES IV

6 HEQF credits at level 6; 20 lectures. Second year undergraduate.

Convener: TBA.

Prerequisites: APG2009F.

Course outline: Understand and be able to produce various structural concepts to buildings at and beyond the residential scale. The concepts will show how the structure (with appropriate material choices) connects to earth. Here vector and other relevant force diagrams are used to argue the form and material and the founding conditions. Structural elements include load bearing walls, retaining walls, foundations, basements and large span tension structures.

Lecture times: TBA.

DP requirements: 80% attendance, participation and 100% completion of all projects, assignments and tests.

Assessment: By written class tests and tutorials.

APG2014S GEOMATICS II

24 HEQF credits at level 6; 60 lectures, 8 practical/tutorial assignments. Second year undergraduate.

Convener: Dr George Sithole.

Prerequisites: APG1015F/S or CSC1015F, MAM1018F/S or MAM1000W, APG1016F/S.

Course outline: Course aims:This course builds further upon the introduction to co-ordinate systems provided in Geomatics I, and extends it to cover co-ordinate transformations, 3-D co-

ordinate systems and time variations. The student is also introduced to the method of least squares as a means of solving over-determined systems of equations, with applications in co-ordinate transformations. Course Content: Introduction to error theory and error propagation; method of least squares - parametric case; two-dimensional co-ordinate systems; motions of the Earth; time; satellite orbits; three-dimensional co-ordinate systems.

Lecture times:

DP requirements: Completion of projects and tests to the satisfaction of the course convener.

Assessment: Tests count 15%, practical assignments count 25%, examination 3 hours counts 60% (sub minimum 40%).

APG2015F GEOGRAPHIC INFORMATION SYSTEMS I

24 HEQF credits at level 6; 60 lectures; 8 practical sessions. Second year undergraduate.

Convener: TBA.

Prerequisites: CSC1015F or APG1015F/S, MAM1000W or MAM1017F/S or MAM1004F and STA1000S, APG1016F/S.

Co-requisites: APG2016W, APG2018X.

Course outline: Course Aims: To provide knowledge and skills in the fundamental concepts of geographic information systems and remote sensing. Course Content: GIS concepts, Cartographic concepts and GIS map production, spherical trigonometry, Map Projections and their application in GIS, GIS data structures and their analysis, Spatial databases, GIS data input with special emphasis on Remote Sensing, GIS analysis and its application.

Lecture times:

DP requirements: Completion of all practical assignments with a minimum average of 40% and to the satisfaction of the course convener, and a minimum test average of 35%.

Assessment: Tests count 20%, , practical assignments 25%, 3 hour examination 55% (sub minimum 40%).

APG2016W SURVEYING I

24 HEQF credits at level 6; 50 lectures; 8 practical assignments; 5 tutorial assignments. Second year undergraduate.

Convener: TBA.

Prerequisites: MAM1000W or MAM1018S/F or MAM1004F and STA1000S; APG1016F/S.

Co-requisites: APG2017X.

Course outline: Course Aims: This course is designed for students of Geomatics to provide understanding of graphical and spatial concepts and skills of plane surveying measuring and calculation. To teach problem solving skills in relation to practical surveying problems. To equip the student with group work skills and technical report writing skills. Course Content: The content of the course includes the basic instrumentation, calculations used in surveying to determine co-ordinates on a mapping plane. These include, but are not limited to theodolites, levels, electronic distance measuring equipment (EDM) and GPS; joins, polars, traversing, intersection, resection, triangulation, trilateration, triangulateration, error figures, eccentric reduction and reverse polars, levelling calculations, distance measurement, and tachaeometry and topographic mapping and surface fitting. In addition, the course builds competency in the solution of integrated survey calculation problems.

Lecture times:

DP requirements: Completion of all practical assignments with a minimum average of 50%, and completion of all tutorial assignments with a minimum average of 50%, and a minimum class test average of 35%, and subminimum of 40% in the examination.

Assessment: First semester: tests count 25%, practical assignments count 12.5%, 3 hour examination in June counts 50%.

Second semester: tutorial assignments 12.5%.

APG2017X BASIC SURVEY CAMP

4 HEQF credits at level 6;1 Week practical project. Second year undergraduate.

Convener: TBA.

Prerequisites: APG1016F/S.

Co-requisites: APG2016W with a minimum of 40% in the June examination.

Course outline: Course Aims: To consolidate knowledge and skills learnt in the course APG2016W. To further teach problem solving skills in relation to practical surveying problems, and to equip the student with group work skills and engender tolerance of diversity. To equip the student with simple technical report writing skills. Course Content: This 1-week camp in the field, is intended for students studying for the Geomatics degree.. The camp is project based with the main emphasis on basic survey operations, including traverse, tacheometry and levelling, with the preparation of a site plan. Other tasks may be performed in addition to the above and will vary from year to year.

Lecture times:

DP requirements: Completion of project with a minimum mark of 50%.

Assessment: Project 100%.

APG2018X GEOGRAPHIC INFORMATION SYSTEMS CAMP

4 HEQF credits at level 6; 1 Week practical project. Second year undergraduate.

Convener: Associate Professor Julian Smit.

Prerequisites: APG1016F/S.

Co-requisites: APG2015F.

Course outline: Course Aims: To consolidate knowledge and skills learnt in the course GIS I. To further teach problem solving skills in relation to practical GIS problems, and to equip the student with group work skills and engender tolerance of diversity. Course Content: This 1-week camp is structured to teach problem solving skills in relation to practical spatial data management challenges in the GIS environment. Groups are made up of students who will work together in a simulated project environment. The camp covers the basic steps of GIS project planning with a focus in project layout, data acquisition, needs analysis, user requirements, and system implementation and maintenance. The successful team will present a GIS solution to a spatial project, showing the project layout, data acquisition, needs analysis, user requirements.

Lecture times:

DP requirements: Completion of project to the satisfaction of the course convener.

Assessment: Project 100%.

APG2019X PRACTICAL TRAINING I

0 HEQF credits at level 6. Second year undergraduate.

Convener: Associate Professor J Whittal.

Co-requisites: APG2016W.

Course outline: Course Aims/Objectives: To consolidate knowledge and skills learnt in the course APG2016W. To equip the student with skills relating to the workplace, which may include: group work, professional communication skills, office procedures, timekeeping, logistical planning, organisational skills and administrative procedures. Course Content: Practical work of not less than five weeks duration related to surveying, as well as practical tasks and computations set by the course convener, during the vacation. The work must be approved by the course convener. The student is required to submit a diary, signed by his or her employer, as well as a technical report according to the Geomatics document "Guidelines for the Preparation of Practical Reports" prior to registration as a third year student.

Lecture times:

DP requirements: Completion of course to the satisfaction of the course convener.

Assessment: Report 100%.

APG2021W TECHNOLOGY II

24 HEQF credits at level 6; 40 lectures, site visits, tutorials. Second year undergraduate.

Convener: TBA.

Prerequisites: APG1003W.

Co-requisites:APG2038W, APG2039W.

Course outline: Understanding materials, components, assembly systems, and generic details applicable to composite construction systems and small framed structures in reinforced concrete and steel. Development of an awareness of materials and construction as an informant of design at the scale of 2 - 4 storey buildings with basements, and of the link between design development and detail resolution both in precedent of architectural merit and in the students own design development work based on Studiowork projects. Understanding of 2d and 3d graphic representation of building assembly.

Lecture times: TBA.

DP requirements: 80% attendance and participation and 100% completion of all projects and assignments.

Assessment: By *en-loge* test and examination of portfolio of all tutorials, projects and assignments.

APG2025W REPRESENTATION III

Only available to repeat students.

12 HEQF credits at level 6; 20 lectures and tutorial sessions. Second year undergraduate.

Convener: TBA.

Co-requisites: APG2021W, APG2038W, APG2039W.

Course outline: The course consolidates the basic skills developed in APG1014S, and extends these to 3D CAD principles and methods in order to facilitate design, presentation and documentation requirements. A range of packages are introduced for both CAD and presentation, emphasising the appropriateness of choices and combinations of methods.

Lecture times: TBA.

DP requirements: 100% completion of projects and assignments: 80% attendance and participation.

Assessment: By CAD examination and examination of all projects and assignments.

APG2026F ELEMENTARY SURVEYING

16 HEQF credits at level 6; 48 lectures, 9 practical/tutorial assignments. Second year undergraduate.

Convener: TBA.

Prerequisites: STA1001F or MAM1017F/S and STA1000S, or MAM1004F and STA100S, or equivalents.

Course outline: Course Aims: This course is designed to provide understanding of graphical and spatial concepts and skills of plane surveying for students of the built environment who are not intending to study higher courses in surveying. To teach problem solving skills in relation to practical surveying problems. To equip the student with group work and technical report writing skills. Course Content: The content of the course includes the South African co-ordinate system; introduction to reduction of observations to a reference surface and projection to a mapping surface. Joins, polars, error, traversing, theodolite and level instruments and their calibration, height determination by levelling and trigonometric heighting, distance measurement, tachaeometry and map creation and interpretation, GIS as a tool for representation and analysis of spatial data, construction surveying: setting out of horizontal works and vertical alignment, calculation of volumes from plan, introduction to GPS as a data collection tool.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener and a test average of 35% or more.

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG2027X WORK EXPERIENCE

0 HEQF credits at level 6. Second year undergraduate. DP course.

Convener: TBA.

Co-requisites: APG2021W, APG2025W, APG2039W.

Course outline: A three week period of work experience during the second year mid-year break to consolidate learning and to gain exposure to career directions, requiring submission of a logbook. Approved work experience can be undertaken in a variety of contexts, including design offices, government departments, NGO's, community based projects, building sites, etc. Please note that it is not the responsibility of the University or the School of Architecture, Planning and Geomatics to find employment for work experience students.

Lecture times:

DP requirements: None.

Assessment: Submission of Work Experience Report.

APG2038W ENVIRONMENT & SERVICES II

18 HEQF credits at level 6; 40 lectures, 20 tutorials. Second year undergraduate.

Convener: TBA.

Co-requisites: APG2021W, APG2039W.

Course outline: The course offers a broad understanding of building design in the context of the micro- and macro-environment. Its focus is on building performance in relation to human comfort standards. The content is developed around building science approaches and different methods for servicing medium size buildings with the incorporation of sustainable design principles as needed

Lecture times: TBA.

DP requirements: 80% attendance and participation, 100% completion and submission of tutorials, projects, tests and assignments.

Assessment: By examination of all tutorials, tests, projects and assignments.

APG2039W DESIGN & THEORY STUDIO II

74 HEQF credits at level 6; 240 hours studio. Second year undergraduate.

Convener: TBA.

Prerequisites: APG1020W.

Co-requisites: APG2021W, APG2025W, APG2038W.

Course outline: The course reiterates in more sophisticated form the issues explored in first year studio in order to gain familiarity with them. They are addressed within the exploration of the architecture of place making, conceived as having four cornerstones: it is ordered by experience, has tectonic quality, is eminently habitable and contributes to its urban context. An undercurrent is the study of design method and digital design techniques are introduced. Design exercises are linked to theoretical concerns related to the contemporary South African city in global context. The format of the course consists of experimental exercises, longer projects and en loge tests.

Lecture times: TBA.

DP requirements: 80% attendance and participation; 100% submission of assignments and projects.

Assessment: By portfolio examination.

APG3000F HISTORY & THEORY OF ARCHITECTURE V

8 HEQF credits at level 7; 20 lectures, 5 tutorials. Third year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: The subject matter of the course varies. Its broad intention is to foster a knowledge and critical perspective of current practice and theory in architecture and urbanism.

Lecture times: TBA.

DP requirements: 80% attendance and participation, 100% completion of all exercises and assignments.

Assessment: By examination of essays and assignments.

APG3001S HISTORY & THEORY OF ARCHITECTURE VI

8 HEQF credits at level 7; 20 lectures, 5 tutorials. Third year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: The main educational objective is to locate aspects of architectural design in relation to major theoretical and philosophical movements. The course aims to give students the means by which to locate themselves within the contradictory conditions of contemporary cultural production and thereby to articulate their own design positions.

Lecture times: TBA.

DP requirements: 80% attendance and participation and 100% completion of all essays and assignments.

Assessment: By examination of essays and assignments.

APG3011S GEOGRAPHIC INFORMATION SYSTEMS II

24 HEQF credits at level 7; 60 lectures; 12 practicals/tutorials. Third year undergraduate.

Convener: Associate Professor Julian Smit.

Prerequisites: APG2015F, APG2018X.

Course outline: Course Aims: This course builds on the theory developed in the GIS I course. By the end of this course the student should have developed the knowledge and skills required to design and implement specialised GIS applications and an understanding of the theory, capabilities and limitations of various spatial analysis and optimisation techniques that are currently applied in the business of GIS. Furthermore the student should be aware of graphic design and presentation methods and have a grasp of some of the algorithms that are used in digital mapping. Certain legal and management issues are also addressed.

Course Content: multidimensional GIS and advanced data structures, spatial data infrastructures and metadata, distributed GIS, digital cartography, GIS application design and development using software engineering tools, GIS project management, spatial analysis, copyright and privacy issues.

Lecture times:

DP requirements: Satisfactory completion of practical assignments and a test average of 35% or more.

Assessment: Tests count 20%, practical assignments count 25%, examination 3 hours counts 55% (sub minimum 40%).

APG3012S GEOMATICS III

24 HEQF credits at level 7; 60 lectures; 12 practicals/tutorials. Third year undergraduate.

Convener: Associate Professor J Smit.

Prerequisites: APG1015F/S or CSC1015F and APG1016F/S and MAM1000W or MAM1018F/S.

Course outline: The nature and concept of satellite and airborne remote sensing: the nature of remote sensing, optical radiation models, sensor models, data models spectral transforms, spatial transforms, thematic image classifications and remote sensing for decision support. An introduction to airborne laser scanning (ALS), application and sensor systems for ALS. Introduction to photogrammetry, geometry of images, image measurement and co-ordinate refinement, stereo restitution, camera calibration and photogrammetric applications.

Lecture times:

DP requirements: Completion of practical assignments with a minimum of 50% and a test average of 35% or more.

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG3013F NUMERICAL METHODS IN GEOMATICS

16 HEQF credits at level 7; 48 lectures; 8 practicals/tutorials. Third year undergraduate.

Convener: Dr George Sithole.

Prerequisites: MAM208FF/S or equivalent, APG2014S, APG2016W.

Course outline: Course Aims: To consolidate the knowledge the student acquired in the introductory course on adjustment, and provide skills and knowledge required to solve all standard adjustment problems. Course Content: Advanced least squares modelling using the parametric adjustment case, condition equation adjustment, survey statistics, network design, elimination of nuisance parameters, combined and general case, quasi-parametric case, parametric adjustment with condition equations for the unknowns, generalised inverses, free net adjustment and S-transformation. Programming of least squares applications.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener and a minimum average of 35% for all tests.

Assessment: Tests count 15%, practical assignments count 25%, examination 3 hours counts 60% (sub minimum 40%).

APG3014X CONTROL SURVEY CAMP

4 HEQF credits at level 7; 1 Week practical project. Third year undergraduate.

Convener: Dr M Adb El-Gelil.

Prerequisites: APG2016W and APG2017X.

Co-requisites: APG3017D and APG3016C.

Course outline: Course Aims: To provide practical experience in carrying out control surveys. Course Content: GPS control survey measurements - network design, measurement, adjustment and analysis. Precise traversing. This camp will take place during a vacation, away from the UCT campus.

Lecture times:

DP requirements: Completion of project to the satisfaction of the course convener.

Assessment: Project counts 100%.

APG3015X PRACTICAL TRAINING II

0 HEQF credits at level 7. Third year undergraduate.

Convener: Associate Professor J Whittal.

Prerequisites: APG2019X, APG2016W.

Course outline: Course Aims: To further equip the student with skills relating to the workplace. To provide the student with further insight into a career in one or more specialised fields of geomatics. To consolidate knowledge and skills learnt in third year geomatics courses. Course Content: Practical work of not less than five weeks duration related to geomatics, as well as practical tasks and computations set by the course convener, during the vacation. The work must be approved by the course convener. The student is required to submit a diary, signed by his or her employer, as well as a technical report according to the Geomatics document "Guidelines for the Preparation of Practical Reports" prior to registration as a final year student.

Lecture times:

DP requirements: Completion of course to the satisfaction of the course convener.

Assessment: Report counts 100%.

APG3016C SURVEYING II

12 HEQF credits at level 7; 30 lectures; 1 essay; 1 seminar, 1 site visit. Third year undergraduate.

Convener: Associate Professor J Whittal.

Prerequisites: APG1016F/S and APG2015F; for BSc Geomatics students APG2016W is also a prerequisite.

Course outline: Course Aims: To provide insight into the origins of the surveying discipline. To introduce some specialised instruments and methods used currently. To equip the student with a theoretical and working knowledge of satellite positioning methods. To further equip the student with group work, technical report writing, research, oral presentation, and problem solving skills, and to encourage critical enquiry. Course Content: The history of surveying in southern Africa is self-taught through reading and assessed by essay. Some additional surveying instrumentation/methods not mentioned in pre-requisite courses are introduced, and students are expected to research and present a 10-minute seminar on a surveying technique, interesting surveying equipment, or a surveying project. Surveying with the global navigation satelite systems is covered in detail and consists of 80% of the course.

Lecture times:

DP requirements: Completion of all assignments with an average of 50%, and a minimum class test average of 35%.

Assessment: Tests count 20%, practical assignments/seminars count 20%, examination 1½ hours counts 60% (sub minimum 40%).

APG3017D SURVEYING III

12 HEQF credits at level 7; 30 lectures; 6 practical/tutorial assignments. Third year undergraduate.

Convener: Associate Professor J Whittal.

Prerequisites: APG2016W and MAM1018S, APG2015F and APG2019X.

Co-requisites: APG3016C.

Course outline: Course Aims: To build on the students' knowledge and skills in surveying principles, instrumentation, and calculation. To equip the student with knowledge of various sources of error and their elimination or mitigation, as well as furthering knowledge of specialised instruments and methods used. To introduce hydrographic surveying. To further equip the student with group work, technical report writing, research and oral presentation, problem solving skills and to encourage critical enquiry. Course Content: This course continues from Surveying I and II and provides more depth on surveying principles, instrumentation, and calculation. Sources of error and their elimination or mitigation are covered, as are more specialized instruments. Hydrographic surveying is introduced.

Lecture times:

DP requirements: Completion of all assignments with an average of 50%, and a minimum class test average of 35%.

Assessment: Tests count 20%, practical assignments/seminars count 20%, examination 1½ hours counts 60% (sub minimum 40%).

APG3023W TECHNOLOGY III

24 HEQF credits at level 7; 40 lectures, site visits and tutorials. Third year undergraduate.

Convener: TBA.

Prerequisites: APG2021W.

Co-requisites:APG3034W, APG3037W.

Course outline: To integrate students' understanding of materials/construction with their design process, to critically and strategically work with those who will appropriately reinforce their individual designs. To extend knowledge and understanding of more advanced construction and more specialised materials and services to encompass larger and more complex buildings. To raise awareness of the importance of specialist information, and where and when to find this. Presentation

of case studies of international buildings that are milestones in innovative construction principles/processes and/or materials, including issues of environmental sustainability. Revisiting basic materials and investigating more advanced techniques that extend their use to larger more complex structures. Introduction to more recent materials and technology, where and how they have been appropriately used. Students' own Studio designs are used as assignments to develop construction details and material decisions, to emphasise integration into the design process.

Lecture times: Tuesday 4th, 5th, 6th, 7th& 8th periods.

DP requirements: 80% attendance, participation and completion of all essays and assignments.

Assessment: By *en-loge* test and examination of portfolio of all tutorials, projects and assignments.

APG3027Z CADASTRAL SURVEY & REGISTRATION PROJECTS

24 HEQF credits at level 7; 2 projects, assignments, and 1 week camp, project. Third year undergraduate.

Convener: Associate Professor J Whittal.

Prerequisites: APG2015F, APG2016W, APG2019X.

Co-requisites: CON2027F, for students of surveying stream also APG3033W.

Course outline: Course Aims: To enhance theoretical knowledge from course work with practical skills and understanding of cadastral surveying, land registration and spatial analysis. Course Content: Urban and rural cadastral farm surveys, including design, fieldwork, calculations, analysis, and plan preparation. This course includes 2 major projects, tutorials and a one-week camp project, which takes place during a vacation, away from the UCT campus.

Lecture times:

DP requirements: Completion of all projects and assignments. Attendance at all scheduled events.

Assessment: Projects and assignments count 100%.

APG3028X INDEPENDENT RESEARCH

0 HEQF credits at level 7. Third year undergraduate.

Convener: TBA.

Co-requisites: APG3037W.

Course outline: Development of independent research initiative in the quantitative and qualitative analysis of architectural and urban programmatic requirements during a three week period in the mid-year break, resulting in the development of a brief for the major design project in studio.

Lecture times:

DP requirements: None.

Assessment: Submission of research report.

APG3033W LAND & CADASTRAL SURVEY LAW

16 HEQF credits at level 7; 23 lectures. Third year undergraduate.

Convener: Associate Professor J Whittal.

Co-requisites: CON2027F.

Course outline: Case law and practical aspects of land tenure systems, ownership, fundamentals of Roman Dutch law, acquisition and cession of rights in land, land registration, cadastral systems and cadastral survey law. Statutes and case law relating to cadastral survey, registration, planning, property ownership and land information management in South Africa. International law and law of the sea. Delimitation and delineation of offshore rights. Post-apartheid land policies and legislation. Land reform and delivery issues in the developing world.

Lecture times:

DP requirements: 50% minimum average for assignments; 40% minimum average for tests.

Assessment: Tests count 34% and assignments count 66%.

APG3034W ENVIRONMENT & SERVICES III

6 HEQF credits at level 7; 20 lectures, 10 tutorials. Third year undergraduate.

Convener: TBA.

Prerequisites:APG2038W.

Co-requisites: APG3023W, APG3037W.

Course outline: Introduction of sophisticated architectural strategies for passive and hybrid environmental control systems and services for medium-scaled buildings. Best practice case studies, and independent research in relation to students' own design work

Lecture times: Friday 4th& 5th periods.

DP requirements: 80% attendance; 100% completion and submission of all projects and assignments.

Assessment:

APG3035F THEORY OF STRUCTURES V

6 HEQF credits at level 7; 20 lectures. Third year undergraduate.

Convener: TBA.

Prerequisites: APG2009F and APG2011S.

Course outline: Understand and be able to produce various structural concepts of all vertical and horizontal spanning elements pertaining to buildings beyond the residential scale. The concepts must show how the structure carries the load (in all three directions), and the most appropriate material choice. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements include bridges, large span building structures and tall buildings, etc. planar space frames, shells, girders, etc. are explored in this section.

Lecture times: Tuesday 1st& 2nd periods.

DP requirements: 80% attendance and participation and 100% submission of all projects, assignments and tests.

Assessment: Tutorials and class tests (20%), examination (80%).

APG3036S MANAGEMENT PRACTICE LAW III

12 HEQF credits at level 7; 20 lectures, 20 tutorials. Third year undergraduate.

Convener: TBA.

Prerequisites:

Course outline: The course provides a broad understanding of social and organizational principles which influence the production of the built environment as well as business principles of practice management related to architectural design and practice. Economic and legal principles are introduced in global and national contexts, giving emphasis to the following two themes: production of the built environment (incl. financial, sectoral, professional and ethical issues) and regulation of the built environment (providing an overview of multiple legislative frameworks and responsibilities, documentation methods).

Lecture times: Wednesday1st, 2nd& 3rd periods.

DP requirements: 80% attendance, 100% submission of lectures and tutorials.

Assessment: Tutorials and reports (50%); written examination (50%).

APG3037W DESIGN & THEORY STUDIO III

80 HEQF credits at level 7; 1 theory and 1 design lecture and studio, 10 hours per week. Third year undergraduate.

Convener: TBA.

Prerequisites: APG2039W.

Co-requisites: APG3023W, APG3034W.

Course outline: The course focuses on the integration of design proposals and theoretical issues in

coherent responses which cross urban, landscape and architectural scales, and which are well developed in detail. The use of digital media is emphasised in terms of conceptualisation, design development and presentation. The format of the course consists of short experimental exercises, longer projects and *en-loge* tests. The third quarter is spent on a major project, which provides scope for individual direction within the constraints of the course objectives.

Lecture times: Monday & Thursday 1st, 2nd, 3rd, 4th & 5th periods.

DP requirements: 80% attendance and participation and 100% submission of all projects and assignments.

Assessment: By portfolio examination.

APG4001S GEODESY

24 HEQF credits at level 8; 60 lectures, 12 practicals.

Convener: Dr M Adb El-Gelil.

Prerequisites: APG3013F, APG3016C, APG3017D.

Course outline: Course Aims: This course describes the objectives, concepts and methods of modern geodesy. On completion of this course the student will have a good understanding of the use of satellite positioning techniques in geodesy and will be able to design and carry out high precision GPS surveys. The student will also be able to design, adjust and analyse modern three-dimensional networks and transform data from one datum to another. The student will have a good understanding of the influence of the Earth's gravity field on geodetic methods and will know how to compute geoid models from gravity and satellite data. Course Content: Introduction to geodesy; satellite positioning in geodesy; geodetic networks; datum transformations; Earth gravity field.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener.

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4002Z LAND USE PLANNING & TOWNSHIP DESIGN

16 HEQF credits at level 8; 48 lectures, 8 practicals.

Convener: Dr M Adb El-Gelil.

Prerequisites: APG3016C, APG3033W, CON2027F.

Course outline: Course Aims: This course provides students with both a theoretical and a practical background in land use planning and the design of townships in the Southern African context. Course Content: Historical and theoretical bases of land use planning, hierarchy of land use plans, land use control and management. Sub-division and township layouts; site analysis. Social considerations; financial and economic considerations, institutional framework. Property development; current development issues.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener.

Assessment: Tests, practical assignments, class work, examination 3 hours (sub minimum 40%).

APG4003Z RESEARCH PROJECT

40 HEQF credits at level 8; 10 - 12 contact sessions, mid-year seminar.

Convener: Associate Professor Julian Smit.

Prerequisites: The candidate must be able to graduate in the year in which the course is taken.

Course outline: Course Aims: Students will start a geomatics project at the beginning of the year, and will submit completed reports and posters at the end of the year. This project will provide them with an opportunity to demonstrate their ability to design, execute and report on a Geomatics-related problem. Students will give an oral presentation of their project mid-year, as well as for the final assessment towards the end of the year. Course Content: Presentation of the project plan, execution of the project, presentation of the result in written, poster and oral form.

Lecture times:

DP requirements: None.

Assessment: Project report counts 70%, poster presentation counts 10%; final oral presentation counts 20%.

APG4005F ENGINEERING SURVEYING & ADJUSTMENT

18 HEQF credits at level 8; 45 lectures, 6 practical assignments.

Convener: Dr George Sithole.

Prerequisites: APG3013F, APG3017D.

Course outline: Course Aims: To provide knowledge on the design and optimisation of two- and three- dimensional engineering network, precision survey techniques and deformation analysis methods. To equip the student with problem solving skills for practical applications in precise engineering surveying and general project management. Course Content: Statistical analysis, deformation and subsidence surveys. Instrumentation and methods of precise engineering surveying, Kalman filters, engineering and industrial metrology, deformation analysis methods, case studies.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener and a minimum average of 35% for all tests.

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4006S GEOMATICS PRACTICE & LAND MANAGEMENT

12 HEQF credits at level 8; 24 lectures, 6 practical assignments.

Convener: TBA.

Prerequisites: BSc Geomatics: APG3033W, CON2027F, APG3019Z.

Co-requisites: BSc Hon GIS: Elective Core courses.

Course outline: Course Aims: To prepare students for professional practice in the private and public sector and provide understanding of the interaction between business practices, land policies and the geomatics profession. Course Content: The commercial environment: building a clientele and contracting, land resource policies. The practice environment: business entities and professional practice, human resource management. The financial environment: business finance, cash flow, resource management, budgets and financial statements, management accounting, pensions and benefits. The professional environment: professionalism, ethics, codes and conduct, professional structures in South Africa.

Lecture times:

DP requirements: Completion of all assignments to the satisfaction of the course convener. 40% minimum for class test.

Assessment: Practical assignments, examination 3 hours (sub minimum 40%).

APG4007F PRINCIPLES OF GIS

24 HEQF credits at level 8; 60 lectures; 12 practical sessions, 2 Projects.

Convener: TBA.

Co-requisites: APG4003Z, APG4008F, APG4009F, APG4011F.

Course outline: Course Aims: This course aims to provide the knowledge and skills in the fundamental concepts of Geographical Information Systems for scientists, especially in the fields of natural, earth and computer sciences. Instruction will take the form of formal lectures, seminars, practicals, assignments and self-study using internet resources and GIS software. Course content: GIS concepts, spatial relationships, topology, spatial and non-spatial data structures and algorithms, vector databases, raster data structures, data capture for raster GIS, spatial analysis using the raster data model, relational database management systems, data modelling, data display and presentation, theory of map projections.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more).

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4008S ADVANCED GIS

24 HEQF credits at level 8; 60 lectures; 12 practical/tutorials.

Convener: Associate Professor J Smit.

Co-requisites: APG4007F, APG4009F, APG4003Z.

Course outline: Course Aims: This course builds on the theory and skills developed in the Introductory GIS course. The aim of this course is to provide students with advanced level GIS skills and knowledge including GIS management issues, GIS application design, Internet GIS and 3D modelling. Course Content: multidimensional GIS and advanced data structures, spatial data infrastructures and metadata, distributed GIS, digital cartography, GIS application design and development using software engineering tools, GIS project management, spatial analysis, copyright and privacy issues.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more).

Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4009F COMPUTING FOR GIS

18 HEQF credits at level 8; 12 lectures; 12 practical/tutorial assignments.

Convener: Dr George Sithole.

Co-requisites: APG4007F, APG4003Z.

Course outline: Course Aims: This course aims to provide students with the fundamental scripting and programming skills they will need to enhance GIS software and develop stand-alone GIS applications using general software environments. It also aims to provide students with the skills needed to interface between GIS applications and other software applications. Course Content: Structure and Syntax of Visual Programming Language, development of GIS functionality in general programming environments, customisation of GIS using scripting languages, extension of attribute management through external DB links and SQL.

Lecture times:

DP requirements: Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more).

Assessment: Tests, practical assignments.

APG4010X GEOINFORMATICS CAMP

4 HEQF credits at level 8.

Convener: Dr George Sithole.

Prerequisites: APG3012S.

Course outline: This camp aims to consolidate knowledge and skills learnt in the course APG3012S. To further teach practical problem solving and production tasks in photogrammetry and remote sensing. In addition to perform 3D data modelling of results achieved and present the output by means of suitable visualisation methods. The practical work will be conducted in groups and the outcomes should be reported as a critical evaluation of the processes and methods used.

Lecture times:

DP requirements: None.

Assessment: Project work results and report (100%).

APG4011F GEOMATICS IV

24 HEQF credits at level 8; 60 lectures, 12 practical assignments.

Convener: Dr George Sithole.
Prerequisites:APG3012S, MAM2084F/S.
Course outline: The nature and concept of satellite and airborne remote sensing: advanced spectral and spatial image transforms, advanced thematic image classification methods, and an introduction to data fusion and hyperspectral image analysis concepts. Processing of ALS data, including: data filtering, segmentation, object classification and 3D modelling. Photogrammetric production concepts including: aerial triangulation, DTM and ortho image production, pictometry, 3D reconstruction and visualisation.
Lecture times:
DP requirements: Completion of the practical assignments to the satisfaction of the course convener (with a minimum average mark of 50%) and a test average of 35% or more.
Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

AST1000F INTRODUCTION TO ASTRONOMY

18 HEQF credits at level 5; 5 lectures per week, 1 tutorial/practical session per week. Three sessions are held in the Planetarium of Iziko Museums of Cape Town, plus five tutorial sessions and five practical sessions.
Convener: Dr S-L Blyth.
Prerequisites:
Course outline: Our place in the Universe. Early beliefs and historical development of astronomical knowledge. Electromagnetic Radiation. Telescopes and instrumentation. The Earth-Sun-Moon system. Planets of the Solar System. Stars. Our galaxy and others. Relativity and Cosmology. Life in the Universe.
Lecture times:
DP requirements: Satisfactory attendance at lectures and tutorials; class mark of at least 35%.
Assessment: Class record: 50%, June examination 2 hours: 50%.
Sub-minimum: 40% for final examination.

AST2002S ASTROPHYSICS

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week, 1 field-trip to Sutherland.
Convener: Dr V McBride.
Prerequisites: PHY1021F and PHY1022S (PHY1004W) or PHY1031F and PHY1032S (PHY1000W); MAM1000W.
Course outline: Radiation Laws, Black Body radiation. Planck function. Wien's Law. Stefan-Boltzmann Law. Hydrogen spectroscopy, stellar spectroscopy. Relativistic Doppler effect. Stellar distances, magnitudes, radii and masses. HR diagram. Hydrostatic equilibrium, stellar and planetary structure. Nuclear energy, p-p cycle, CNO cycle, 3-Â. The sun. Stellar evolution. White dwarfs, neutron stars, black holes. Our galaxy, 21-cm radiation, radio mapping, interstellar matter. Galaxies, dark matter. Hubble Law, expansion of the Universe, primordial nucleosynthesis, 2.726 K background radiation, the Big Bang model. Radio, infra-red, ultra-violet, x-ray and gamma-ray-astronomy.
Lecture times:
DP requirements: Satisfactory attendance at lectures and tutorials; class mark of at least 35%.
Assessment: Class record: 50%, November examination 2 hours: 50%.
Sub-minimum: 40% for final examination.

BUS1036F/S EVIDENCE-BASED MANAGEMENT

18 HEQF credits at level 5; 3 lectures per week, 1 one hour tutorial per week.
Convener: Mr J Rousseau.
Prerequisites: None.
Course outline: This is a course taken by all students in the Commerce Faculty. It is intended to

furnish students with the main intellectual skills required in the study and practice of business at all levels. The focus is on the development of critical reasoning skills, including the ability to analyse and construct logical arguments, to research problems, to articulate competing viewpoints and to form independent judgments about contentious issues of policy and practice. The approach of the course is centred on case studies and controversies in areas of especial relevance to an understanding of commercial activity and the social and political environment in which it occurs.

Lecture times:

DP requirements: 40% required (on average) for all coursework; submission of all tutorials and essays; attendance at a minimum of 75% tutorials.

Assessment: Essays and tutorial assignments 50%, 2 hour June/October examination 50%. A subminimum of 40% must be achieved in the exam.

Website: http://www.commerce.uct.ac.za/managementstudies/undergrad/

BUS2010F/S MARKETING I

18 HEQF credits at level 6; 3 lectures per week, 1 one hour tutorial per week.

Convener: Professor John Simpson.

Prerequisites: ECO1010F, ECO1011S, BUS1010F/S or BUS1036F/S

Objective: To give an overview of the Marketing Process considering current trends in the South African context. The course will stress the importance of the Marketing Concept, Target Marketing and the Marketing Mix as a means of formulating a Marketing Strategy with the view to achieving the strategic objectives of an organisation.

Course outline: The marketing concept, the marketing environment, consumer markets and industrial markets, buyer behaviour, marketing research, the use and importance of differentiation, market segmentation and target marketing, the marketing mix, product policy, pricing policy, distribution policy, promotion policy, marketing strategy, marketing organisation and implementation, measurement and control of marketing effectiveness including the marketing audit.

Lecture times:

DP requirements: 40% class mark and the completion of all required assignments, attendance at 100% of tutorials.

Assessment: Essays, case studies, project and test 50%, 2 hour June examination 50%.

BUS2020F BUSINESS FINANCE

18 HEQF credits at level 6; 3 or 4 lectures and 1 two-hour tutorial per week. *NOTE: This course is NOT for students intending to major in Finance in the BBusSc degree. Any student intending to take Finance II after passing Business Finance will need to achieve a satisfactory mark in either Finance I or in the Finance II entrance examination.*

Convener: TBA.

Prerequisites: ECO1010F and ECO1011S, STA1001F/S/H or equivalent , STA1000F/S/H, and BUS1036F/S.

Co-requisites: ACC1006F.

Objective: The intent of this course is to provide students with a broad introduction to financial markets, corporate finance and financial management.

Course outline: Business Finance serves as an introduction to the concepts of corporate finance. It covers the principles of corporate finance, commencing with mastery of the tools and techniques essential for financial management and proceeding to the principles underlying investment and financing decisions made by large corporations listed on a securities exchange. The course also aims to provide an entrepreneurial focus, equipping the prospective entrepreneur with some of the quantitative decision making tools required for a successful business venture.

Lecture times:

DP requirements: 40% for classwork, completion of all required assignments and tests, attendance at 80% of the tutorials.

Assessment: Classwork 40%, final examination 60%.

CAS1001S AFRICA: CULTURE, IDENTITY & GLOBALISATION

18 HEQF credits at level 5. First-year,second-semester course, one lecture and one compulsory tutorial per week.

Convener: Associate Professor N Shepherd.

Prerequisites: This is for non-Humanities students only.

Course outline: This is a service course designed specifically for non-Humanities students preparing themselves for life of professional practice. Broad-based and introductory, it is intended to satisfy the Complimentary Studies requirements of professional institutes (like the Engineering Council of South Africa). It does this by focussing on contexts and ideas which will be of direct benefit in professional practice, as well as on more abstract ideas which are generally enriching. The course takes a case-study approach, sampling a range of materials as a way of introducing students to some of the key words and concepts in Humanities-type study. Throughout, the emphasis is in finding readily accessible points of entry into sometimes complex issues and discourses, as well as providing "tools to think with": conceptual tools and an associated critical vocabulary. It does so specifically in the context of post-Apartheid South Africa and also of the intensified effects of globalisation.

Lecture times: Friday, 5th period.

DP requirements: None.

Assessment: Two assignments counting 15% each; one group project counts 20%; and one 2-hour examination counts 50% of the final mark.

Note:

(1) Attendance at tutorials is compulsory, failing which students' papers may not be marked.

(2) This course does not count as a credit towards a Humanities degree.

CEM1000W CHEMISTRY 1000

36 HEQF credits at level 5; 4 lectures per week, 1 practical per week, 1 tutorial per week.

Conener:

Prerequisites: Physical Sciences at NSC level 5 (or senior certificate HG E/ SG C).

Course outline: Microscopic and macroscopic concepts, atomic structure, chemical bonding and molecular structure, chemistry of the elements and inorganic chemistry, chemical equilibrium, acids and bases, solubility products, chemical analysis, phases of matter, thermodynamics and thermochemistry, colligative properties, oxidation and reduction, electrochemistry, chemical kinetics and radiochemistry. Introduction to structure and reactivity in organic chemistry and the language of organic chemistry; describing and predicting organic reactivity; introduction to the structure, properties and reactivity of biologically important molecules.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: November examination 3 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM1008F CHEMISTRY FOR ENGINEERS

16 HEQF credits at level 5; 4 lectures per week, 1 practical and/or tutorial per week.

Convener:

Prerequisites:

Course outline: Basic chemical concepts, stoichiometry, some systematic inorganic chemistry, particularly metal oxides. Atomic structure and chemical bonding, with the emphasis on the structure of solids. Chemical equilibrium and aqueous solution chemistry, acids and bases. Thermochemistry. Basic electrochemistry and corrosion of metals, polymers.

Lecture times:

DP requirements: Attendance and completion practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: June examination 2 hours counts 60%, course record counts 40%.It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM1009H CHEMISTRY 109

18 HEQF credits at level 5; 3 lectures per week, 2 tutorials per week, 1 practical per week.

Note: *This course, together with CEM1010F, is equivalent to CEM1000W.*

Convener:

Prerequisites:

Course outline: Microscopic and macroscopic worlds, gases, atomic structure, chemical bonding and molecular structure, introduction to acids and bases, solutions, thermochemistry, kinetics, chemical equilibrium, acid-base equilibria, radiochemistry, introduction to the language of organic chemistry, functional groups and isomers in organic chemistry.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: November examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM1010F CHEMISTRY 110

18 HEQF credits at level 5; 5 lectures per week, 1 tutorial per week, 1 practical per week.

Note: *This course, together with CEM1009H, is equivalent to CEM1000W. Registration is normally restricted to students in the GEPS programme.*

Convener:

Prerequisites: CEM1009H.

Course outline: Volumetric analysis, chemical bonding, the solid state, liquids, colligative properties of solutions, acid-base equilibria, solubility products, chemical kinetics, oxidation and reduction, electrochemistry, introductory thermodynamics.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: June examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM2007F PHYSICAL CHEMISTRY & SPECTROSCOPY

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week (Monday 96 students) or Thursday (25 students), 6 tutorials per semester.

Convener:

Prerequisites: CEM1000W or equivalent, first-year full course in Physics, first-year full or semester course in Mathematics. Concurrent registration for STA1000F/S is strongly recommended.

Course outline: Introduction to spectroscopy, molecular spectroscopy, thermodynamics, phase equilibria, electrochemistry, kinetics, solid-state chemistry, separation science. The practical course covers the lectured material.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: June examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM2008S ORGANIC & INORGANIC CHEMISTRY

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week - Monday (96 students) or Thursday (25 students), 1 tutorial per week.

Convener:

Prerequisites: CEM1000W or equivalent, first-year full course in Physics, first-year full or semester course in Mathematics. DP certificate forCEM2007F.

Course outline: Main-group chemistry and trends in the Periodic Table, chemistry of the transition metals and co-ordination chemistry, structure elucidation of organic molecules, organic reactivity, reaction mechanisms and stereochemistry, elimination reactions and carbonyl group reactivity, substitution and addition reactions, chemical biology. The practical course covers the lectured material.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: November examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM3005W CHEMISTRY 305

72 HEQF credits at level 7; 5 lectures per week, 2 practicals per week.

Convener:

Prerequisites: CEM2007F and CEM2008S, first-year full course in Mathematics; completion of or concurrent registration for STA1000F/S is strongly recommended.

Course outline: Wave mechanics and spectroscopy, adsorption and heterogeneous catalysis, X-ray crystallography, dynamics, inorganic reaction mechanisms, organometallic chemistry, organic structure and reactivity, organic synthesis, organic dynamic stereochemistry. The practical course covers the lectured material.

Lecture times:

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: November examination two 3 hour papers counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CHE1000Z INTRODUCTION TO CHEMICAL ENGINEERING

For students transferring into Chemical Engineering.

16 HEQF credits at level 5; 48 lectures, 18 tutorials/practicals.

Convener:

Prerequisites:

Course outline: Unit conversions; introduction to processes and design; chemical engineering calculations; graphical analysis; Excel and modelling; design project.

Lecture times:

DP requirements: Satisfactory performance in tutorials.

Assessment: February examination, one 3 hour paper.

CHE1004W ENGINEERING I

32 HEQF credits at level 5; 96 lectures, 14 tutorials, 1 plant visit, 1 practical, 1 design project.

Convener:

Prerequisites:

Course outline: Studying and working in chemical engineering; unit conversions; introduction to processes and design; chemical engineering calculations; graphical analysis; modelling using spreadsheets; design project.

Lecture times:

DP requirements: Satisfactory performance in tutorials, competency tests and projects; satisfactory attendance at tutorials and outings.

Assessment: Class tests, projects; November examination 3 hours.

CHE2031F/P MATERIAL & ENERGY BALANCES

20 HEQF credits at level 6; 60 lectures, 12 tutorials.

Convener:

Prerequisites: CHE1004W or CHE1000Z; CEM1000W, MAM1017F/S.

Course outline: Material balances without reaction, including the law of conservation of mass and development of a systematic approach to problem solving. Material balances with chemical reaction including nomenclature and conventions, limiting and excess reactants, tie substances and element balances. Material balances with recycle. Material and energy balances involving chemical equilibrium. Energy balances involving heat and work, including basic thermodynamics, development of the conservation of energy equation, enthalpy, heat capacity, heats of transition and the use of steam tables. Energy balances with chemical reaction involving total enthalpy, standard heats of formation, combustion and reaction, isothermal and adiabatic reactors. Simultaneous material and energy balances.

Lecture times:

DP requirements: Satisfactory performance in tutorials and journal tasks; minimum of 40% for class mark.

Assessment: Class tests; project; June examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE2032Z DESIGN OF CHEMICAL PROCESSES

8 HEQF credits at level 6; 24 lectures, 12 tutorials, 1 week field-trip.

Convener:

Co-requisites: CHE2031F.

Course outline: Use of spreadsheets for mass and energy balances. Chemical engineering drawing. Design of chemical process flowsheets (including introduction to process economics). Introduction to Health, Safety and Environment in chemical process industry. Introduction to chemical process industry. Field-trip to South African chemical process plant. Overview of South African chemical process industries.

Lecture times:

DP requirements: Satisfactory performance in assignments; satisfactory attendance at tutorials, field trip and report back session; minimum of 40% for assignments.

Assessment: Assignments, field-trip report.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE2033W CHEMICAL ENGINEERING LABORATORY I

4 HEQF credits at level 6; 7 practicals.

Convener:

Co-requisites: CHE2031F.

Course outline: Steady state mass and energy balancing, fluid flow measurements, pump characteristics, heat exchange, transport phenomena.

Lecture times:

DP requirements: Satisfactory performance in all reports and presentations.

Assessment: Class test; reports; presentations.

CHE2035S THERMODYNAMICS I

12 HEQF credits at level 6; 36 lectures, 10 tutorials.

Convener:

Prerequisites: CHE2031F, MAM1018F/S.

Course outline: Basic concepts; extension and application of First Law of Thermodynamics and Second Law of Thermodynamics. Entropy balances, steam/refrigeration cycles, thermodynamic properties of real substances, equilibrium and stability of one-component systems, phase transitions.

Lecture times:

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests; November examination 3 hours.

Sub-minimum: 40% in the examination paper**:** satisfy the requirements of the exit level outcomes of the course

CHE2040S FLUID FLOW & HEAT TRANSFER

20 HEQF credits at level 6; 60 lectures, 24 tutorials.

Convener:

Prerequisites: DP in CHE2031F, MAM1018F/S, PHY1012F/S.

Co-requisites: MAM2083F/S.

Course outline: Fluid Flow: Fluid statics; Flow of fluids: general energy and momentum relationships; Flow of Newtonian liquids in pipes: friction factors and pressure drop, velocity distribution for laminar flow using shell balances, turbulent flow, friction losses, flow over banks of tubes; Flow and pressure measurement: Fluid pressure, measurement of fluid flow; Pumping of liquids: centrifugal pump characteristics, matching of pump and system curves, power requirements. Heat Transfer: Heat transfer by conduction: plane walls, resistances in series, thick-walled tubes, spheres, unsteady conduction; Heat transfer by convection: natural and forced, inside and outside tubes, to spheres; Heat transfer by radiation: black bodies, grey bodies, gases; Condensation and boiling heat transfer; Shell and tube heat exchanger design: temperature differences, film coefficients, overall heat transfer coefficients, pressure drops; Insulation.

Lecture times:

DP requirements: Satisfactory performance in tutorials; assignments; project; minimum of 40% average for class tests.

Assessment: Class tests; assignments, project; November examination, two 3 hour papers.

Sub-minimum: 40% in each of the two examination papers and satisfy the requirements of the exit level outcomes of the course.

CHE3000X PRACTICAL TRAINING

Course outline: Chemical Engineering students shall complete a period of six to eight weeks of practical work before registering for the 4th year of their studies if possible. The work should be project-based, and should require application of a significant body of knowledge and skills from the 2nd or 3rd year curriculum. Evidence of this work, in the form of a log book as well as a technical report to the satisfaction of the programme convener (or a letter of confirmation from a practising engineer that a satisfactory report has been written, if the the work is confidential) shall be submitted on the day of registration.

DP requirements: None.

Assessment: Final report.

CHE3035S BIOPROCESS ENGINEERING I

8 HEQF credits at level 7; 24 lectures, 2 tutorials, 2 practicals, 2 Plant visits.

Convener:

Prerequisites: All second year core courses.

Course outline: An introduction to life sciences; the requirements of microbial processes;

bioprocess design, including bioreactor design, bioprocess kinetics, sterilisation; selected case studies, visits to local bioprocess industries.

Lecture times:

DP requirements: None.

Assessment: Assignments; November examination 2 hours.

CHE3039S CATALYSIS

8 HEQF credits at level 7; 24 lectures.

Convener:

Prerequisites: All second year core courses.

Course outline: General introduction to the chemistry and kinetics of catalysis. Application of catalysts and reactor technology in processes such as petroleum refinery, methanol and Fischer-Tropsch synthesis and hydrocracking.

Lecture times:

DP requirements: None.

Assessment: November examination 2 hours.

CHE3040S SOLID-FLUID OPERATIONS

12 HEQF credits at level 7; 36 lectures, 12 tutorials.

Convener:

Prerequisites: CHE2031F, CHE2040S.

Course outline: Fluid and solid-fluid operations. Motion of a particle in a fluid and fluid through a bed of particles. Particle characterisation. Sedimentation, thickening, centrifugation, mixing and agitation, rheology, flow through packed beds, fluidisation, filtration.

Lecture times:

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests, assignment, November examination 3 hours.

CHE3044F REACTOR DESIGN I

12 HEQF credits at level 7; 36 lectures, 12 tutorials.

Convener:

Prerequisites: CHE2031F, CEM2007F, DP in CHE2035S.

Co-requisites: MAM3080F.

Course outline: Ideal reactors. Reactor staging. Chemical kinetics. Rate expressions from experimental data. Series, parallel and complex reactions. Residence time distributions. Non ideal reactor models.

Lecture times:

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests; June examination 3 hours.

Sub-minimum: 40% in the final exam and satisfy the requirements of the exit level outcomes of the course.

CHE3046F THERMODYNAMICS II

12 HEQF credits at level 7; 36 lectures, 11 tutorials.

Convener:

Prerequisites: CHE2031F, DP in CHE2035S.

Course outline: Thermodynamics of multicomponent mixtures, estimation of Gibbs Free Energy and fugacity of species in mixtures; phase equilibrium in mixtures; chemical equilibrium; combined phase and chemical equilibrium; applications of computational methods to solve thermodynamic problems.

Lecture times:
DP requirements: Satisfactory performance in tutorials and project; minimum of 40% average for class tests.
Assessment: Class tests; project; computer examination; June examination 3 hours.

CHE3049W CHEMICAL ENGINEERING LABORATORY II

16 HEQF credits at level 7; 8 lectures, 5 practicals.
Convener:
Prerequisites: CHE2033W, CHE2031F, CHE2040S.
Course outline: The course requires students to design an experimental program, to perform the experiments and to analyse the subsequent data from a range of practicals relevant to typical processes/unit operations found in the process industries. These include classification, crystallisation, distillation, filtration, fluidization, heat transfer, mass transfer, milling, process control, reaction kinetics and thermodynamics. The focus is on comparing theoretical descriptions and empirical data with experimentally observed phenomena. Students are required to present findings, as individuals and in groups, both orally and in the form of concise technical reports.
Lecture times:
DP requirements: Satisfactory performance in the class test, reports and presentations.
Assessment: Class tests, reports, presentations.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3050S CHEMICAL PROCESS UNIT DESIGN

6 HEQF credits at level 7; 24 lectures.
Convener:
Co-requisites: CHE3053S, CHE3054S.
Course outline: This course combines elements of chemical engineering process design covered in 2nd and 3rd year courses within a dedicated design project around a chemical process unit. Special focus is on the design of reactor and separation units and how they integrate within a process unit. The project entails 4 stages:
- data collection and conceptual design
- mass and energy balances
- reactor and separation unit designs
- overall process analysis

Each stage will be presented in an intermediate technical report, followed by a summary report.
Lecture times:
DP requirements:
Assessment: Project.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3053S SEPARATION PROCESSES

13 HEQF credits at level 7; 36 lectures, 10 tutorials.
Convener:
Prerequisites: CHE2031F, CHE3046F, DP in CHE3063F.
Course outline: General principles of mass transfer operations in stagewise and continuous contact equipment, gas absorption, distillation, liquid-liquid extraction, membranes, adsorption, multi-component separation.
Lecture times:
DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.
Assessment: Class tests; November examination 3 hours.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3054S REACTOR DESIGN II

13 HEQF credits at level 7; 36 lectures, 10 tutorials.

Convener:

Prerequisites: DP in CHE3044F, DP in CHE3046F, DP in CHE3063F.

Co-requisites: MAM2084F/S.

Course outline: Non-Isothermal reactor design. Multiple steady states. Heterogeneous catalysis and rate expressions. Transport resistances in heterogeneous processes. Non-catalytic solid-fluid reactions and reactor design.

Lecture times:

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests; November examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3056S APPLIED ROCKET SCIENCE

8 HEQF credits at level 7; 24 lectures, 12 tutorials.

Convener: Dr Randhir Rawatlal.

Prerequisites: DP in CHE2040S, CHE2035S.

Co-requisites:CHE3044F, MAM3080F.

Course outline: The course presents the rocket engine as a chemical process and treats its design as one would a chemical process plant. Chemical engineering fundamentals are applied to the design of liquid propellant rocket engines with emphasis on the trade-offs between performance, mass, and complexity. Important topics include supersonic fluid mechanics, basic thermochemistry within the thrust chamber and nozzle, powercycle design and operation as well as the associated tradeoffs in powercycle selection and optimisation, control system design as applied to a transient system with fast feedback. Ultimately, the student is able to understand and analyse the heat transfer challenge in rocket engines and the trade-offs associated with different cooling approaches.

Lecture times:

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Course work 40%; November examination 60%.

CHE3062S PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering and Geomatics students. ***(NOTE:*** **Second-year students may not register for CHE3062S**.)

12 HEQF credits at level 7; 24 lectures.

Convener: Associate Professor J English.

Co-requisites: CHE3049W.

Course outline: This course covers effective reporting. Students learn the requirements for written and oral reports in terms of planning, organisation and selection of information, as well as in terms of linguistic style and final presentation. Students will have to demonstrate proficiency in both formats.

Lecture times:

DP requirements: Satisfactory attendance at all sessions; minimum of 50% for class mark.

Assessment: Class test, 2 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

CHE3063F MASS TRANSFER

16 HEQF credits at level 7; 48 lectures, 10 tutorials.

Convener:

Prerequisites: CHE2031F, CHE2040S, MAM2083F/S.

Course outline: Types of diffusion, Fick's law, Maxwell-Stefan theory, molecular diffusion, single and multicomponent mass transfer analysis. Film coefficients, boundary conditions, macro-scopic balances using film coefficients. Boundary layer theory, turbulent flow. Overall coefficients, use of overall coefficients, interfacial mass transfer, analogies, practical analysis of mass transfer with simultaneous heat and momentum transfer.

Lecture times:

DP requirements: Satisfactory performance and attendance in tutorial and project, class mark of 40%.

Assessment: Class test; project; June examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3064S MINERAL & METALLURGICAL PROCESSING I

8 HEQF credits at level 7; 4 lectures, 5 practicals.

Convener:

Prerequisites: All second year core courses.

Course outline: The course begins with a multimedia-based introduction to the field of mineral and metallurgical processing, from the mining operation to environmental rehabilitation. The course then requires students to perform experiments and to analyse the subsequent data from a cone crusher, ball mill or HPGR, in-line pressure jig, hydrocyclones, flotation cell, leach cell, DC plasma-arc furnace and electrowinning cell. Here, the HPGR, ball mill, in-line pressure jig, flotation cell and DC plasma-arc furnace are pilot-scale units. Finally, students are required to develop a simplified process simulation of one of the above unit operations using a spreadsheet-based simulator (LIMN).

Lecture times:

DP requirements: None.

Assessment: Projects; reports.

CHE3065S NUMERICAL SIMULATION FOR CHEMICAL ENGINEERS

8 HEQF credits at level 7; 24 lectures.

Convener:

Prerequisites: MAM3080F, MAM2084F/S, CHE3063F.

Course outline: Computer arithmetic, application of similarity transforms to reaction-diffusion and rate based mass transfer; data fitting by linear leasts squares regression; application of non-linear equations techniques in mass and energy balances (VLE); application of ODE solvers, BVP solvers and the method of lines in reaction and mass transfer systems described by ODEs and PDEs; stiffness ratio; non-linear leasts squares estimation of model parameters with variance; formulate objective functions and minimisation/maximisation of process operating models; embedded systems.

Lecture times:

DP requirements: None.

Assessment: Projects; assignments.

CHE3066S CRYSTALLISATION & PRECIPITATION

8 HEQF credits at level 7; 24 lectures.

Convener:

Prerequisites: All second year core courses.

Course outline: Overview, Crystallisation methods, Product characterisation, Fundamental mechanisms, Crystallisation and precipitation equipment, Applications of industrial crystallisation, Measurement techniques, Precipitation: Basic Principles, Chemistry Particle processes in precipitation, Mixing and Hydrodynamics, Scale up.

Lecture times:

DP requirements: Satisfactory performance in all assignments.

Assessment: Assignments.

CHE4024F PRINCIPLES OF ENVIRONMENTAL PROCESS ENGINEERING

8 HEQF credits at level 8; 24 lectures, 5 tutorials. 1 afternoon field-trip.

Convener:

Prerequisites: All second year core courses.

Course outline: Interaction of industrial processes with the natural environment; mechanisms of pollution; air pollution theory and examples (Cape Town, the Highveld, global issues); energy-related environmental issues; industrial water use and effluent treatment; acid mine drainage; municipal and industrial solid waste management; life cycle assessment; sustainability and sustainable development.

Lecture times:

DP requirements: Satisfactory performance in project.

Assessment: Project; June examination 2 hours.

CHE4029Z PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering students.

8 HEQF credits at level 8; 24 lectures.

Convener: Associate Professor J English.

Prerequisites: CHE3062S or EEE3073S or MEC3037S.

Note: *Any student who has failed or not taken CHE3062S and who wishes to register for CHE4029Z may apply through his/her Department for a special concession.*

Co-requisites: CHE4048F

Course outline: The syllabus includes the following aspects of communication: theory; professional writing including: business proposals; graphic communication; posters; readability; and group presentations using PowerPoint to an audience drawn from industry.

Lecture times:

DP requirements: Sastifactory attendance at all sessions.

Assessment: Oral examination 50%, projects 50%.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4036Z CHEMICAL ENGINEERING DESIGN

28 HEQF credits at level 8.

Convener:

Prerequisites: All core third year courses, CHE4048F, CHE4049F, DP in CHE4042F.

Co-requisites: Maximum number of credits taken concurrently is 16.

Students will not be given a concession to do CHE3054S or CHE3053S for the first time alongside CHE4036Z.

Course outline: This course brings together many of the elements previously covered in the chemical engineering degree and is intended to be the culmination of the previous years' study. The course is structured around an open ended design problem and includes:

- process evaluation, comparison and selection
- material and energy balancing;
- hazard analysis and operability;
- economic evaluation;
- unit operation design;
- plant equipment selection and specification, materials selection and plant layout;
- project evaluation.

The work will be presented in the form of intermediate technical reports, a concise executive summary and various oral presentations.

Lecture times:

DP requirements: None.
Assessment: Individual and group submissions.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4042F PROCESS DYNAMICS & CONTROL

16 HEQF credits at level 8; 24 lectures, 9 tutorials.
Convener:
Prerequisites: All core third year courses.
Course outline: Process dynamics: mathematical models, transfer functions, open-loop response of first, second and higher order systems. Feedback control systems; block diagrams, types of feedback controller. Stability Analysis: Bode diagrams and stability, gain and phase margins, Controller tuning. Feedforward and cascade control. Multi-input-multi-output systems: stability, interaction, relative gain array, decoupling.
Lecture times:
DP requirements: Satisfactory performance in tutorials, projects, laboratory and individual learning reflections.
Assessment: Projects; June examination, one 3 hour and one 2 hour paper.
Sub-minimum: 40% in each of the two examination papers and satisfy the requirements of the exit level outcomes of the course.

CHE4045Z CHEMICAL ENGINEERING PROJECT

32 HEQF credits at level 8.
Convener:
Prerequisites: All core third year courses.
Co-requisites: Maximum number of credits taken concurrently is 16.
Course outline: An assigned experimental or theoretical investigation involving limited staff supervision. Assessment of performance based on engineering ability and initiative displayed in formulation of objectives, execution of the project and presentation of the results. Limited lectures in the scientific method, survey of the literature, design of experiments, relevant analytical equipment and techniques, safety in the laboratory, the handling of wastes, introduction to statistics, analysis and interpretation of data, report writing, presentation of research findings.
Lecture times:
DP requirements: Satisfactory attendance at all sessions. Satisfactory performance in written proposal and specialist oral presentation.
Assessment: Oral presentations; project proposal; final written report; poster.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4048F BUSINESS, SOCIETY & ENVIRONMENT

20 HEQF credits at level 8; 48 lectures, 8 tutorial sessions.
Convener:
Prerequisites: All core third year courses.
Co-requisites: CHE4049F, CHE4029Z.
Course outline: The course aims to provide a foundation for students to engage with their future roles as practising professionals or entrepreneurs relative to expectations of society, and of employers. The course also introduces contextual and conceptual aspects relating to the final year design project (CHE4036Z). The course covers: Benefit Indicators, Physical Risk in the Process Industries, Stakeholder Participation, Innovation and Entrepreneurship, Business Planning, Capital and Operating Cost Estimation, Profitability Assessment, Introduction to Optimisation, Engineering Ethics.
Lecture times:
DP requirements: Satisfactory performance in tutorials, project, class mark of 40%.

Assessment: Class test; projects; June examination 3 hours.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4049F PROCESS SYNTHESIS & EQUIPMENT DESIGN

20 HEQF credits at level 8; 48 lectures, studio sessions, tutorials.

Convener:

Prerequisites: All core third year courses.

Co-requisites: CHE4048F.

Course outline: The course aims to familiarise students with the design of entire chemical processes, building on but going beyond the detailed sizing of major equipment as learned in third year and minor equipment, pipe work and heat exchangers as learned in second year. It covers: Process Flowsheeting Conventions; Process Flowsheet Development using Process Synthesis Theory and Heuristics; Chemical Engineering Process simulation using Aspen Plus; Equipment Design Heuristics; Process Control Philosophy; Health, Safety and Environmental (HSE) Reviews; Plant Layout.

Lecture times:

DP requirements: Average of 50% for projects. Maximum one project less than 50%. 100% for Aspen competency test. Satisfactory completion of all tutorials.

Assessment: Pprojects; tutorials; Aspen competency test; June examination 3 hours (subminimum: 50%).

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4050F MINERAL & METALLURGICAL PROCESSING II

8 HEQF credits at level 8; 16 lectures, 4 projects, 2 tutorial sessions.

Convener:

Prerequisites: All third year core courses.

Course outline: The course begins with a multimedia-based overview of the theory and practice of milling and flotation process items and circuits (Metso CBT). The course then discusses laboratory techniques, sampling procedures and data reconciliation procedures applicable to the analysis of milling and flotation process devices and circuits. Introduction to mineralogy and liberation analysis methods are discussed. An introduction to hydrometallurgy containing the basic concepts and calculations encountered in this field is given. Students are required to demonstrate their understanding of the course material through four projects. The course then presents selected theories/models used for the design, modelling and simulation of industrial milling and flotation process devices and circuits. The course concludes with an overview of the use of two milling and flotation simulators (JKSimMet and JKSimFlot).

Lecture times:

DP requirements: None.

Assessment: Projects.

CIV1004W ENGINEERING I

32 HEQF credits at level 5.

Convener: Ms N Wolmarans.

Prerequisites:

Course outline: The course provides opportunities for the development of the essential skills required in engineering within a civil engineering context. Aspects of civil engineering are introduced by means of practical sessions involving problem solving, personal, academic and professional skills, numerical and computational methods, laboratory experiments and project work, group work, fieldwork, the use of measurement techniques, and elementary aspects of planning. The course includes a module which will address the development of academic skills needed for studying in a university environment, and a module to ensure productive use of IT. Professional

Communication Studies gives input on this course for a percentage of the final mark.
Lecture times:
DP requirements:
Assessment: Continuous assessment by projects, assignments and tests.

CIV1006S BUILDING SCIENCE I

16 HEQF credits at level 5; 4 lectures per week.
Convener: Dr H Beushausen.
Prerequisites:
Course outline: The course introduces students to the nature and properties of construction materials and how these affect their uses. It illustrates problems that might arise through injudicious choice of materials and the reasons behind the selection of materials for particular applications. It deals with soils, cement and concrete, stone, timber, metals (iron and steel, aluminium, copper, brass, bronze, zinc), corrosion, ceramics, glass, polymers, paints and bitumen, composites, thermal, acoustic and fire properties of building components.
Lecture times:
DP requirements:
Assessment: November examination 2 hours.

CIV2011F/P MECHANICS OF MATERIALS

16 HEQF credits at level 6; 48 lectures, 12 tutorials/practicals.
Convener: Associate Professor P Moyo.
Prerequisites: MAM1042S.
Course outline: Concepts of stress and strain; elasticity versus plasticity; effects of known actions on various cross-sections; determination of the magnitude of stresses and strains caused by prescribed actions (axial forces, bending moments, shear forces, twisting moments); fundamentals of the 2-dimensional theory of elasticity; simplifications for bars, beams and shafts.
Lecture times:
DP requirements:
Assessment: June examination 3 hours.

CIV2020X PRACTICAL EXPERIENCE

Course outline: Civil Engineering students are required to gain at least 10 weeks of practical experience and insight into the practice of civil engineering by working during vacations. Students are encouraged to engage in a wide variety of civil engineering work, but must ensure that adequate experience in both site work and design office practice (a minimum of four weeks in each) is achieved. This course provides the framework for gaining practical experience to supplement the academic studies.

CIV2031S STRUCTURAL ENGINEERING I

16 HEQF credits at level 6; 48 lectures, 12 tutorials/practicals.
Convener: Professor MG Alexander.
Prerequisites: CIV2011F (DP).
Course outline: Introduction to various structural systems; conditions of equilibrium; external and internal structural indeterminacies. Analysis of statically determinate structures: determination of actions in trusses, beams and frames; axial force, shearing force and bending moment diagrams; calculation of displacements by the method of successive integration; virtual work method. Buckling of struts: geometric instability. Properties of structural timber; permissible-stress approach to design; design of timber structures.
Lecture times:
DP requirements:

Assessment: November examination 3 hours.

CIV2034S SPATIAL DATA ACQUISITION & MANAGEMENT

16 HEQF credits at level 6; 48 lectures, 12 practicals.

Convener: Associate Professor U Rivett.

Prerequisites: CIV1004W, MAM1003W (DP).

Course outline: Spatial data acquisition: Spatial data for Civil Engineering Applications, Distance Measurement, Co-ordinate systems, Introduction to Land Surveying, Determination of Heights, Levelling, Theodolite Measurement and Calculations, Traverse, Tacheometry. Fundamentals of GPS, Photogrammetry and Remote Sensing and their application in Civil Engineering.

Spatial data management: Introduction to GIS; Georeferencing, Projections & Scale, Uncertainty, Error and Sensitivity in GIS, Spatial Query and Analysis; Data Models in GIS, GIS Applications in Civil Engineering.

Infrastructure planning and design project.

Lecture times:

DP requirements:

Assessment: Group projects, class tests and practical work.

CIV2035X CIVIL ENGINEERING CAMP

4 HEQF credits at level 6; 2 weeks.

Convener: Associate Professor U Rivett.

Prerequisites: CIV2034S (DP).

Course outline: Infrastructure planning and design project. Spatial Data Acquisition. Setting Out, Distance Measurement, Levelling Traverse, Tacheometry, GPS, Error and Accuracy. Use of GIS for data integration of various spatial and non-spatial data, metadatabase design. Spatial Query and Analysis.

Lecture times:

DP requirements:

Assessment: Group project and practical work.

CIV2037F EXPERIMENTAL METHODS & STATISTICS

16 HEQF credits at level 6; 48 lectures, 8 practicals.

Convener: Associate Professor P Moyo.

Prerequisites: CIV1004W.

Course outline: Concepts of statistics, measures of central tendency, measures of dispersion, frequency distributions, introduction to probability, regression analysis and correlation, hypothesis testing and goodness of fit tests, analysis of variance, introduction to experimentation, instrumentation & data acquisition, measurement of strain, measurement of force, torque & pressure, measurement of vibration. Professional Communication Studies gives a module in this course for a percentage of the final mark.

Lecture times:

DP requirements:

Assessment: Continuous assessment by projects, assignments and tests.

CIV2039S GEOTECHNICAL ENGINEERING I

16 HEQF credits at level 6; 48 lectures, 6 practicals, 9 tutorials.

Convener: Dr D Kalumba.

Prerequisites: CIV2011F (DP), GEO1008F (DP).

Course outline: Introduction to soil mechanics. Physical characteristics of soils: particles, texture, phases, soil structure, grain size, distribution, classification. Water in soil: capillarity, shrinkage,

heave, permeability, seepage, flow nets. Compressibility and consolidation: effective stress, rate of consolidation, vertical stress and settlement. Shear strength of soils.
Lecture times:
DP requirements:
Assessment: November examination 3 hours.

CIV2040S FLUID MECHANICS

8 HEQF credits at level 6; 25 lectures, 4 tutorials, 1 practical.
Convener: Associate Professor JE van Zyl.
Prerequisites: MAM1003W (DP), PHY1010W (DP)
Course outline: Hydrostatics: pressure / pressure force. Principles of fluid flow; classification, the continuity, energy & momentum equations and their applications. Real & ideal fluids; behaviour, viscous flow, boundary layer, separation & cavitation.
Lecture times:
DP requirements:
Assessment: November examination 2 hours.

CIV3031F STRUCTURAL ENGINEERING II

16 HEQF credits at level 7; 48 lectures, 12 tutorials/practicals.
Convener: Dr S Skatulla.
Prerequisites: CIV2031S.
Course outline: Flexibility versus stiffness methods in structural analysis. Analysis of statically indeterminate structures by the force method: trusses, beams and frames. Design loads for steel structures; ultimate limit-state design philosophy; design of structural steelwork: ties, struts, purlins, girts, columns, beams, trusses, frames, connections. Individual design project.
Lecture times:
DP requirements:
Assessment: June examination 3 hours.

CIV3035S STRUCTURAL ENGINEERING III

16 HEQF credits at level 7; 48 lectures, 12 tutorials/practicals.
Convener: Dr H Beushausen.
Prerequisites: CIV3031F (DP).
Course outline: Analysis of statically indeterminate structures by the displacement method; direct-stiffness method; computer-oriented matrix formulation. Properties of structural concrete, reinforcing and prestressing steel; elastic design of concrete structures; Serviceability limit-state design of reinforced and prestressed concrete elements (beams and slabs). Laboratory and analysis projects.
Lecture times:
DP requirements:
Assessment: Project, class test, November examination 3 hours.

CIV3042F GEOTECHNICAL ENGINEERING II

16 HEQF credits at level 7; 48 lectures, 12 tutorials.
Convener: Dr D Kalumba.
Prerequisites: CIV2039S (DP).
Course outline: Limit considerations, active and passive earth pressure, slope stability and bearing capacity failure. Ground investigation. Foundations of shallow and piled structures. Gravity wall criteria, theory of wells.
Lecture times:

DP requirements:
Assessment: June examination 3 hours.

CIV3043F HYDRAULIC ENGINEERING

16 HEQF credits at level 7; 48 lectures, 7 tutorials.
Convener: Associate Professor JE van Zyl.
Prerequisites: CIV2040S (DP).
Course outline: Flow in pipelines: laminar & turbulent flow - Reynolds Number; head losses in pipelines & fittings; the design of pipe systems. Pump selection. Open channel flow: the steady flow equations; Froude Number; uniform, gradually & rapidly varied flow; hydraulic structures, e.g. flumes, weirs, spillways, control gates.
Lecture times:
DP requirements:
Assessment: June examination 3 hours.

CIV3044F ENGINEERING HYDROLOGY

8 HEQF credits at level 7; 22 lectures, 5 tutorials.
Convener: Associate Professor JE van Zyl.
Prerequisites: CIV2037F (DP).
Course outline: Flood hydrology: factors affecting runoff; selected prediction methods; flood routing. Drought hydrology: flow measurements, mass balances, storage-yield relationships for reservoirs.
Lecture times:
DP requirements:
Assessment: June examination 2 hours.

CIV3045F TRANSPORTATION PLANNING

16 HEQF credits at level 7; 52 lectures, 13 tutorials.
Convener: Associate Professor M Vanderschuuren.
Prerequisites: CIV2037F (DP) and CIV2034S (DP).
Course outline: Introduction on the functioning of the city, transport in context, transport and land-use; transport and the economy; transport and the society; transport and sustainability. Modes of transport. Traffic engineering: traffic flow theory and traffic data collection. Transport policy and the decision maker. The transport planning process and transport modelling. The use of GIS in the transportation context. Professional communication (presentation skills).
Lecture times:
DP requirements:
Assessment: June examination 3 hours 50%, class mark 50%.

CIV3046F WATER TREATMENT

12 HEQF credits at level 7; 36 lectures, 12 tutorials.
Convener: Professor G Ekama.
Prerequisites: CEM1008F.
Course outline: Potable water quality criteria. Water treatment: Objectives, processes and systems. Surface water characterization: Aqueous equilibria, Alkalinity, acidity, pH, buffer capacity and titration curves, log-species pH diagrams of the inorganic carbon system; pH control. Aqueous-gas phase equilibrium, conversion between concentration units, aqueous-solid phase interactions, calcium carbonate saturation, using the Modified Caldwell Lawrence Diagram for 2 and 3 phase equilibrium, changes of state with dosing, water stabilization.
Lecture times:

DP requirements:

Assessment: Two tests of 2 hours each. DP >2/3^{rds} class average for tests. Tests count 1/3rd and exam counts 2/3rds of final mark. A minimum exam mark of 50% and a final mark =>50% is required to pass the course. June examination 3 hours.

CIV3047S URBAN WATER SERVICES

12 HEQF credits at leverl 7; 36 lectures.

Convener: Associate Professor N Armitage.

Prerequisites: CIV3043F (DP) and CIV3044F (DP).

Course outline: An introduction to the design and operation of water services in urban areas, including: water supply and distribution; sanitation and urban drainage. Introduction to community participation.

Lecture times:

DP requirements:

Assessment: Three design projects (60%). November examination 2 hours (40%).

CIV4031F STRUCTURAL ENGINEERING IV

16 HEQF credits at level 8; 48 lectures, 12 tutorials/practicals.

Convener: Professor A Zingoni.

Prerequisites: CIV3031F, CIV3035S, MAM2080W.

Course outline: : Ultimate limit-state design of structural steelwork; plastic analysis of steel beams and frames; ultimate limit-state design of reinforced concrete beams and columns; yield-line analysis of concrete slabs; ultimate limit-state design of prestressed concrete beams. Introduction to the design of structures as integrated systems: the full design process; conceptualisation; alternative schemes. Design project. Laboratory project.

Lecture times:

DP requirements:

Assessment: June examination 4 hours.

CIV4035C DESIGN PROJECT

24 HEQF credits at level 8; 5 weeks full time duration.

Convener: Associate Professor R Del Mistro.

Prerequisites: CIV4033Z (DP). No simultaneous registration of more than 1 other course.

Course outline: Planning and design of a major civil engineering project involving a number of civil engineering and other closely related disciplines, and applying professional communications.

Lecture times:

DP requirements:

Assessment: Assessment by prescribed submissions and contributions.

CIV4041F PROFESSIONAL PRACTICE

16 HEQF credits at level 8; 50 lectures; 1 tutorial.

Convener: Associate Professor N Armitage.

Co-requisites: CIV4035C and CIV4044F/S.

Course outline: Time-value of money, Utility Cost analysis, the project life cycle, contracts site law, project management, Health & Safety, Ethics and Codes of Conduct, Sustainability in Civil Engineering, the structure of the profession, professional communication.

Lecture times:

DP requirements:

Assessment: Continuous assessment by class tests, essays, project and presentation.

CIV4042F WASTEWATER TREATMENT

12 HEQF credits at level 8; 36 lectures; 10 tutorials.

Convener: Professor G Ekama.

Prerequisites: CEM1008F.

Course outline: Objectives of wastewater treatment; wastewater test methods for organic, nitrogen and phosphorus content; physical characterization of wastewater, settleable, non-settleable and dissolved constituents; unit operations in wastewater treatment, primary sedimentation; biodegradable and unbiodegradable organics, biological growth and death behaviour; reactor kinetics; biological process kinetic equations; the steady state activated sludge model; oxygen demand, sludge production, nutrient requirements; sewage sludge stability and disposal, selection of sludge age.

Lecture times:

DP requirements:

Assessment: Two tests of 2 hours each. DP >2/3^{rds} class average for tests. Tests count 1/3rd and exam counts 2/3rds of final mark. A minimum exam mark of 50% and a final mark =>50% is required to pass the course. June examination 3 hours.

CIV4043F URBAN DESIGN & MANAGEMENT

16 HEQF credits at level 8; 48 lectures; 12 tutorials.

Convener: Associate Professor R Del Mistro.

Prerequisites: CIV3045F (DP) and CIV3047S (DP).

Course outline: The South African city. Evolution and upgrading of informal settlements (physical, social and economic infrastructure). Municipal infrastructure asset management. Geometric and pavement design of roads.

Lecture times:

DP requirements:

Assessment: Class mark 50%; June examination 50%.

CIV4044S/F RESEARCH PROJECT

48 HEQF credits at level 8.

Convener: Associate Professor JE van Zyl.

Prerequisites: CIV4041F (DP). No simultaneous registration with more than one other course.

Course outline: An individual investigation into an assigned problem in civil engineering resulting in a formal written thesis and a poster presentation.

Lecture times:

DP requirements: Completion of thesis and poster.

Assessment:

CML1001F/CML1004S BUSINESS LAW I

CML1001L BUSINESS LAW 1 - THIRD TERM (WINTER ONLY - SEE ADMISSION CRITERIA BELOW)

Business Law I has one general course code (CML1001F) for the first semester course and one general course code (CML1004S for the second semester. However, the students are allocated to different groups on registration and to distinguish each group a number is added to the general course code eg LG02 - 62775. Although the syllabus is the same for all groups different tests and examinations are set for each group. Students in one group are not permitted to attend another group's lectures.

18 HEQF credits at level 5; 5 lectures per week.

Convener: TBA.

Prerequisites: None.

Course outline: Introduction to law, general principles of contract; sale; lease; credit agreements, agency.

Lecture times:

DP requirements: A student must write the test. No subminimum is required. No make-up test. Where a student has missed the test for a valid reason, the student will be permitted to write the examination, which will count for 100%. Professor Jooste will decide if the reason is valid. All correspondence must be addressed to him in advance of the test date. (For Winter School contact your lecturer and not Professor Jooste.)

Assessment: The test counts 40% and the examination counts 60%.

CML2001F COMPANY LAW

CML1001L COMPANY LAW - THIRD TERM (WINTER ONLY - SEE ADMISSION CRITERIA BELOW)

Company Law has one general course code (CML2001F) for the first semester. However, the students are allocated to different groups on registration and to distinguish each group a number is added to the general course code eg LG04 - 64964. Although the syllabus is the same for all groups different tests and examinations are set for each group. Students in one group are not permitted to attend another group's lectures.

18 HEQF credits at level 6; 5 lectures per week.

Convener: TBA.

Prerequisites: CML1001F. No undergraduate student in the first year of study may register for Company Law.

Course outline: The common law and statutory provisions relating to the nature, formation and management of partnerships, trusts, companies and close corporations.

Lecture times:

DP requirements: A student must write the test. No subminimum is required. No make-up test. Where a student has missed the test for a valid reason, the student will be permitted to write the examination, which will count for 100%. Professor Jooste will decide if the reason is valid. All correspondence must be addressed to him in advance of the test date. (For Winter School contact your lecturer and not Professor Jooste.)

Assessment: The test counts 40% and the examination counts 60%.

CML2005F LABOUR LAW I

CML2005L LABOUR LAW - THIRD TERM (WINTER ONLY - SEE ADMISSION CRITERIA BELOW)

18 HEQF credits at level 6; 5 lectures per week.

Convener: TBA.

Prerequisites: No undergraduate student in his/her first year of study may take Labour Law. It is recommended that students have passed a foundation course in law eg Business Law I.

Course outline: The common law contract of employment. Legislative interventions and protections including the Basic conditions of the Employment Act; the Skill Development Act, and the Unemployment Insurance Act. Discipline and dismissals under the Labour Relations Act of 1995. Unfair discrimination in employment and recruitment and selection. Employment equity legislation. Collective labour law as provided for under the Labour Relations Act and the Constitution. Freedom of association and organisational rights. Collective bargaining and dispute resolution. Strikes and lockouts. Industrial democracy and worker participation.

Lecture times:

DP requirements: A student must write the test. No subminimum is required. No make-up test. Where a student has missed the test for a valid reason, the student will be permitted to write the examination, which will count for 100%. Professor Jooste will decide if the reason is valid. All correspondence must be addressed to him in advance of the test date. (For Winter School contact

your lecturer and not Professor Jooste.)

Assessment: The test counts 40% and the examination counts 60%.

CML2010S BUSINESS LAW II

CML2010L BUSINESS LAW II THIRD TERM (WINTER ONLY - SEE ADMISSION CRITERIA BELOW)

Business Law II has one general course code (CML2010S) for the second semester. However, the students are allocated to different groups on registration and to distinguish each group a number is added to the general course code eg LG02 - 65100. Although the syllabus is the same for all groups different tests and examinations are set for each group. Students in one group are not permitted to attend another group's lectures.

18 HEQF credits at level 6; 5 lectures per week.

Convener: TBA.

Prerequisites: CML1001F or equivalent. No undergraduate student in the first year of study may register for Business Law II.

Course outline: Negotiable Instruments; insurance, insolvency and secured transactions, intellectual property.

Lecture times:

DP requirements:A student must write the test. No subminimum is required. No make-up test. Where a student has missed the test for a valid reason, the student will be permitted to write the examination, which will count for 100%. Professor Jooste will decide if the reason is valid. All correspondence must be addressed to him in advance of the test date. (For Winter School contact your lecturer and not Professor Jooste.)

Assessment: The test counts 40% and the examination counts 60%.

Admission Criteria for Law Courses on Offer During the Third Term (Winter Only):

CML1001L - BUSINESS LAW I
CML2001L - COMPANY LAW
CML 2005L - LABOUR LAW
CML2010L - BUSINESS LAW II

The above courses are on offer during the THIRD TERM, but only during the WINTER. Lectures are offered on a daily basis for three hours over a four week period. Course outlines, DP requirements and assessment are as above. The following admission criteria will apply: Groups will be limited to 60 students and the following submission criteria will apply:

1. Only students who are explicitly required by their programme to do the law course(s) in question are eligible. (In other words, students doing the course as an optional course will not be eligible.)
2. A first year student may not do a law course during the third term.
3. In addition to 1 and 2, only the following students are eligible to do the law courses and in the following order of preference:

(a) accounting conversion students.

(b) students who have failed the particular law course in a previous year (not including students who have failed to obtain a DP).

(c) students who, due to curriculum problems, cannot do the course in question in the normal way. (This is subject to written verification by their Faculty.)

(d) students who need the course to graduate. (In other words, if the student cannot do the course, he/she will be held back for another year. (This is subject to written verification by their Faculty.) This only applies to a student who has completed and passed all other courses for the degree before Winter School begins (in other words, students who have no further courses to complete in the second semester). NB: Any advice given by student advisors or any others which is contrary to the above must be ignored.

Information on closing date for application for admission to courses on offer during the THIRD TERM can be obtained from the Centre for Open Learning.

CON1004W CONSTRUCTION TECHNOLOGY I

32 HEQF credits at level 5; 4 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: Dr A Windapo.

Prerequisites:

Course outline: The building as a System; the site including site/soil investigation, setting-out of a building etc; Construction Technology appropriate for assembly of a double-storey house, including: manufacture and performance of materials and components used; construction of such dwelling; and preparation of a report concerning the temporary facilities, plant and equipment used, specialists used, sequence of building and comparison of the requirements of good practice;and the National Building Regulations and the Occupational Health and Safety Act.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (2 tests 5% each; group project 20%; 2 individual projects 10% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON1007X PRACTICAL TRAINING

Convener: K Le Jeune.

Course outline: 120 hours (3 weeks) of approved employment experience. Approved experience employed in any of the built environment disciplines (construction; engineering; housing; property development and management; quantity surveying; relevant local authority, provincial and national government departments). 40 hours (1 week) Department organised community build.

DP requirements: Complete practical training and complete report.

CON1010S CONSTRUCTION INFORMATION SYSTEMS

8 HEQF credits at level 5; 2 lectures per week, tutorials, practicals.

Convener: K Le Jeune.

Prerequisites:

Course outline: Introduction to computers; introduction to networks; data storage, manipulation/analysis and reporting using spreadsheets (MS Excel) and relational databases (MS Access); problem-solving with spreadsheets and databases.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (1 test 10%; 2 assignments 10% each; 8 tutorials 20%); November examination 2 hours 50%.

CON1011F PROPERTY STUDIES I A

16 HEQF credits at level 5; 4 lectures per week, tutorials, practicals.

Convener: Mr S Durr.

Prerequisites:

Course outline: Property Development: A study of the principles of property development including the relevant statutes and ordinances: Urban development; Control of land in South Africa; Town planning; Overview of property development; The establishment of townships; Types of dwelling units and housing types; Principles of medium and high density residential developments; Sectional title and group housing; Development of retirement centres; Introduction to commercial property development; Development of: Office buildings, parking garages, shopping centres, industrial parks; Rehabilitation and conversion of buildings.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50%; June examination 2 hours 50%.

CON1012S PROPERTY STUDIES I B

16 HEQF credits at level 5; 4 lectures per week, tutorials.

Convener: Associate Professor F Viruly.

Prerequisites:

Course outline: Welfare and economic efficiency: economic efficiency through the price system. Real property: characteristics and functions of the real property market; pricing of land and resources. Development: the development process; timing and rate of development; finance for development; redevelopment; public sector development; economics of planning controls; the construction industry. Urban land use: land use and land values; pattern of urban land use; growth of urban areas; quality of urban environment; housing; regional policy. The government and land resources: impact of government economic policy on land resources; theory of urban public finance; taxation and land resources; recent developments.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50%; November examination 2 hours 50%.

CON1015S PROPERTY INFORMATION SYSTEMS

8 HEQF credits at level 5; 2 lectures per week, tutorials, practicals.

Convener: K Le Jeune.

Prerequisites:

Course outline: Introduction to computers; introduction to networks; data storage, manipulation/analysis and reporting using spreadsheets (MS Excel) and relational databases (MS Access); problem-solving with spreadsheets and databases.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (1 test 10%; 2 assignments 10% each; 8 tutorials 20%); November examination 2 hours 50%.

CON1017S PROPERTY INVESTMENT MATHEMATICS I

8 HEQF credits at level 5; 1 lecture per week, 2 tutorials per week.

Convener: Associate Professor K Michell.

Prerequisites:

Course outline: Simple Interest, Equivalence, Compound Interest, Present Value, Annuities, General Annuities, Sinking funds, Amortization.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 30%; November examination 2 hours 70%.

CON1018W BUILDING TECHNOLOGY IT

16 HEQF credits at level 5; 2 lectures per week, 1 studio session per week.

Convener: Dr A Windapo.

Prerequisites:

Course outline: An appreciation of the construction industry; its size and role in the economy. An overview of the construction industry's structure; its participants and their roles and responsibilities. An understanding of the construction assembly process associated with simple buildings, together with an appreciation of the relationship between design, technology and assembly. Basic architectural drawing directed to the understanding and transmission of graphic information. Introduction to site surveying including measurement, levelling, etc.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (2 tests 5% each; group project 20%; 2 individual projects 10% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON1019F/S PROFESSIONAL COMMUNICATION STUDIES

CON1019F for Property Studies students; CON1019S for Construction Studies students.

16 HEQF credits at level 5; 4 lectures per week, tutorials.

Convener: Associate Professor J English.

Prerequisites:

Course outline: The aim of the course is to equip students with practical skills to enable them to plan and present persuasive oral presentations and oral reports; to function effectively in small-group activities; to prepare and write business and technical reports.

Lecture times:

DP requirements: 100% attendance and 50% minimum class test average.

Assessment: Class test, 2 hourwritten examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

CON1020F/S MANAGEMENT & ENTERPRISE

18 HEQF credits at level 7; 4 lectures per week, 12 tutorials.

Convener: J Marks.

Prerequisites:

Course outline: Management and enterprise is a foundational course for property and construction students. The course will focus on creating a common language and understanding related to business, management, enterprise and entrepreneurship within the context of the property and construction environment. Students will engage with the elements of business formation and management through an integrated project. Alignment with other courses will illustrate the role of business management in the property and construction process, and the importance of an enterprise mindset in developing and managing sustainable and viable projects.

Lecture times:

DP requirements: 50% year mark.

Assessment: Year mark 100% (projects 35%; 2 assignments 10% each; individual assessment 15%; presentation 30%).

CON2006W CONSTRUCTION TECHNOLOGY II

32 HEQF credits at level 6; 4 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: E Müller.

Prerequisites: CON1004W.

Course outline: Construction technology appropriate for assembly of light weight long span structures and multi-storey buildings, including: assembly and performance; reinforced concrete; steel and timber; materials, components, plant and equipment required: such as formwork, concrete, steel including reinforcing, roofing systems (including flat roof waterproofing); cladding systems; windows and doors, ceilings and partitions, access flooring, finishes; services requirements and services spaces; and fire and other regulations.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (2 tests 10% each; 4 assignments 7.5% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON2013X PRACTICAL TRAINING

Convener: K Le Jeune.

Prerequisites: CON1007X.

Course outline: 160 hours (4 weeks) of approved experience employed in any of the built environment disciplines (construction; engineering; housing; property development and management; quantity surveying; relevant local authority, provincial and national government departments).

DP requirements: Complete practical training and complete report.

CON2020S CONSTRUCTION MANAGEMENT I

16 HEQF credits at level 6; 4 lectures per week, tutorials.

Convener: TBA.

Prerequisites: BUS1010F or BUS1036F/S.

Course outline: The principles of management: the main schools of management and their history and developments; scientific management; Human relations school; systems thinking; contingency theory and operations research/theory.The construction enterprise and its environment: Customer profile; patterns of demand; types of service or product provided; common organisational structures; the construction firm as a complex system. The construction project and its environment; Construction management processes and practices applicable to small projects.Project processes to include: the project delivery process; the production process and the traditional procurement process. Construction management practice to include site layout and management, plant management, materials management, health and safety regulation, waste management, financial management and risk management.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (group assignment 20%; 2 tests 20%; individual assignment 5%); November examination 2 hours 50%.

CON2022W MEASUREMENT & DESIGN APPRAISAL I

16 HEQF credits at level 6; 2 lectures per week, 1 studio session per week.

Convener: E Edwardes.

Prerequisites: CON1004W.

Course outline: The theoretical aspects of the course are covered in lectures on: Principles of measurement and the documentation thereof; and detailed analysis of the clauses contained in the Standard System of Measuring Building Work.

The practical component of the course entails the measurement, abstraction and billing of the following elements: Foundations; Superstructure Brickwork; Roofs, Eaves and Rainwater goods; Internal and External Finishes; Ceilings; Floors; and Doors, Windows and Opening Adjustments.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (4 tests 10% each; assignment 10%); November examination 4 hours 50%.

CON2024S PROPERTY STUDIES II A

16 HEQF credits at level 6; 4 lectures per week, tutorials.

Convener: R McGaffin.

Prerequisites: CON1011F, CON1012S, CON2030F, BUS2020F.

Co-requisites: CON2029S.

Course outline: Nature and scope of investment. Nature and scope of property investment. The investment decision process. The property development process. Decision making among alternatives. Property evaluation: principles of feasibility studies; feasibility studies for residential,

commercial and industrial developments; principles of economic viability studies: townships, sectional title, retirement villages, office, shopping centre, and industrial developments. Whole life appraisal. Risk management: the nature of risk; risk analysis; risk management and control.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (test 20%; 2 assignments 15% each); November examination 2 hours 50%.

CON2027F REAL PROPERTY LAW I

16 HEQF credits at level 6; 4 lectures per week, tutorials.

Convener: T Boxall.

Co-requisites: CML1002F (or equivalent).

Course outline: South African Law of Property and statutes relating to immovable and real rights; the acquisition of rights over land in South Africa; forms of land tenure; possession and occupation of immovable property; servitudes; mineral rights; real and personal securities; survey of land; registration of rights over immovable property; erection of buildings; subdivision of land; agricultural land; fencing.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 20% and 30%); June examination 2 hours 50%.

CON2029S MEASUREMENT

8 HEQF credits at level 6; 2 lectures per week.

Convener: TBA.

Prerequisites: CON1018W.

Course outline: An introduction to measurement in the property and construction industry, including: the SAPOA method and the application thereof; the Guide to Elemental Cost Estimating and Analysis for Building Works and the application thereof; an overview of the Standard System of Measuring Building Work; and the compilation and purpose of the Bills of Quantities.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 25%; short assignments 0%); November examination 2 hours 50%.

CON2030F PROPERTY INVESTMENT MATHEMATICS II

8 HEQF credits at level 6; 2 lectures per week, tutorials.

Convener: TBA.

Prerequisites: CON1017S.

Course outline: Evaluation Techniques for Property Development and Investment Decisions: Rate of Return, Simple Payback, Discounted Payback and Discounted Cash Flow (NPV and IRR).

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 30%. (test and turorials); June examination 3 hours 70%.

CON2031S PROPERTY STUDIES II B

16 HEQF credits at level 6; 4 lectures per week, tutorials.

Convener: Dr M Mooya.

Prerequisites: CON1011F, CON1012S, STA1000S, ECO1010F.

Course outline: The Valuation Profession: The Property Valuers Profession Act (47 of 2000). Functions and responsibilities of the Valuer. An Introduction to the Statutes and Ordinances

(relevant sections) affecting valuation (all as amended): Transfer Duty Act 40 of 1949; Estate Duty Act 45 of 1955; Removal of Restrictions Act 84 of 1967; Immovable Property (Removal or Modification of Restriction) Act 94 of 1965; Administration of Estates Act 66 of 1965; Stamp Duties Act 77 of 1968; Expropriation Act 63 of 1975; Land Affairs Act 101 of 1987; Physical Planning Act 125 of 1991; Housing Act 107 of 1997; Environment Conservation Act 73 of 1989; National Environmental Management Act 107 of 1998; Development Facilitation Act 67 of 1995; Less Formal Township Establishment Act 113 of 1991; Land Survey Act 8 of 1997; Prevention of Illegal Eviction from and Unlawful Occupation of Land Act 19 of 1998; Water Act No 54 of 1956 / National Water Act 36 of 1998; Rental Housing Act 50 of 1999 / Rent Control Act 80 of 1976; Upgrading of Land Tenure Rights Act 112 of 1991; Value-Added Tax Act 89 of 1991; Municipal Ordinance 20 of 1974 (rating sections); Land Use Planning Ordinance (WC) 15 of 1985; Western Cape Planning and Development Act 7 of 1999; Property Valuation Ordinance (WC)1993; Valuation Ordinances of all other provinces. Property Valuation: Purposes for which valuations are required; Concepts of value (personal, exchange and market value); Classification of value and accuracy of valuations; The Surveyor-General; The Registrar of Deeds; The Valuer's records; Factors influencing supply and demand in the property market; Types of fixed property; Factors influencing the value of property; Appreciation and depreciation; Relationship between land and improvements; Value of improvements; Valuation of Residential properties; The Valuation Report.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 20% each, assignment 10%) November examination 2 hours 50%.

CON3012W CONSTRUCTION TECHNOLOGY III

32 HEQF credits at level 7; 2 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: E Müller.

Prerequisites: CON2006W.

Course outline: Construction Technology and services appropriate for the assembly of light weight long span structures and multi-storey buildings, including: plumbing and drainage - water supply (hot and cold); drainage; waste disposal; electrical installation; air-conditioning systems; communication systems; lifts, hoists and escalators. Basements, soil stabilization, rock-anchoring and retaining structures. Piling and special foundations. Civil engineering construction. Sustainable technology. Theory of structures.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 10% each, 4 assignments 7.5%); June examination 2 hours 25%, November examination 2 hours 25%.

CON3023X PRACTICAL TRAINING

Convener: K Le Jeune.

Course outline: 160 hours (4 weeks) of approved experience employed in any of the built environment disciplines (construction; engineering; housing; property development and management; quantity surveying; relevant local authority, provincial and national government departments).

DP requirements: Complete practical training and complete report.

CON3030S CONSTRUCTION COSTING

16 HEQF credits at level 7; 2 lectures per week, 1 studio session per week.

Convener: Professor K Cattell.

Prerequisites: CON1010F or CON1015F, CON1004W or CON1018W, CON2022W or CON2029S and CON3043W.

Co-requisites: CON3040W.

Course outline: Computation of labour costs; synthesis of labour; material and plant costs for Bills of Quantities item rates; pricing approximate quantities of elemental estimates; pricing subcontracts; pricing preliminaries.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 80% (project 35%; peer review 5%; 3 individual assessments 10% each; journal 5%; plenary quiz 5%); November examination 2 hours 20%.

CON3031W MEASUREMENT & DESIGN APPRAISAL II

32 HEQF credits at level 7; 4 lectures per week, 1 studio session as required.

Convener: E Edwardes.

Prerequisites: CON2006W and CON2022W.

Co-requisites: CON3012W and CON3043W.

Course outline: The theoretical aspects of the course are covered in lectures and detailed studies on: principles of measurement and documentation used in measurement; and descriptive clauses in the Standard System of Measuring Building Work (6th ed.) The practical component of the syllabus is a progression from the prerequisite course Measurement and Design Appraisal 1. The principles of measurement are applied to advanced projects with particular emphasis on simple framed and load-bearing multi-storey buildings by means of elemental quantification, covering: Foundations; Reinforced Concrete Structures; Plumbing and Drainage; Architectural Metalwork; Structural Steelwork; Specialist Work; and External Works. The practicals require complete computerised documentation with competence in the WinQS and/or QSPlus software package(s). Students measure all elements of a small commercial structure.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (4 tests 10% each, assignment 10%, 5 short assignments 10%); November examination 4 hours 25%.

CON3032W APPLIED CONTRACT LAW I

12 HEQF credits at level 7; 2 lectures per week, seminars.

Convener: T Boxall.

Prerequisites: CML1002F or CML1001F or CML1006S.

Course outline: The JBCC Principle Building Agreement;. the Arbitration Act; Case studies.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: November examination 2 hours 50%, year mark 50%.

CON3033F PROPERTY STUDIES I

16 HEQF credits at level 7; 4 lectures per week, 1 tutorial session per week.

Convener: R McGaffin.

Prerequisites: STA1001F/S.

Course outline: Introduction to Investment. Characteristics of Property as an investment. Financial Mathematics for Cost Engineering and Property Development Decisions. Evaluation Techniques for Property Development and Investment Decision.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (test 20%; test 30%, 10 tutorials); (June examination 2 hours 50%.

CON3034F PROPERTY STUDIES III A

16 HEQF credits at level 7; 4 lectures per week, tutorials.

Convener: K Evans.

Prerequisites: CON2024S, CON2030F, CON2031S, ECO1010F, ECO1011S.

Course outline: Property economics: property values; supply and demand; the economics of developments. Property finance: personal portfolio planning; institutional portfolio planning; urban finances; sources and forms of property finance. Taxation: income taxation; property taxation; Value Added Tax.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 20%; project 20%, 2 assignments 10%); June examination 2 hours 50%.

CON3035S PROPERTY STUDIES III B

16 HEQF credits at level 7; 4 lectures per week, tutorials.

Convener: TBA.

Prerequisites: CON2024S, CON2031S, STA1001F, ACC1006F/S, ECO1010F, ECO1011S.

Course outline: Management of building design and construction: general contracting; construction and project management; architectural design; specification of operating systems; upgrade programmes; estimating; preparation of contracts, drawings and specifications; preparation of tender packages; tendering processes and award. Value Management: the concept of value management. Property marketing: concept of marketing; marketing management; marketing management philosophies, marketing of residential properties; marketing of commercial and industrial properties.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50%; November examination 2 hours 50%.

CON3036W PROPERTY & CONTRACT LAW

16 HEQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: T Boxall.

Prerequisites: CML1002F or CML1001F or CML1006S; CON2027F.

Course outline:JBCCPrincipalBuilding Agreement; Arbitration Act; Alternative dispute resolution; Case law.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 15% each; assignment 20%) November examination 2 hours 50%.

CON3038W CONSTRUCTION MANAGEMENT II

32 HEQF credits at level 7; 4 lectures per week, seminars, tutorials, field trip(s), Computer laboratory sessions.

Convener: M Massyn.

Prerequisites: CON2020S or CON3039S/W.

Course outline: An introduction to production management theory and practice by considering: typical business and project objectives; the need to achieve high productivity; the impact of method and layout on production; planning for production. Techniques such as: Gantt charts; critical path networks, precedence diagrams; computer applications; short term planning systems; progress recording; work study. Construction procurement systems. Management accounting in construction. Industry structures and development. Health, safety issues surrounding production management.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 10% each; 3 assignments 10% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON3039S CONSTRUCTION MANAGEMENT IT

16 HEQF credits at level 7; 4 lectures per week, tutorials.

Convener: TBA.

Prerequisites: BUS1010F or BUS1036F/S.

Course outline: The principles of management: the main schools of management and their history and developments; scientific management; Human relations school; systems thinking; contingency theory and operations research/theory. The construction enterprise and its environment: Customer profile; patterns of demand; types of service or product provided; common organisational structures; the construction firm as a complex system. The construction project and its environment; Construction management processes and practices applicable to small projects. Project processes to include: the project delivery process; the production process and the traditional procurement process. Construction management practice to include site layout and management, plant management, materials management, health and safety regulation, waste management, financial management and risk management.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (group assignment 20%; 2 tests 20%; individual assignment 5%); November examination 2 hours 50%.

CON3040W COST ENGINEERING IT

16 HEQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: Associate Professor K Michell.

Prerequisites: CON1018W and CON2029S or CON2006W and CON2022W.

Course outline: An appreciation of client/developer motivation and needs. The client briefing process. An understanding of the theory of construction cost planning and cost control. An understanding of design economics, elemental cost analysis of buildings; cost studies/cost comparisons. Consideration of cost and price indices. Utilising the outputs of cost planning and cost control, and of approximate estimates. Communication applied to the cost planning and control environment. Consideration of current research being conducted on the practice of cost planning and cost control in South Africa.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (4 tests 12.5% each; 4 assignments); June examination 2 hours 25%; November examination 2 hours 25%.

CON3041F PROPERTY STUDIES III C

16 HEQF credits at level 7; 4 lectures per week, tutorials.

Prerequisites: CON2024S or CON2030F, CON2031S, CON1017S, CON1018W, STA1001F, ECO1010F.

Convener: Dr M Mooya.

Course outline: An introduction to case law relating to the valuation of fixed property; property valuation; highest and best use of property; influence of the 'wrong' development on market value; influences of leases on values; leases and rentals; theory of the income, residual, cost and accounts methods of valuation; valuation of leasehold interests; valuation for insurance purposes; valuation of income-producing properties; mass valuations; the valuation report.

Lecture times:

DP requirements: 40% subminimum in both course work and examination.

Assessment: Year mark 50%(2 tests 20% each, assignment 10%) June examination 2 hours 50%.

CON3043F/S COST ENGINEERING UNDER UNCERTAINTY

16 HEQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: Associate Professor K Michell.

Prerequisites: CON1017S, CON2006W, CON2022W, CON2029W/S.

Course outline: Consideration of client/developer motivation and needs. The client briefing process. The theory of construction cost planning and cost control. Design economics, elemental cost analyses of buildings; cost studies/cost comparisons. Consideration of cost and price indices. Techniques for cost planning and cost control, and the preparation of approximate estimates. Communication applied to the cost planning and control environment. Consideration of current research being conducted on the practice of cost planning and cost control in South Africa.

Lecture times:

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (4 tests 12.5% each; 4 assignments); June examination 2 hours 25%; November examination 2 hours 25%.

CON3044F/S GLOBALISATION & THE BUILT ENVIRONMENT

18 HEQF credits at level 7; 26 lectures.

Convener: Dr E Hurst.

Course outline: What is globalisation: the globalisation debate; globalisation and technology; globalisation and the information age; globalisation and American power; state power; international law; regionalist governance; the declining authority of nation states; national culture and global culture; cosmopolitan cities; media and consumer culture; culture and identity; global citizens; migration; global trade; information and the knowledge economy; inequality; world orders. Globalisation is contextualised in the final project, in terms of the property and construction industries.

Lecture times:

DP requirements: Weekly submissions and attendance; 40% subminimum in course work.

Assessment: Year mark 100% (major project 50%; assignment 20%; essay 15%; presentation 15%).

CSC1015F COMPUTER SCIENCE 1015

18 HEQF credits at level 5; 4 lectures per week, 1 tutorial per week,1 practical per week.

Convener:

Prerequisites: Mathematics 6 or better.

Course outline: Introduction to computing and applications. Problem solving and algorithm development in Python. Fundamental programming constructs and abstractions. Number representation, boolean algebra and logic gates.

Lecture times:

DP requirements: Minimum of 45% aggregate in practical work.

Assessment: Theory tests 15%; practical tests and practical assignments 25%; June examination 3 hours 60%.

Subminima: 45% for practicals; 45% for theory tests and examination.

CSC1016S COMPUTER SCIENCE 1016

18 HEQF credits at level 5; 4 lectures per week, 1 tutorial per week, 1 practical per week.

Convener:

Prerequisites: CSC1015F (or Supp) or CSC1018F.

Course outline: Object-oriented design. Advanced programming constructs and techniques using Java. Linear abstract data structures. Binary trees and their applications. Event-driven programming, graphics and graphical user interfaces. Ethics and professional issues in computing.

Lecture times:

DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Theory tests 15%; practical tests and practical assignments 25%; November examination 3 hours 60%.
Subminima: 45% for practicals; 45% for theory tests and examination.

CSC1017F

16 HEQF credits at level 5; 48 lectures, 1 practical per week.
Convener:
Course outline: Introduction to programming and algorithms; basic syntax, variables, operators, comments, expressions, strings, input and output; conditional statements: if, nested ifs, if-else ladders, Boolean expressions; loops: for and while, nested loops; functions, parameters, return values; testing and debugging; arrays and lists, multidimensional arrays, text files; recursion; number systems.
Lecture times:
DP requirements:45% weighted average for practical work.
Assessment: Theory tests count for 15%, practicals count for 15%, practical tests count for 10%, June examination counts for 60% of the course mark.
Subminima:45% weighted average for practical work, 45% weighted average of tests and exams.

CSC2001F COMPUTER SCIENCE 2001

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week.
Convener:
Prerequisites: CSC1016S/CSC1011H, MAM1000W or equivalent.
Course outline: OBJECT-ORIENTED DESIGN. DATA STRUCTURES: Abstract data types and assertions; Linear structures - lists, strings, stacks, queues; recursive algorithms, tree structures - binary trees, AVL trees, B-Trees; graphs - graph traversals, minimum spanning trees, sets, hashing, priority queues. Database systems.
Lecture times:
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests 16 2/3%; June examination 3 hours 50%; practicals and projects 33 1/3%.
Subminima: 45% for tests and examination; 45% for practicals.

CSC2002S COMPUTER SCIENCE 2002

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week.
Convener:
Prerequisites: CSC2001F (or Supp), MAM1000W or equivalent.
Course outline: Mobile application development and interface design. Computer architecture and introduction to assembler programming. Multicore computers. Concurrent programming.
Lecture times:
DP requirements: Minimum 50% in practical test and minimum 45% aggregate in practical work.
Assessment: Tests 16 2/3%; November examination 3 hours 50%; practicals, practical tests and projects 33 1/3%.
Subminima: 45% for tests and examination; 45% for practicals.

CSC2003S COMPUTER GAMES

24 HEQF credits at level 6; 5 lectures per week, 1 practical per week.
Convener:
Prerequisites: CSC2001F, MAM1000W or equivalent.
Course outline: Introduction - History of Games, Genres of Games. Playability and Design - Play, Narrative, Design Process, Design Documents. 2D Game Programming --- Game APIs, game

technology, interaction. AI/Simulation - Simulation and Search Strategies. Text-based games.
Lecture times:
DP requirements: Minimum of 45% in practical work.
Assessment: Tests 16 2/3%, November examination 3 hours 50%, practicals, practical test and projects 33 1/3%.
Subminima: 45% for tests and examination; 45% for practicals.

CSC3002F COMPUTER SCIENCE 3002

36 HEQF credits at level 7; 5 lectures per week, 2 practicals per week.
Convener:
Prerequisites: CSC2001F and CSC2002S.
Course outline: This course consists of: Operating systems, Networks, Database systems.
Lecture times:
DP requirements: Minimum 45% aggregate in practical work.
Assessment: June examination 3 hours 50%, test(s) 15%, practicals 35%.
Subminima: 45% for practicals; 45% for tests and examination.

CSC3003S COMPUTER SCIENCE 3003

36 HEQF credits at level 7; 5 lectures per week, 2 practicals per week.
Convener:
Prerequisites: CSC2001F and CSC2002S.
Course outline: This course consists of: compilers (30); and Theory of Algorithms (30).
Lecture times:
DP requirements: Minimum 45% aggregate in practical work.
Assessment: November examination 3 hours 50%, Test(s) 15%, practicals 35%.
Subminima: 45% for practicals; 45% for tests and examination.

CSC3015D THEORY OF ALGORITHMS

18 HEQF credits at level 7; 30 lectures, 1 practical per week.
Convener:
Prerequisites: CSC2001F, CSC2002S.
Course outline: Algorithms are widely recognised as being central to computing. This course categorises algorithms according to their solution strategy and presents example problems and algorithmic solutions in each category. It also considers fundamental notions of algorithmic complexity and computability in a systematic way.
Lecture times:
DP requirements:
Assessment: Tests 15%, practicals 35%, 1.5 hr written November examination 50%.
Subminima: 45% for practicals; 45% for tests and examination.

CSC3020H THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN

36 HEQF credits at level 7; 2.5 lectures per week, 1 practical per week.
Convener:
Prerequisites: CSC2001F, CSC2002S and CSC2003S.
Course outline: Game engine architecture. Computer Graphics for Gaming, Agents in Gaming, multi-user and distributed games, Game design.
Lecture times:
DP requirements:
Assessment: November examination 3 hours 50%, Test(s) 16 2/3%, Practicals 33 1/3%.

Subminima: 45% for practicals; 45% for tests and examination.

CSC3023F COMPUTER SCIENCE 3023

24 HEQF credits at level 7; 44 lectures, 1 practical per week.

Convener:

Prerequisites: CSC2001F, CSC2002S.

Course outline: Operating system structure and operations; computer system organisation; process management and storage management; protection; open source operating systems. Introduction to C++; pointers and memory management; streams and I/O; OO in C++; operator overloading; function objects; templates; the STL; exceptions.

Lecture times:

DP requirements : Minimum of 45% aggregate in practical work.

Assessment: Tests count for 15%; practicals count for 35%; June examination counts for 50%.

Subminima: 45% for practicals; 45% for tests and examination.

ECO1007S ECONOMICS FOR ENGINEERS

This course is designed specifically for engineering students. It is aimed at providing a broad perspective on the subject, and concentrates more on an understanding of theoretical concepts and their application in practise as may impact on the professional life of an engineer.

16 HEQF credits at level 5; lectures, tutorials.

Convener:

Course outline: The course covers the following areas: microeconomics, international trade and the balance of payments, macroeconomics, financial markets, the public sector, South African economic and environmental issues. The course focuses on the application of economic principles.

Lecture times:

DP requirements: An average year mark of at least 35%.

Assessment: Tests, essays and tutorials 45%; November examination 55%.

Note: *Credit will not be given for both ECO1007S and ECE1010F/S.*

ECO1010F/S MICROECONOMICS

18 HEQF credits at level 5; 48 lectures, 12 tutorials.

Convener:

Prerequisites: Senior Certificate with at least a D on the Higher Grade for Mathematics; or NSC with at least a 5 for Mathematics. Senior students not fulfilling this requirement must have passed the equivalent of 6 semester courses.

Course outline: The course focuses on demand and supply analysis; consumer behaviour; production functions and production costs; market forms; income distribution and international trade.

Lecture times:

DP requirements: All class tests and compulsory written assignments (essays and tutorials) have to be completed, and an average year mark of at least 35% has to be achieved.

Assessment: Tests, essays and tutorials 50%; June/November examination 50%.

ECO1011S MACROECONOMICS

18 HEQF credits at level 5; 48 lectures, 12 tutorials.

Convener:

Prerequisites: ECO1010F/S.

Course outline: The course covers the following areas: circular flow model; national income accounting; Keynesian aggregate spending; aggregate demand and supply; money; interest rates and exchange rates; inflation, monetary, fiscal and balance of payments policy.

Lecture times:

DP requirements: All class tests and compulsory written assignments (essays and tutorials) have to be completed, and an average year mark of at least 35% has to be achieved.

Assessment: Tests, essays and tutorials 50%; November examination 50%.

ECO2003F MICROECONOMICS II

18 HEQF credits at level 6; second year, first semester course, 4 lectures and 1 tutorial/workshops per week.

Convener:

Prerequisites: ECO1010F/S Microeconomics.

Course outline: The course formalizes consumer and producer optimisation, and explores factor markets under perfect and imperfect competition before introducing general equilibrium theory graphically and algebraically. The final section, on industrial organisation, looks at models that relax the critical assumptions of GE. All sections of the course incorporate applications. The sequence and number of lectures allocated to topics is variable.

Lecture times:

DP requirements: An average year mark of at least 35%.

Assessment: Class work 50% (tests and essays), June examination 3 hours 50%.

Additional Information: Course information, such as the dates, times and venues of lectures, tutorials and tests, and of the prescribed and recommended books will be posted on the School of Economics notice board at the beginning of the semester.

ECO2004S MACROECONOMICS II

18 HEQF credits at level 6; second year, second semester, 5 lectures/workshops per week.

Convener:

Prerequisites: ECO110F/S Microeconomics and ECO111S Macroeconomics. A student will be permitted to take ECO204S without having passed ECO203F, although it is desirable to pass ECO203F prior to taking ECO204S.

Course outline: The course builds upon ECO111S as follows: Short run IS-CM, medium run AS-AD and long run Solow Swan treatment of the macroeconomy. Analysis of the open economy, such as trade and exchange rate regimes.

Lecture times:

DP requirements: An average year mark of at least 35%. Tutorial attendance and submission of assignments. Attendance at class tests.

Assessment: Class record 50% (tests and essays), November examination 3 hours 50%.

Additional Information: Course information, such as the dates, times and venues of lectures, tutorials and tests, and of the prescribed and recommended books will be posted on the School of Economics notice board at the beginning of the semester.

EEE1000X PRACTICAL TRAINING

Convener: Mr S Schrire.

Course outline: Electrical Engineering students shall produce to the satisfaction of the head of department, a certificate showing evidence of completion of suitable work in the basic workshop processes during a period of at least six weeks in an approved workshop, either before registration or during the long vacation following the year of first registration in the Faculty. Such evidence must be produced by 31 March of the year following such training. Alternatively students may produce a certificate showing evidence of completion of an approved structured intensive practical training course of at least 3 weeks duration.

DP requirements: Not applicable.

EEE1004W ENGINEERING I

32 HEQF credits at level 5; 96 lectures, 20 laboratory sessions, 1 project.

Convener: Ms R Smit.

Prerequisites:

Course outline: The engineering approach to electricity, basic practical electronics, soldering and bread-board skills, use of measuring instruments, electricity in our everyday lives, heating, lighting and motive power, safety and earthing, generation of electrical power, sustainable energy sources, three-phase power, AC and DC electricity, case studies and applications illustrating core electrical engineering concepts and introducing electrical engineering design, introduction to nuclear power.

Lecture times:

DP requirements: 60% for Computer Literacy Test, 90% Lab attendance, attendance at all class tests.

Assessment: Class tests and assignments 30%, November examination 70%

EEE2026S BASIC ELECTRICAL ENGINEERING II

20 HEQF credits at level 6.

Convener: Dr A Mishra.

Prerequisites:

Course outline: Divided into Modules D, E and F.

Module D: Introduction to Microprocessors

8 HEQF credits at level 6, 24 lectures.

Outline: A history of computers and microprocessors; analog and digital systems; sampling and A to D conversion; simple microprocessor systems; introduction to a microcontroller; structured assembler programming; building from components to systems; connecting external devices to the microprocessor; simple control loops.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: November Examination of D and E modules 3 hours (80%) and Year mark (20%).

Module E: Analog Electronic Design

8 HEQF credits at level 6; 24 lectures, 4 tutorials and 1 practical.

Outline: Operation of Electronic devices such as Bipolar Junction Transistors and Field Effect Transistors. Design of common circuits incorporating these devices including, but not limited to amplifiers, current sources and mirrors and voltage regulators. Operation of Operational Amplifiers and other basic analog circuit building blocks. Design of fundamental circuits based around simple integrated circuits such as inverting and non-inverting amplifiers and switching circuits. Basic parameters of the components used will be mentioned and explained in the context of reliable circuit design.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: November Examination of D and E modules 3 hours (80%) and Year mark (20%).

Module F: Laboratories

4 HEQF credits at level 6, 4 practicals.

Convener: Mr S Schrire**.**

Outline: Projects on opamps/voltage regulators, filter, logic, transistors.

Lecture times:

DP requirements: Satisfactory completion of coursework for each and every module.

Assessment: On practical work.

EEE2030F ELECTRICAL ENGINEERING I

For students in Mechanical Engineering Department only.

12 HEQF credits at level 6; 36 lectures, 8 tutorials.

Convener: TBA.

Prerequisites:

Course outline: Electrical quantities, circuit components, Network theorems, AC circuits including Phasor diagrams, resonance, RMS values, power and power factor. Transducers, electronic devices.

Lecture times:

DP requirements: Completion and hand in of all tutorials and laboratory report.

Assessment: June examination 3 hours.

EEE2031S ELECTRICAL ENGINEERING II

For students in Mechanical Engineering Department only

12 HEQF credits at level 6; 36 lectures, 8 tutorials, 1 practical.

Convener:TBA.

Prerequisites: EEE2030F.

Course outline: Single phase diagrams for resistive, inductive and capacitive loads; complex power; power factor correction; 3-phase systems; magnetic circuits; the single phase transformer; d.c. machines.

Lecture times:

DP requirements: Completion and hand in of all tutorials.

Assessment: November examination 80%, year mark 20%.

EEE2035F SIGNALS & SYSTEMS I

12 HEQF credits at level 6; 30 lectures and 6 tutorials.

Convener: Dr F Nicolls.

Prerequisites: MAM1018F/S.

Co-requisites: MAM2083F/S.

Course outline: This course provides students with the basic tools required for understanding linear systems, and the effect that such systems have on deterministic signals. Upon completion, students will be able to characterise and manipulate linear time-invariant systems in terms of input-output relationships, using both time and frequency domain methods. The course includes concepts related to signal representation, linear convolution, Fourier analysis, and sampling of continuous-time signals.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: June examination 2 hours.

EEE2036S PROBABILITY & STATISTICAL DESIGN IN ENGINEERING

12 HEQF credits at level 6; 36 lectures; 12 tutorials; 6 practicals.

Convener: Dr A Murgu.

Prerequisites/Corequisites: MAM2083F/S.

Course outline: Fundamental concepts of sample spaces; counting, combinations and permutations; probability axioms (Kolmogorov); modelling and analysis of engineering phenomena as random variables, both discrete and continuous; functions of random variables; conditioning; derived distributions; expectation, mean and variance; transforms; convolution; covariance and correlation; least squares estimation; probability and design problems in real life as well as in engineering; . extentions to limit theorems.

Lecture times:

DP requirements: 80% attendance and satisfactory completion of coursework.

Assessment: November examination 60%, year mark 40%.

EEE2038W FUNDAMENTALS OF ELECTRICAL ENGINEERING

24 HEQF credits at level 6; 72 lectures; 20 tutorials, 3 practicals, 1 project.
Convener: Dr MA Khan.
Prerequisites: MAM1017F/S, PHY1012F/S or equivalent.
Course outline: Divided into Modules A and C.

Module A: Electrical Circuits
12 HEQF credits at level 6; 36 lectures, 10 tutorials, 1 practical.
Outline: DC circuits, voltage, current and power network theorems. Transient circuit analysis. Single phase AC circuit theory. Phasor diagrams for resistive, inductive and capacitive loads; complex power. Power factor correction.
Lecture times:
DP requirements: Satisfactory completion of coursework.
Assessment: June examination 2 hours.

Module C: Power Engineering
12 HEQF credits at level 6; 36 lectures, 10 tutorials, 2 practicals, 1 project.
Convener: Dr MA Khan.
Outline: Three phase circuits, magnetic circuits; the single phase transformer; d.c. machines.
Lecture times:
DP requirements: Satisfactory completion of coursework.
Assessment: November examination 2 hours.

EEE2039W FUNDAMENTALS OF ELECTRONIC ENGINEERING

36 HEQF credits at level 6; 96 lectures; 6 tutorials, 6 practicals.
Convener: Dr S Winberg.
Prerequisites: EEE1003W, CSC1015F, MAM1003W or PHY1010W or equivalent.
Course outline: Divided into Modules B, D, E, F and G.

Module B: Digital Electronics
12 HEQF credits at level 6; 24 lectures, 6 tutorials, 6 practicals.
Convener: Dr A Murgu.
Outline: Digital systems and information representation, Binary Logic, Boolean Algebra, combinational circuits, design concepts and procedures, arithmetic functions, sequential circuits, state automata.
Lecture times:
DP requirements: Satisfactory completion of coursework (minimum 50%).
Assessment: June examination of module B 2 hours.

Module D: Introduction to Microprocessors
8 HEQF credits at level 6; 24 lectures.
Convener: Associate Professor SP Chowdhury.
Outline: A history of computers and microprocessors; analog and digital systems; sampling and A to D conversion; simple microprocessor systems; introduction to a microcontroller; structured assembler programming; building from components to systems; connecting external devices to the microprocessor; simple control loops.
Lecture times:
DP requirements: Satisfactory completion of coursework.
Assessment: November Examination of D and E modules 3 hours (80%) and Year mark (20%).

Module E: Analog Electronic Design
8 HEQF credits at level 6; 24 lectures, 4 tutorials.

Convener: TBA.

Outline: Operation of Electronic devices such as Bipolar Junction Transistors and Field Effect Transistors. Design of common circuits incorporating these devices including, but not limited to amplifiers, current sources and mirrors and voltage regulators. Operation of Operational Amplifiers and other basic analog circuit building blocks. Design of fundamental circuits based around simple integrated circuits such as inverting and non-inverting amplifiers and switching circuits. Basic parameters of the components used will be mentioned and explained in the context of reliable circuit design.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: November Examination of D and E modules 3 hours (80%) and Year mark (20%).

Module F: Laboratories

4 HEQF credits at level 6; 4 practicals.

Outline: Projects on opamps/voltage regulators, filter, logic, transistors.

Lecture times:

DP requirements: Satisfactory completion of coursework for each and every module.

Assessment: On practical work.

Module G: Computing II for Electrical Engineers

4 HEQF credits at level 6;, 12 lectures, 3 programming assignments, 1 class test.

Convener: Dr S Winberg.

Outline: To write C++ programs with application to electrical engineering problems.

Lecture times:

DP requirements: Completion of every assignment.

Assessment:70% programming assignments; 30% class test.

EEE2040F BASIC ELECTRICAL ENGINEERING I

24 HEQF credits at level 6; 60 lectures; 22 tutorials, 13 practicals.

Prerequisites: MAM1017F/S, PHY1012F/S or equivalent.

Course outline: Divided into Modules A and B.

Module A: Electrical Circuits

12 credits, 36 lectures, 10 tutorials, 1 practical.

Convener: Dr MA Khan.

Outline: DC circuits, voltage, current and power network theorems. Transient circuit analysis. Single phase AC circuit theory. Phasor diagrams for resistive, inductive and capacitive loads; complex power. Power factor correction.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: June examination 2 hours.

Module B: Digital Electronics

12 credits, 24 lectures, 6 tutorials, 6 practicals

Convener: Dr A Murgu.

Outline: Digital logic gates and devices that form the basis of digital computers; computer simulation package and design of digital circuits; evaluation of software simulation and hardware implementation.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: June Examination of module B 2 hours.

EEE3000X PRACTICAL TRAINING

Convener: Mr S Schrire.

Course outline: Electrical Engineering students shall produce a technical report and certificate showing to the satisfaction of the head of department, evidence of completion of suitable work for a minimum period of six weeks in engineering employment at the end of the Third Year. The report and certificate is to be submitted by the end of the fourth week of the term immediately following the period of employment. Students who submit evidence of having obtained suitable practical experience prior to their registration may be exempted from EEE3000X. The employer must certify that the student completed the work.

DP requirements: Not applicable.

EEE3017W DIGITAL ELECTRONICS

16 HEQF credits at level 7; 48 lectures, 10 practicals.

Not for EC students.

Convener: Ms R Verinder.

Prerequisites: EEE2039W or equivalent.

Course outline: Logic design, algorithmic state machines, data converters, advanced micro controller usage, C application to micro controllers; popular interface standards; common digital devices, instrument busses automated instrumentation and process control.

Lecture times:

DP requirements: Submission of all practicals, 50% or more for at least 2 class tests.

Assessment: November examination 2 hours 55%, class tests35%, practicals 10%.

EEE3031S ENERGY UTILIZATION

10 HEQF credits at level 7; 24 lectures, 2 practicals, 1 project, 3 tutorials.

Convener: Dr MA Khan.

Prerequisites: EEE2038W or equivalent.

Course outline: Introduction to the features, characteristics and operation of three phase AC induction and synchronous machines. Introduction to power electronics.

Lecture times:

DP requirements: Completion of two laboratory experiments and the submission of two laboratory reports.

Assessment: November examination 1½ hours.

EEE3044S ENERGY CONVERSION & UTILIZATION

For Electrical and Computing, Electro-Mechanical and Mechanical Engineering students only.

8 HEQF credits at level 7; 24 lectures, 2 practicals.

Convener: Associate Professor KA Folly.

Prerequisites: EEE2031S or EEE2026S.

Course outline: The structure and components of a power system; AC power theory; electrical loads and tariffs; DC machines; AC machines.

Lecture times:

DP requirements: Satisfactory completion of course and laboratory work.

Assessment: November examination 2 hour paper.

EEE3055F ELECTROMAGNETIC ENGINEERING

20 HEQF credits at level 7; 48 lectures, 12 tutorials, 2 practicals, 1 design project.

Convener: Emeritus Professor B Downing.

Prerequisites: EEE2039W, MAM2083F, PHY2010S.

Course outline: Divided into Modules A and B.

Module A: Electromagnetic Field Theory
Electromagnetic field theory, giving the derivation and some applications of Maxwell's equations in an electrical engineering context.
Outline: Time-varying electromagnetic fields; Maxwell's equations; continuity and displacement current; basis of Kirchhoff's laws; propagation of plane waves in lossless and lossy media; power density and Poynting vector; reflection and refraction of plane waves; radiation from antennas.

Module B: Transmission Line Theory
Outline: Overhead 3-phase power transmission lines. Short, medium and long line models. RF and microwave transmission lines, coaxial lines, micro strip, wave guides and fibre optic transmission lines. Equivalent circuit and line constants, two port equations, propagation, attenuation and phase constant, characteristic impedance, incident and reflected waves, reflection coefficient, the SMITH'S CHART, standing waves, high frequency loss-less lines, line matching examples.
Lecture times:
DP requirements: Satisfactory completion of coursework. Completion of laboratory session.
Assessment: June examination 3 hours.

EEE3057S POWER ENGINEERING

20 HEQF credits at level 7; 48 lectures, 6 tutorials, 4 practicals, 1 field trip, 1 project.
Prerequisites: EEE2038W or equivalent.
Module A
Convener: Dr MA Khan.
Course Outline: Introduction to the features, characteristics and operation of three phase AC induction and synchronous machines. Introduction to power electronics.
Module B
Convener: Associate Professor SP Chowdhury.
Course Outline: Introduction to power systems engineering. Structure of a power system; AC and DC power distributors, electrical loads and tariffs, Transmission Efficiency and conductor efficacy.
Lecture times:
DP requirements: Satisfactory completion of coursework and attendance at class visit.
Assessment: November examination 3 hours.

EEE3061W MECHATRONICS DESIGN I

For Mechatronics and Electro-Mechanical Engineering students only.
12 HEQF credits at level 7; 24 lectures, 24 practicals, 6 tutorials.
Convener: TBA
Prerequisites: EEE2038W, EEE2039W or equivalent.
Course outline: Elements of electromechanical systems. Industrial sensors, programmable logic controllers (PLCs), power electronics, actuators. Top-down and bottom-up strategies. Specifications, tenders, intellectual property and licensing. Case histories in mechatronic design.
Lecture times:
DP requirements: Submission of all projects and class mark of 40% plus.
Assessment: Project, November examination 1½ hours.

EEE3062F DIGITAL ELECTRONICS

For Electro-Mechanical Engineering students only.
12 HEQF credits at level 6; 24 lectures, 6 tutorials, 6 practicals.
Convener: Associate Professor M Dlodlo.
Prerequisites:
Course outline: What is a digital system? Boolean Algebra, Logic Gates and Logic Functions, Minimisation, Number System and Binary Arithmetic, Combinational circuits, Flip-Flops and

sequential circuits.
Lecture times:
DP requirements:
Assessment: June examination 2 hours.

EEE3063F TRANSMISSION LINES

10 HEQF credits at level 7; 24 lectures, 6 tutorials, 1 design project.
Convener: Emeritus Professor B Downing.
Prerequisites: EEE2039W, MAM2083F.
Course outline: Overhead 3-phase power transmission lines. Short, medium and long line models. RF and microwave transmission lines. Equivalent circuit and line constants, two port equations, propagation, attenuation and phase constant, characteristic impedance, incident and reflected waves, reflection coefficient, the SMITH'S CHART, standing waves, high frequency loss-less lines, line matching examples.
Lecture times:
DP requirements: None.
Assessment: June examination 1½ hours.

EEE3064W DIGITAL ELECTRONICS & MICROPROCESSORS

16 HEQF credits at level 7; 48 lectures, 8 practicals.
Convener: Mr S Ginsberg.
Prerequisites: EEE2039W or equivalent.
Course outline: Advanced digital electronics with emphasis on VHDL, Algorithmic state machine design methods and computer architecture.
Lecture times:
DP requirements: Satisfactory completion of coursework.
Assessment: November examination 2 hours combined with class mark.

EEE3067W DIGITAL ELECTRONICS & MICROPROCESSORS

For Science students only. Please see the Science Faculty Handbook for further details.
Assessment: November examination 3 hours.

EEE3068F ELECTRONIC CIRCUITS

12 HEQF credits at level 7; 30 lectures 5 laboratories.
Convener: Mr S Ginsberg.
Prerequisites: EEE2038W or equivalent, EEE2039W or equivalent.
Course outline: Frequency analysis of circuits: manual Bode plot techniques for plotting magnitude and phase, breakpoints analysis. Operational amplifiers: design of circuits using opamps, practical limitations, frequency response, stability. Noise in circuits. Introduction to analogue filters. Oscillators. Use of Spice-based simulation software to simulate electronic circuits. Laboratory practicals in building and testing of circuits on bread-board, power supplies, switched mode circuits, mixed signal systems.
Lecture times:
DP requirements:
Assessment: June examination 2 hours.

EEE3069W CONTROL ENGINEERING

Electrical and Mechatronics Students only.
20 HEQF credits at level 7; 48 lectures, tutorials as required, practicals as required, design project.
Convener: Professor M Braae.

Prerequisites: MAM20804S/F, EEE2035F, EEE2038W, EEE2039W.

Course outline: Terminology: open and closed loop configurations, block diagrams, dynamic system modelling, transient response, steady state error criterion. System stability: Routh Hurwitz criterion, Root Locus. Frequency response: Nyquist plots, Bode diagrams, Nichols Charts. Compensation: Lead-lag circuits, minor loops, feed forward and three-term controllers. Sensitivity analysis. Identification techniques. Sampled data systems: z-transforms, hold circuits, pulse transfer functions, minimum prototype response controllers, bilinear transformation, frequency response methods. State variables, state space models and design methods. Robustness, observability controllability, stability and performance.

Lecture times:

DP requirements: Completion of course assignments.

Assessment: June examination 2 hours, November Examination 2 hours - 90%, year mark 10%.

EEE3070S MEASUREMENT & MICROPROCESSORS

For Electro-Mechanical Engineering students.

8 HEQF credits at level 6.

Convener: Associate Professor SP Chowdhury.

Prerequisites:

Course outline: Refer to the course outline for Module D of EEE2039W.

Lecture times:

DP requirements:

Assessment: Programming test and November Examination.

EEE3073S PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students.

12 HEQF credits at level 7; 24 lectures.

Convener: Associate Professor J English.

Prerequisites:

Course outline: This course covers effective reporting. Students learn the requirements for written and oral reports in terms of planning, organisation and selection of information, as well as in terms of linguistic style and final presentation. Students will have to demonstrate proficiency in both formats. **Second-year students may not register for EEE3073S**.

Lecture times:

DP requirements: 100% attendance and 50% minimum class test average. Pass in Ethics assignment.

Assessment: Class test, 2 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

EEE3074W EMBEDDED SYSTEMS

20 HEQF credits at level 7; 48 lectures, 6 practicals, projects.

Convener: Dr S Winberg.

Prerequisites: CSC2001F, CSC2002S, EEE2039W or equivalent.

Course outline: To introduce the student to the design and programming of an embedded system, controlled, for example, by a RISC processor. After the initial embedded coding practice, the tool chains for loading, testing and debugging the code are introduced, followed by more advanced topics of hardware/software interfacing. By the end of the course embedded operating systems are used. The implications of multitasking, realtime operations, safety and maintenance are covered.

Course Outcomes: Experience a range of embedded platforms: microchip PIC-based systems, Texas Instruments, ARM as well as virtual PC for simulating Intel platforms. Experience with operating systems such as Windows Embedded and UCLinux. Program an embedded processor in C using an Open Source tool chain, test and debug simple code on processor using the JTAG interface. Write

and use code to interface to specific peripherals attached to the embedded processor. Decide when an operating system is needed for a system design. Know how to configure and load the appropriate operating system. Write, test and debug C code running on an embedded system. Use network interfaces, design communication protocols, gain experience in sampling and controlling peripherals.

Lecture times:

DP requirements: Complete all practical assignments, achieve over 40% class mark to write the final examination.

Assessment: 50% from 2 hour examination in June and in October, 50% from Class Mark (Practical Reports and Project Report).

EEE3077W DIGITAL & EMBEDDED SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

EEE3078W DIGITAL EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

EEE3079W EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

EEE3081F CONTROL ENGINEERING A

For Electrical and Computer Engineering Students only.

10 HEQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.

Convener: Professor M Braae.

Prerequisites: MAM2084S/F, EEE2035F, EEE2038W, EEE2039W.

Course outline: Terminology: open and closed loop configurations, block diagrams, dynamic system modelling, transient response, steady state error criterion. System stability: Routh Hurwitz criterion, Root Locus. Frequency response: Nyquist plots, Bode diagrams, Nicholas Charts. Compensation: Lead-lag circuits, minor loops, feed forward and three-term controllers. Sensitivity analysis. Identification techniques.

Lecture times:

DP requirements: Completion of course assignments.

Assessment: Examination 2 hours 90%, year mark 10%.

EEE3082S CONTROL ENGINEERING B

For Electrical and Computer Engineering Students only.

10 HEQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.

Convener: Professor M Braae.

Prerequisites: EEE3081F (DP).

Course outline: Sampled data systems: z-transforms, hold circuits, pulse transfer functions, minimum prototype response controllers, bilinear transformation, frequency response methods. State variables, state space models and design methods. Robustness, observability controllability, stability and performance.

Lecture times:

DP requirements: Completion of course assignments.

Assessment: Examination 2 hours 90%, year mark 10%.

EEE3083F COMMUNICATION SYSTEM & NETWORK DESIGN 1

12 HEQF credits at level 7; 36 lectures, 12 tutorials, 3 practicals.

Convener: Dr O Falowo.

Prerequisites: EEE2039W or equivalent.

Course outline: Introduction to Networks: Internet, protocol, network edge, core network and access networks, circuit switching and packet switching, LAN topology, physical media, layered architecture, performance, protocol model. Application layer: service, client-server paradigm, network applications: web and http, ftp, email, ssh, DNS, p2p file sharing, socket programming. Transport layer: transport layer services, multiplexing/demultiplexing, Network layer: Introduction, virtual circuit and datagram networks, router, Internet Protocol datagram, fragmentation, IPv4, Physical layer: Digital information, Digital communication system, Sampling, Pulse modulation, Quantization, Pulse code modulation, Bandpass modulation schemes ASK, FSK, PSK, Phase-shift keying and amplitude phase keying in vector representation, Orthogonal frequency shift keying, QPSK.

Lecture times:

DP requirements: 80% attendance and satisfactory completion of coursework.

Assessment: Examination 2 hours 50%, year mark 50%.

EEE3084W COMMUNICATION SYSTEM & NETWORK DESIGN

24 HEQF credits at level 7; 72 lectures, tutorials and practicals as required.

Convener: Dr O Falowo.

Co-requisites/Prerequisites: EEE2039W.

Course outline: Divided into Modules A and B.

Module A (First Semester): Communication system and network design I

12 HEQF credits at level 7; 36 lectures; tutorials and practicals as required.

Outline: Introduction to Networks: Internet, protocol, network edge, core network and access networks, circuit switching and packet switching, LAN topology, physical media, layered architecture, performance, protocol model. Application layer: service, client-server paradigm, network applications: web and http, ftp, email, ssh, DNS, p2p file sharing, socket programming. Transport layer: transport layer services, multiplexing/demultiplexing, Network layer: Introduction, virtual circuit and datagram networks, router, Internet Protocol datagram, fragmentation, IPv4, Physical layer: Digital information, Digital communication system, Sampling, Pulse modulation, Quantization, Pulse code modulation, Bandpass modulation schemes ASK, FSK, PSK, Phase-shift keying and amplitude phase keying in vector representation, Orthogonal frequency shift keying, QPSK.

Module B (Second Semester): Communication system and network design II

12 HEQF credits at level 7; 36 lectures; tutorials and practicals as required.

Outline: Transport layer: UDP, reliable data transfer, TCP, connection management, congestion and congestion control. Network layer : ICPM, IPv6, link-state algorithm, distance vector routing algorithm, routing in internet, broadcast and multicast routing. Data link layer: link layer services, error detection and correction. Multiple access : TDMA, Aloha, CSMA, LAN technologies: IEEE 802 family, MAC, LAN addressing, ARP, Ethernet, Token Rings, hubs and switches, PPP, ATM, MPLS, all IP networks. Physical layer : Information theory and entropy, Channel capacity, source coding, probability of error, Eb/n performance, matched filter detection, ISI and pulse shaping, equalisation, bandpass demodulation / detection schemes with ASK, FSK, PSK, probability or error with bandpass detection, MSK.

Lecture times:

DP requirements: 80% attendance and satisfactory completion of coursework.

Assessment: Examination 50%, year mark 50%.

EEE3085S COMMUNICATION SYSTEM & NETWORK DESIGN II

12 HEQF credits at level 7; 36 lectures, tutorials and practical work as required.

Convener: Dr O Falowo.

Telecommunication Stream: This fundamental course in telecommunication is pre-requisite to all 4th year telecommunication courses.

Prerequisites: EEE2039W, EEE3083F.

Course outline: Transport layer: UDP, reliable data transfer, TCP, connection management, congestion and congestion control. Network layer : ICPM, IPv6, link-state algorithm, distance vector routing algorithm, routing in internet, broadcast and multicast routing. Data link layer: link layer services, error detection and correction. Multiple access : TDMA, Aloha, CSMA, LAN technologies: IEEE 802 family, MAC, LAN addressing, ARP, Ethernet, Token Rings, hubs and switches, PPP, ATM, MPLS, all IP networks. Physical layer : Information theory and entropy, Channel capacity, source coding, probability of error, Eb/n performance, matched filter detection, ISI and pulse shaping, equalisation, bandpass demodulation / detection schemes with ASK, FSK, PSK, probability or error with bandpass detection, MSK.

Lecture times:

DP requirements: 80% attendance and satisfactory completion of coursework.

Assessment: Examination 2 hours 50%, year mark 50%.

EEE3086F SIGNALS & SYSTEMS II

12 HEQF credits at level 7; 36 lectures, 6 tutorials, 2 practicals.

Convener: Associate Professor A Wilkinson.

Prerequisites: EEE2035F, EEE2036S.

Course outline: Time domain and Fourier domain analysis of linear systems. Power spectral density. Propagation of signals through linear systems. Filter concepts. Noise in linear systems. Calculation of signal to noise ratio. Decibel calculations. Amplitude modulation and demodulation. Frequency division multiplexing. Heterodyning (shifting in frequency). Angle Modulation Applications: telecommunications transmitters and receivers; instrumentation. Some examples of non-linear systems will also be discussed; for example the generation of harmonics at the output of a non-linear time-invariant system.

Lecture times:

DP requirements: Submission of all assignments and drill problems, attendance at laboratory sessions.

Assessment: Examination 2 hours.

EEE4001F DIGITAL SIGNAL PROCESSING

20 HEQF credits at level 8; 48 lectures, tutorials as required, practicals as required.

Convener: Dr F Nicolls.

Prerequisites: EEE3086F or EEE3069W or equivalent.

Course outline: Discrete time signals and systems. The Discrete Fourier transform properties and fast algorithms. The z-transform. Frequency response from z-plane. FIR and IIR filter design and structures for digital filters. Basics of image processing, radar and sonar signal processing.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: Examination 3 hours.

EEE4006F PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students.

8 HEQF credits at level 8; 24 lectures.

Convener: Associate ProfessorJ English.

Prerequisites: EEE3073S.

Note: *Any student who has failed or not taken CHE326S and who wishes to register for EEE4006F may apply through his/her Department for a special concession.*

Co-requisites: EEE4051F.

Course outline: The syllabus includes the following aspects of communication: theory; professional writing including: business proposals; graphic communication; CVs, posters; readability; and group

presentations using PowerPoint to an audience drawn from industry.

Lecture times:

DP requirements: 100% attendance and 50% minimum class test average.

Assessment: Oral examination 50%, projects 50%.

EEE4013F CONTROL SYSTEMS

For Electro-Mechanical and Mechanical Engineering students only.

8 HEQF credits at level 7; 24 lectures, 2 practicals, 12 tutorials, design project.

Convener: Mr M Tsoeu.

Prerequisites: MAM2083 and MAM2084. Students must be in their fourth year of registration and be in at least the third academic year of study.

Course outline: Terminology: open and closed loop system, block diagrams, dynamic system modelling, transient response, steady-state error criterion. System stability: Routh-Hurwitz criterion, root locus. Compensation: minor loop, feedback, feed forward and cascade configurations. Sensitivity analysis, System identification. Introduction to state space methods.

Lecture times:

DP requirements: Satisfactory completion of coursework.

Assessment: June examination 2 hours.

EEE4022F/S FINAL YEAR PROJECT

40 HEQF credits at level 8.

Convener: Individual supervisors.

Prerequisites: All 1st, 2nd, 3rd year core courses and specific, individual, requirements depending on the topic selected. A maximum of 32 credits of coursework can be taken at the same time as the thesis.

Course outline: The thesis is an important opportunity for the student, at the end of the degree programme, to tackle a real engineering project. The student is expected to work on the project both individually and under the guidance of a supervisor. An engineering project involves the creative application of scientific principles to the solution of problems in society.

It involves a problem description or research hypothesis developed in consultation with a supervisor

Reviewing the topic in detail and defining the boundaries (scope) carefully, to confirm an understanding of the requirements of the supervisor

Searching for, selecting and justifying the most appropriate approaches to solving the problem or testing the hypothesis

Analysis, designing, building, integrating and testing as appropriate, including hardware, software and simulation

Evaluating the project against the success criteria and design objectives and

Writing a report about the project, the findings, and any recommendations, make an oral presentation and prepare an exhibit.

Lecture times:

DP requirements:

Assessment: Project report.Oral presentation, open day exhibition of project.

EEE4036C/A ELECTRICAL ENGINEERING DESIGN

8 HEQF credits at level 8; 12 lectures, project.

Convener: Professor CT Gaunt.

Prerequisites:EEE3083F, EEE3069W or EEE3086F, or EEE3057W.

Course outline: To draw together the prior material in the EE, E&CE and ME degrees, in the context of professional project and design work. The course consists of a block of lectures, and a

group project which is intended to exercise the lecture material.

The design environment - Project, production and manufacturing processes. The pessimistic mind view - worst-case design, tolerances, reliability and statistical yield. Standards and codes. STEEP analysis - social, technical, environmental, economic and political context. EDA and CAD.

Design methods - Synthesis of candidate concepts and selection of an optimum concept; development of specifications and user requirements; modelling, simulation, reality checks; design work; qualification and acceptance tests; documentation. Case histories.

A Formal Design Methodology - Common features of formal design methodologies. IBM's Rational Unified Process. Phases and iterations - inception, elaboration, construction, transition. Disciplines - business modelling, requirements gathering, analysis and design, implementation, testing, deployment, project management, configuration and change management, environment.

Project - A design topic will be tackled, working as a small group. A design report will be submitted.

Lecture times:

DP requirements:

Assessment: Continuous assessment 50%. Two hour examination in June/September 50%. There is a sub-minimum requirement of 50% in the examination in order to pass the course.

EEE4051F NEW VENTURE PLANNING

8 HEQF credits at level 8; 24 lectures.

Convener: TBA.

Prerequisites: EEE2038W, EE2039W or equivalent, EEE3073S, MAM2084S.

Co-requisites: EEE4006F.

Course outline: The entrepreneurial perspective; developing a new venture; what is a feasibility plan? Product concept and description; market assessment; industrial analysis; marketing plan; operations, development plans and management; financial projections.

Lecture times:

DP requirements:

Assessment: Individual learning log 5%, presentations 10%, project report(s) 85%.

EEE4080C ELECTRICAL MACHINES & DRIVES

8 HEQF credits at level 8; 20 lectures, 3 tutorials, 1 project.

Convener: Dr P Barendse.

Prerequisites: EEE3069W, EEE3031S or EEE3057S.

Course outline: Introduction to reference frame theory; dq-machine modelling; field orientated control of a permanent magnet synchronous motor; introduction to single-phase induction motors.

Lecture times:

DP requirements: Submission of two tutorials, writing of two class tests and achieve a class mark of at least 40%.

Assessment: September examination, 2 hours.

EEE4084F DIGITAL SYSTEMS

20 HEQF credits at level 8; 48 lectures, 2 projects.

Convener: Dr S Winberg.

Prerequisites: CSC3021F, EEE3064W or EEE3017W (>70%).

Course outline: The objective of this course is to develop an understanding of the concepts involved in the design and development of high performance and special-purpose digital computing systems, in terms of both hardware and software design. The course builds on a basic understanding of parallel computing principles, expanding the students' expertise into the specialized fields of reconfigurable computing and high performance parallel computing. The coursework involves four laboratory assignments, two mini projects. A number of compulsory quizzes are held, for which

advanced notice and a syllabus is provided. The lecture sessions include presentations by lecturers, seminars and workshops during which students learn fundamental theories, brainstorm ideas, and discuss influential and recent publications in the field.

Lecture times:

DP requirements: Coursework assessment mark of at least 40%.

Assessment: June examination 40%, year mark 60%.

Website: http://www.vrsg.uct.ac.za/EEE4084F.

EEE4087F MOBILE BROADBAND NETWORKS

20 HEQF credits at level 8; 48 lectures, 6 practicals, 6 tutorials.

Conveners: Dr O Falowo, Dr A Murgu.

Prerequisites: EEE3055F or EEE3063F; EEE3085S, EE3083F, EEE3084W, EEE3086F or equivalent.

Course outline: Selected topics in (1) wireless and fixed access networks (16 lectures), (2) mobile broadband transport and services (16 lectures), and (3) broadband networks (16 lectures).

Wireless and Fixed Access Networks: Wireless network Fundamentals (architecture and components, protocols and standards, cellular concept and cellular system fundamentals, call splitting and sectoring). Wireless Access Technologies (GSM and General Packet Radio Service 2.5G Wireless, 3G Wireless, UMTS and CDMA2000 3.5G and 4G wireless networks. Wireless LAN, Bluetooth Ad hoc networks and Sensor area networks. Heterogeneous wireless networks). Fixed Access Networks, Radio Resource Management, Mobility Management.

Broadband Networks: TCP Traffic Control, Traffic and Congestion control in ATM Networks, Performance Evaluation of Communication Networks, Mathematical Analysis, Computer Simulations and Markov Analysis, Networks on Queues, Traffic Characterisation for Broadband Services, QoS in Packet Networks, Basic Mathematics for Quality of Service, QoS Metrics, IP QoS Functional Requirements, IP Integrated Services and Differentiated Services, QoS in ATM networks; IP Traffic Engineering, Routing and Traffic Engineering with MPLS; Router Architectures and IP Address Lookup Algorithms; Quality of Service Routings; Deploying Quality of Service.

Mobile Broadband Services and Transport: Network Convergence; Network Trends; Evolution and Market Internetworking; Hierarchical TDM networks, Internet, LAN/SOHO and Access Networks, WAN application requirements; QoS; Service Platforms, AAA, VoIP, API (Parlay, JAIN); Next Generation Networks; Multiservice platforms, Soft-switch, Data Plane Technology, multiplexing, routing, MPLS, L2/L3/L4, switching; Control Plane Technology, signalling, Call Set Up and connection control (SS7, H.323, SIP, MGCP); Applications : telephony, packet voice, streaming.

Lecture times:

DP requirements: Minimum 80% in attendance and in completion of coursework.

Assessment:

EEE4088F WIRELESS COMMUNICATION SYSTEMS DESIGN

20 HEQF credits at level 8; 48 lectures, practicals and tutorials as required, plus a design project.

Convener: Associate Professor M Dlodlo.

Prerequisites/Corequisites: EEE3055F or EEE3063F; EE3085S or EEE3083F or EEE3084W, EE3086F or equivalent.

Course outline:RF and microwave wireless communication systems.

RF Wireless Systems Content: Any topics from Microwave and RF components and transmission lines; Mobile communication systems, Radar systems; noise and distortion in microwave systems; Frequency planning, Regulatory aspects of Spectrum usage; Antenna technology, Satellite communication systems; Global Positioning Systems (GPS); Use of Microwave test equipment.

Digital Communication Systems Content : Any topics from Digital Modulation, highlights; Formatting and Source Coding Synchronisation; Reducing Signal Degradation; signals, spectra and

noise, communications link analysis, coding and interleaving to mitigate fading effects, main parameters and Fading Channel Models, applications. Modulation and Coding trade-offs, Error Performance of communication systems corrupted by noise.

Lecture times:

DP requirements: Minimum 80% in active attendance and at least 40% class marks in completion of coursework.

Assessment: June examination 3 hours and year mark.

EEE4089F POWER DISTRIBUTION & TRANSMISSION NETWORKS

20 HEQF credits at level 8; 48 lectures, 3 practicals, 2 field trips.

Convener: Dr S Chowdhury.

Prerequisites: EEE3057S.

Course outline: Transmission and distribution, Electrical loads and load forecasting, delivery process and pricing, substations, distributed generation, power system protection, high voltage engineering.

Lecture times:

DP requirements: Satisfactory completion of coursework and continuous assessment mark of at least 35%.

Assessment: June examination 3 hours and year mark.

EEE4090F POWER SYSTEMS ANALYSIS OPERATION & CONTROL

20 HEQF credits at level 8; 48 lectures, 2 practicals, 2 field trips.

Convener: Associate Professor K Folly.

Prerequisites: EEE3057S.

Course outline: Load flow studies, fault calculation, power system operations, power system stability and control, Grid connections of distributed generator (DG) high voltage DC transmissions systems.

Lecture times:

DP requirements: Satisfactory completion of coursework and continuous assessment mark of at least 35%.

Assessment: June examination 3 hours.

EEE4093F PROCESS CONTROL & INSTRUMENTATION

20 HEQF credits at level 8; 48 lectures, tutorials and practicals as required, design project.

Convener: Professor M Braae.

Prerequisites: EEE3069W or equivalent.

Course outline: Aims to provide an integrated view of the principles and practice of modern industrial control and its applications.

Various topics will be covered including: Measurement of physical variables, industrial transducers, integration of programmable logic controllers (PLCS), supervisory control and data acquisition (SCADA) systems and management information systems (MIS), signal transmission and conditioning, micro controllers, computer interfacing, realtime multitasking in computer control, nonlinear and advanced control methods.

Lecture times:

DP requirements: Attendance at all laboratory sessions and class mark of 40% plus.

Assessment: Project, June examination 3 hours and year mark.

EEE4096S NEURAL, FUZZY & EVOLVING SYSTEMS

8 HEQF credits at level 8; 24 lectures, project(s).

Convener: Associate Professor J Greene.

Prerequisites: All third year core courses.

Course outline: An introduction to Pattern recognition, Machine Learning and Stochastic Optimisation. A practical hands-on introduction using programming in Matlab (which will be taught along with the subject matter). Additional introductory tutorials will be given for those unfamiliar with Matlab.

Lecture times:

DP requirements: 80% submission of all assignments, satisfactory completion of hands-on proficiency test.

Assessment: November examination 2 hours.

EEE4099F ELECTRICAL MACHINES & POWER ELECTRONICS

20 HEQF credits at level 8; 48 lectures, 3 labs, 6 tutorials.

Convener: Dr MA Khan.

Prerequisites: EEE3031S or EEE3057S or equivalent.

Course outline: Switching and conduction losses of power semi-conductor devices. Uncontrolled and controlled naturally commutated/converters. DC to DC converters; buck, boost, CÛK, flyback, and full bridge. Unipolar and bipolar pulse width modulated schemes. Space vector modulation, Half-bridge and full-bridge configurations for single and three phase converters. The analytical models of DC and AC machines are analysed and methods of achieving speed control discussed. The characteristics of each machine under variable speed operation are studied. Modern four-quadrant DC and AC Drive topologies are discussed together with their control objectives and performance. Topics on specialised electrical machines are also presented.

Lecture times:

DP requirements: Satisfactory completion of tutorials and laboratory and 40% plus for class mark.

Assessment: June Examination 3 hours.

EEE4100X PRACTICAL TRAINING

Prerequisites: EEE3000X.

Course outline: Electrical Engineering students shall produce a report to the satisfaction of the head of department showing the completion of suitable work for a minimum of three weeks experience in an electrical engineering environment. The experience may include the attendance of instruction, practical work, and engineering work including analysis, design and/or site inspections.

EEE4101F NUCLEAR POWER ENGINEERING

20 HEQF credits at level 8; 48 lectures, 4 tutorials, 2 site visits and 3 laboratories.

Convener: Professor CT Gaunt.

Prerequisites: EEE3057S or EEE3044S.

Course outline:Common discipline component (24 lectures)

Development of nuclear engineering: atomic models, relativity, x-rays, nuclear reactions Introduction to nuclear engineering: radioactivity, nuclear and neutron physics, radiation protection, fission and fusion reactor concepts. Nuclear fuel cycle: production, handling and use of nuclear fuel and the safe disposal of waste Nuclear reactor theory: introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors, heat extraction, reactor statics and dynamics, shut down and restart. Materials in nuclear engineering: interaction of radiation with matter Radiation protection: theory and practice of radiation dosimetry Reactor engineering and design. Environmental aspects: evaluation of effects of radioactivity added to the environment by human activities Regulatory: reactor operator licensing, nuclear safety, and reactor operations

Electrical engineering component (24 lectures) Nuclear energy: global and national energy requirements, integration of nuclear power with other sources. Nuclear power plant systems: conventional and advanced generation power reactors, coupling of reactor and power plant, nuclear simulators; electrical systems in nuclear engineering: design methodology, problem formulation,

criteria, trade-off decisions and design optimization; case studies. Instrumentation: behaviour of various nuclear radiation detectors; design and application of radiation dosimeter systems for personnel monitoring, area radiation monitoring and accident situation, nuclear reactor flux distributions, temperatures and transients. Control systems: measurement and control of fundamental parameters for nuclear plant operation and safety.

Lecture times:

DP requirements: 30% on CAM and attendance of both visits.

Assessment: Examination 70%, year mark 30%.

EEE4103F NUCLEAR POWER SOURCES

For Mechanical, Electro-mechanical and Chemical Engineering students only.

12 HEQF credits at level 8; 24 lectures, 3 labs and 2 site visits.

Convener: Professor CT Gaunt.

Prerequisites: EEE3044S or 3rd year Chemical Engineering.

Course outline: Module A of EEE4101F

Development of nuclear engineering: atomic models, relativity, x-rays, nuclear reactions Introduction to nuclear engineering: radioactivity, nuclear and neutron physics, radiation protection, fission and fusion reactor concepts. Nuclear fuel cycle: production, handling and use of nuclear fuel and the safe disposal of waste Nuclear reactor theory: introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors, heat extraction, reactor statics and dynamics, shut down and restart. Materials in nuclear engineering: interaction of radiation with matter Radiation protection: theory and practice of radiation dosimetry Reactor engineering and design. Environmental aspects: evaluation of effects of radioactivity added to the environment by human activities Regulatory: reactor operator licensing, nuclear safety, and reactor operations.

Lecture times:

DP requirements: 30% attendance on CAM and both site visits.

Assessment: Examination 70%, year mark 30%.

EGS1005F INTRODUCTION TO ENVIRONMENTAL ASSESSMENT & MANAGEMENT

12 HEQF credits at level 5; 48 lectures, 8 practicals, 3 field trips.

Convener:

Co-requisites: Any one of CIV4031F, CIV4034F, CIV4040F, CIV4041F.

Course outline: Introduction to environmental management and sustainable development and climate change. Environmental assessment: process, methods, reports, and public involvement. Environmental management of construction. Practical sessions: case studies,field trips and course project.

Lecture times:

DP requirements:

Assessment: June examination 2½ hours, 50%.

END0007F FOUNDATIONS OF ENGINEERING MATHEMATICS

Administered by the ASPECT co-ordinator.

0 HEQF credits at level 5. First-year first semester course.

Convener: To be decided.

Prerequisites:

Course outline: Fundamentals of algebra: inequalities; absolute values, logarithms and exponents; functions and graphs: polynomial, rational, exponential, logarithmic, trigonometric; trigonometry; analytic geometry;an introduction to limits, continuity, and differentiability;an introduction to derivatives and integrals;vector analysis using graphical techniques.

Lecture times: Monday 1st period; Wednesday & Thursday 1st& 2nd periods; Friday 4th& 5th periods.

Workshops: Wednesday 6th - 8th periods.
DP requirements: 40% in class tests and weekly tests.
Assessment: June examination 30%, year mark 70%.

END1008Z INTRODUCTION TO COMMUNICATION

Administered by the ASPECT coordinator.
8 HEQF credits at level 5. First-year whole year course.
Convener: Evelyn Vicatos.
Prerequisites:
Course outline: The course develops content-specific academic literacy skills for engineering students. It concentrates on academic reading, academic writing, listening skills, research skills and oral communication skills. Students are thus prepared for communication in engineering courses, as well as for the demands of the engineering profession.
Lecture times: Tuesday 2nd& 3rd periods or Friday 1st& 2nd periods.
DP requirements: Completion of assignments.
Assessment: June or November examination 3 hours counts 50%, class assignments count 50%.

END1017F/S MATHEMATICS 1017

Administered by the ASPECT coordinator.
16 HEQF credits at level 5. First-year single semester course; run in both first and second semester.
Convener: Tracy Craig.
Prerequisites:
Course outline: Functions and models; limits and derivatives; rules of differentiation; applications of differentiation - maxima, minima, related rates, optimization and curve sketching; integration and applications of integration.
Lecture times: Monday, Wednesday & Thursday 1st& 2ndperiods; Friday 5th period.
Workshops: Wednesday 6th – 8th periods.
DP requirements:30% in class record; class record is 70% class tests 30% problem sets.
Assessment: Class record 50%, Final examination 50%.

END1018S MATHEMATICS 1018

Administered by the ASPECT coordinator.
16 HEQF credits at level 5. First-year second semester course.
Convener: Tracy Craig.
Prerequisites: END1017F or MAM1017F.
Course outline: Integration and applications of integration; an introduction to differential equations; complex numbers; matrices; vectors and the geometry of space.
Lecture times: Monday, Wednesday & Thursday 1st& 2ndperiods; Friday 5th period.
Workshops: Wednesday 6th – 8th periods.
DP requirements: 30% in class record; class record is 70% class tests 30% problem sets.
Assessment: Class record 50%, Final examination 50%.

GEO1006S INTRODUCTION TO MINERALS, ROCKS & STRUCTURE

Field Work: Students are required to attend a one day excursion in the Cape Peninsula and a four day excursion through the South Western Cape during the September vacation.
18 HEQF credits at level 5; 1 practical per week, 5 lectures per week, one 1 day and one 4 day field trip.
Convener:
Prerequisites:A minimum of 45% in GEO1009F.
Course outline: Crystals and minerals; igneous and metamorphic rocks; structural geology; mineral

deposits and economic geology; palaeontology.

Lecture times:

DP requirements:

Assessment: Class test 35%, Field reports 15%, November examination one 2 hour theory examination counts 50% (sub-minimum 40%).

GEO1008F INTRODUCTION TO GEOLOGY FOR CIVIL ENGINEERS

12 HEQF credits at level 5; 48 lectures, 12 practicals.

Convener:

Prerequisites:

Course outline: Introduction to the structure of planet Earth and plate tectonics of the lithosphere. Physical and chemical properties of rock forming minerals. Clay minerals, their structure and properties. Petrology of igneous, sedimentary and metamorphic rocks. Weathering and applied geomorphology. Structural geology, geomechanical classification of jointed rock masses. Field and laboratory testing techniques. Case studies of problem soils throughout South Africa and problem soils in general.

Lecture times:

DP requirements:

Assessment: June examination 3 hours 60%, year mark 40%.

GEO1009F INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 HEQF credits at level 5; 5 lectures per week, 1 practical per week.

This course is presented jointly by the Departments of Archaeology, Environmental and Geographical Science and Geological Sciences, but administered by Geological Sciences.

Convener:

Prerequisities: Physical Sciences, Life Sciences or Geography at NSC level 5 or AGE1003H. Preference will be given to students registered in the Science Faculty.

Course outline: Structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; humans and the environment.

Practicals: One practical per week, Monday or Tuesday or Thursday or Friday, 14h00-17h00.

Fieldwork: Students are required to attend three half day excursions in the CapePeninsula.

DP requirements: An average of 30% on all marked classwork and tests.

Assessment: Marked classwork counts 24%; marked class tests count 16%; June examination 3 hours 60% A Subminimum of 40% is required in the theory examination paper. Supplementary examination will be written in November.

HUB2005F INTRODUCTION TO MEDICAL ENGINEERING

This course is intended as an introduction to the field of Biomedical Engineering and for students with an interest in applying their engineering skills to the solution of problems in health care. Students are exposed to some basic aspects of human physiology and medical instrumentation, while they receive an overview of health care, biomechanics and medical imaging.

8 HEQF credits at level 6; 24 lectures.

Convener: Associate Professor T Douglas.

Prerequisites:

Course outline: Introduction to the human body; Overview of health-care technology; The circulation system; The electrical activity of the heart and ECG; Biomechanics of the musculoskeletal system; Medical imaging physics and applications.

Lecture times:

DP requirements:

Assessment: Two class tests 40% (each test worth 20%), June examination 3 hours 60%.

HUB4007F BIOMECHANICS OF THE MUSCULOSKELETAL SYSTEM

8 HEQF credits at level 8; 24 lectures, 4 practical sessions.

Convener: Dr Sudesh Sirarasu.

Prerequisites: Mathematics 2, Physics 2 or Applied Mathematics 2 or equivalent.

Co-requisites: HUB2022F Anatomy for Biomedical Engineering.

Course outline: Body segment parameters; joint forces and torques; kinematic and kinetic data collection; computer techniques of data acquisition and analysis; aspects of electromyography; introduction to muscle, joint, and bone force optimisation techniques; rheology of bones, cartilage and collagenous tissues; fracture mechanics; joint lubrication and wear; properties of biomaterials; stress analysis; design of artificial joints; tissue response to implanted materials; implant failure analysis; biomechanics of human gait (walking and running) in health and disease.

Lecture times:

DP requirements:

Assessment: Written examination at the end of the first semester. Work during the semester may contribute to the overall mark.

HUB4045F INTRODUCTION TO MEDICAL IMAGING & IMAGE PROCESSING

12 HEQF credits at level 8; 26 lectures, 4 practical sessions.

Conveners: Associate Professors T Douglas and E Meintjes.

Prerequisites: Students must be in their fourth year of study.

Course outline: This course provides an introduction to the physics and engineering principles involved in the acquisition and processing of medical images. Topics include: mathematical tools of image processing; computed tomography, ultrasound, magnetic resonance imaging.

Lecture times:

DP requirements:

Assessment: Assignments, written assessment or a final project.

MAM1000W MATHEMATICS I

36 HEQF credits at level 5; 5 lectures per week, 1 double-period tutorial per week.

Convener:

Prerequisites:

Course outline: Differential and integral calculus of functions of one variable, differential equations, partial derivatives, vector geometry, matrix algebra, complex numbers, Taylor series.

Lecture times:

DP requirements:

Assessment: November examination two no longer than 3 hour papers: 66.67%, year mark: 33.33%.

MAM1010S MATHEMATICS 1010

18 HEQF credits at level 5.

Convener: Dr P Uys.

Prerequisites:

Course outline: Financial mathematics, functions, intoduction to derivatives, techniques of differentiation, inverse trig functions, Newton's method, applications of the derivative, integrals, integration techniques and applications.

Lecture times:

DP requirements:

Assessment: November examination, 2-hour paper: The final mark is either (40% x class mark + 60% x the examination mark) or (20% x class mark + 80% x the examination mark), whichever is better.

MAM1017F/S ENGINEERING MATHEMATICS A

16 HEQF credits at level 5; 4 lectures per week, 1 double-period tutorial per week, offered in each semester.

Convener:

Prerequisites:

Course outline: An introduction to differential and integral calculus. Functions, limits and continuity. Rational functions, the natural exponential and logarithm functions. Radian measure and the Trigonometric functions. The rules of differentiation. Curve sketching. Applications of the mean value theorem. Rates of change and optimization involving functions of a single variable. L'Hospital's rules, indeterminate forms and the squeeze theorem. Antidifferentiation. The binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.

Lecture times:

DP requirements: 30% For class record, high tutorial attendance.

Assessment: Examination, not longer than 3 hours in June or November: Class record up to 40%.

MAM1018F/S ENGINEERING MATHEMATICS B

16 HEQF credits at level 5; 4 lectures per week, 1 double-period tutorial per week, offered in each semester.

Convener:

Prerequisites: MAM1017F/S.

Course outline: Further calculus of a single variable. The inverse trigonometric functions. Integration by parts. Partial fractions. Areas, volumes and arc length. An introduction to modeling and differential equations. Vector algebra and geometry. Points, lines and planes. Dot products and cross products. Matrices. Systems of linear equations. Gauss reduction. Matrix algebra. Linear transformations. The matrix representing a linear map. Inverses. An introduction to complex numbers. The complex plane. Moduli and arguments, conjugates. De Moivre's theorem. Roots of polynomials. Some simple complex maps.

Lecture times:

DP requirements: 30% For class record, high tutorial attendance.

Assessment: Examination, not longer than 3 hours in June or November: Class record up to 40%.

MAM1042S ENGINEERING STATICS

16 HEQF credits at level 5; 4 lectures per week, 1 two hour tutorial per week.

Convener:

Prerequisites:

Course outline: Topics from: review of vectors, position, displacement and force vectors, line of action and transmissibility, addition of forces at a point, normal reaction and friction, equilibrium for a particle, connected particles, limiting equilibrium, free body diagrams. Parallel and non-parallel coplanar forces, moment of a force, couples, principle of moments, addition of a force and a couple, resultant and equilibrium for a rigid body, internal forces, toppling and sliding, two-force and three-force systems, compound systems, trusses. Centre of mass of many particles, centre of mass of extended bodies, composite bodies. Distributed forces, pressure distributions. Moments of inertia for areas and masses, parallel axis theorem.

Lecture times:

DP requirements: 35% for class record and high tutorial attendance.

Assessment: November examination 2.5 hours: 67%, year mark: 33%.

MAM1043H MODELLING & APPLIED COMPUTING

18 HEQF credits at level 5; 2½ lectures per week, one 1-hour tutorial every week.

Convener:

Prerequisites:

Course outline: An introduction to Applied Mathematics and Mathematical Modelling including approximations and estimation theory, numerical methods, dynamical systems and modelling and simulation of discrete and continuous processes with Matlab. Exposure to research methodology and mathematical communication.

Lecture times: 1st semester: 2nd period Monday, Wednesday and Friday.

2nd semester: 2nd period Tuesday and Thursday.

Assessment: November examination not longer than 3 hours: 60%; year mark: 40%.

MAM1044H DYNAMICS

18 HEQF credits at level 5; 2½ lectures per week, 1 practical every two weeks.

Convener:

Prerequisites:

Course outline: A systematic introduction to the elements of mechanics; kinematics in three dimensions. Newton's law of motion, models of forces (friction, elastic springs, fluid resistance). Conservation of energy and momentum. Simple systems of particles, including brief introduction to rigid systems. Orbital mechanics with applications to the planning of space missions to the outer planets. This course can be taken in conjunction with MAM1043H as lectures are arranged to make this possible.

Lecture times:

DP requirements:

Assessment: November examination no longer than 3 hours: 67%, year mark: 33%.

MAM1045S MODELLING & PROGRAMMING WITH MATLAB FOR ELECTRICAL ENGINEERS

16 HEQF credits at level 5; 4 lectures per week, 1 double-period tutorial per week .

Convener:

Prerequisites:

Course outline: Expressions, basic operations, script files, vector and matrix handling, loops, decisions, function files, reading and writing data, basic graphics, strings, basic numerical methods (e.g. applied to systems of linear equations, and roots of nonlinear equations), numerical solutions of ODE's, least squares, Fourier synthesis, examples of interest to electrical engineering (signal processing, complex numbers, phasors, electromagnetic waves, electronic circuits).

Lecture times:

DP requirements: 30% Class record and high tutorial attendance.

Assessment: November examination no longer than 2 hours: 60%, year mark: 40%.

MAM2000W, MAM2001H, MAM2002S, MAM2003Z, MAM2004H MATHEMATICS II, 2001, 2002, 2003, 2004

Modules under these codes may be taken. Refer to the Handbook of the Faculty of Science for details.

48 HEQF credits at level 6, 24 HEQF credits at level xxx, 24 HEQF credits at level xxx, 12 HEQF credits at level xxx and 24 HEQF credits at level xxx respectively.

Convener:

Prerequisites: MAM1000W.

1. MAM1003W (or its equivalent MAM1017 and MAM1018) is NOT equivalent to MAM1000W and does not normally give admission to MAM2000W. Students who have passed MAM1003W (or its equivalent) and wish to enrol for MAM2000W should consult the MAM2000W course co-ordinator before 1 December in the year preceding the year in which they wish to register for MAM2000W. They will be expected to do some reading during the long vacation on those parts of the work of MAM1000W which are not included in MAM1003W (or its equivalent). Their

admission to MAM2000W will be at the discretion of the Head of the Department of Mathematics & Applied Mathematics, who will in each case take account of the student's performance in MAM1003W (or its equivalent). A student who expects, before the start of his or her first year, to include MAM2000W in his or her curriculum, should register for MAM1000W and not MAM1017F and MAM1018S.

2. For students transferring to the Faculty of Science after having passed MAM1003W, an alternative option is to claim credit and exemption for MAM1004F.

MAM2044F NONLINEAR DYNAMICS

This course is identical to module 2ND of MAM3046W for Science students.

18 HEQF credits at level 6; 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: MAM2080W or equivalent.

Course outline: Fixed points, bifurcations, phase portraits, conservative and reversible systems. Index theory, Poincaré-Bendixson theorem, Lienard systems, relaxation oscillators. Hopf bifurcations, quasi periodicity and Poincaré maps, applications to oscillating chemical reactions and Josephson junctions. Chaos on a strange attractor, Lorentz map, logistic map, Hénon map, Lyapunov exponents. Fractals.

Lecture times:

DP requirements:

Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MAM2050S BOUNDARY-VALUE PROBLEMS

This course is identical to module 2BP of MAM2046W for Science students.

12 HEQF credits at level 6, 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: At least 40% in MAM2080W.

Course outline: Boundary-value problems. Sturm-Liouville problems. Diffusion, Laplace's and wave equation. Solution by separation of variables. Green's function.

Lecture times:

DP requirements:

ssessment: November examination no longer than 2 hours: 70%, year mark: 30%.

MAM2053S NUMERICAL ANALYSIS & SCIENTIFIC COMPUTING

This course is identical to module 2NA of MAM2046W for Science students.

12 HEQF credits at level 6; 2½ lectures per week, 1 tutorial per week.

Note: Credit cannot be obtained for both MAM2053S and MAM3080F.

Convener:

Prerequisites: MAM2080W or MAM2083 and MAM2084

Course outline: Solutions to non-linear equations and rates of convergence. Direct and iterative methods for solving linear systems, pivoting strategies, matrix factorization, norms, conditioning. Solutions to initial value problems including higher order ordinary differential equations. Interpolation and approximation theory, splines, discrete and continuous least squares. Numerical differentiation and integration. Error analysis and control.

Lecture times:

DP requirements:

Assessment: November examination no longer than 2 hours: 70%, year mark: 30%.

MAM2082F COMPUTER PROGRAMMING IN MATLAB

The aim of this course is to introduce basic scientific programming in MATLAB.

8 HEQF credits at level 6; 1 lecture and 1 tutorial per week.

Convener:

Prerequisites: MAM1003Wor MAM1017 and MAM1018.

Course outline: Expressions, basic operations, script files, vector and matrix handling, loops, decisions, function files, reading and writing data, basic graphics, strings, basic numerical methods (e.g. applied to systems of linear equations, and roots of nonlinear equations), numerical solution IVP's (Euler's method & Runge-Kutta methods), numerical solution of BVP's(finite difference methods), further examples of interest to engineers (simulation, chaos, mechanical systems, fluid flow, heat transfer).

Lecture times:

DP requirements: 30% Class record and high tutorial attendance.

Assessment: June examination no longer than 2 hours: 60%, year mark: 40%.

MAM2083F/S VECTOR CALCULUS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 HEQF credits at level 6; 4 lectures per week, 1 double-period tutorial per week.

Convener:

Prerequisites: MAM1003W or MAM1017 and MAM1018.

Course outline: Differentiation of vector valued functions, space curves and surfaces. Partial derivatives, chain rule, maxima and minima, Lagrange multipliers. Gradient, divergence and curl. Taylor's theorem for one and several variables, Jacobians, Newton's method for several variables. Multiple integrals and change of variable. Surface integrals. Line integrals, work done by a force, potentials. Green's theorem, divergence theorem, Stokes' theorem.

Lecture times:

DP requirements:

Assessment: One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

MAM2084F/S LINEAR ALGEBRA & DEs FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 HEQF credits at level 6; 4 lectures per week, 1 double-period tutorial per week.

Convener:

Prerequisites: MAM2083F/S.

Course outline: First order ordinary differential equations. Systems of linear equations, linear combinations, linear dependence, linear subspaces and basis. Determinants. Eigenvalues and eigenvectors, diagonalization, applications to systems of linear differential equations and finding principal axes. Solution of n-th order linear differential equations. The Laplace transform. Brief introduction to partial differential equations and the method of separation of variables.

Lecture times:

DP requirements:

Assessment: One paper written in June or November no longer than 2.5 hours:60%, year mark: 40%.

MAM3000W, MAM3001W, MAM3002H, MAM3003S, MAM3004Z
MATHEMATICS III, 3001, 3002, 3003, 3004

Modules under these codes may be taken. Refer to the Handbook of the Faculty of Science for details.

72 HEQF credits at level 7, 72 HEQF credits at level xxx, 36 HEQF credits at level xxx, 36 HEQF credits at level 7 and 18 HEQF credits at level xxx respectively.

MAM3043S METHODS OF MATHEMATICAL PHYSICS

This course is identical to module 3MP of MAM3040W for Science students.

18 HEQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: MAM2080W or equivalent courses.

Course outline: The Fourier-transform solution of linear PDEs on the line. The long-term asymptotic behaviour of solutions: the methods of Laplace, stationary phase and steepest descents. Nonlinear waves: the method of characteristics; the effect of dissipation; the Cole-Hopf transform for the Burgers equation; travelling fronts for the KPP equation. The effect of dispersion: KdV and nonlinear Schroedinger equation. Elliptic integrals and elliptic functions; dark and bright solitons; kinks and breathers for the sine-Gordon equation. Multisoliton solutions: the Hirota method and Baecklund transformations.

Lecture times:

DP requirements:

Assessment: November examination no longer than 2 hours: 75%, year mark: 25%.

MAM3049S INTRODUCTION TO GENERAL RELATIVITY

This course is identical to module 3GR of MAM3040W for Science students.

18 HEQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: MAM2080W or equivalent courses.

Course outline: Christoffel relations, geodesics, curvature, the Riemann tensor. The energy momentum tensor in electrodynamics and fluid dynamics. Principle of equivalence, Einstein's field equations. Black Holes. Gravitational Waves.

Lecture times:

DP requirements:

Assessment: November examination no longer than 3 hours: 75%, year mark: 25%.

MAM3050F NUMERICAL MODELLING

This course is identical to module 3AN of MAM3040W for Science students.

18 HEQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: MAM2080W or equivalent courses.

Course outline: Boundary-value problems. Numerical solutions of PDEs by the method of finite differences, finite elements and spectral methods.

Lecture times:

DP requirements:

Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MAM3054S FLUID DYNAMICS

This course is identical to module 3FD of MAM3040W for Science students.

18 HEQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener:

Prerequisites: MAM2080W or equivalent courses.

Course outline: Description of fluids, equations of fluid flow for simple fluids, analytic techniques. Applications.

Lecture times:

DP requirements:

Assessment: November examination no longer than 2 hours: 75%, year mark 25%.

MAM3080F NUMERICAL METHODS

12 HEQF credits at level 7; 3 lectures per week, 1 double tutorial per week.

Convener:

Prerequisites: At least 40% in MAM2080W or equivalent courses.

Course outline: Computational issues: finite precision, speed of algorithm, Matlab Polynomial interpolation: Lagrange form, Newton Form, error formulae, splines. Solutions to non-linear equations: bisection method, inverse interpolation, Newton's method in one dimension, error formulae, rates of convergence, Newton's method for systems. Solutions to linear equations: Gaussian elimination, pivoting, LU factorisation, QR factorisation, iterative methods. Numerical differentiation: derivation of finite difference formulae. Numerical integration: derivation of Newton-Cotes formulae, adaptive composite trapezium rule, Gaussian integration. Solutions to systems of explicit first-order ODEs: Euler, modified Euler, Runge-Kutta. Stiffness: stability, backward Euler. Conversion of higher order explicit equations to first-order systems. Solution to PDE BVP on a rectangular domain by finite differences on a regular mesh.

Lecture times:

DP requirements:

Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MEC1000X PRACTICAL TRAINING

0 HEQF credits at level 5.

Convener: Associate Professor BI Collier-Reed.

Prerequisites:

Course outline: Electro-Mechanical and Mechanical Engineering students shall produce to the satisfaction of the head of department, a certificate showing evidence of completion of suitable work in the basic workshop processes during the period of at least six weeks in an approved industrial workshop, either before registration or during the long vacation following the year of first registration in the Faculty. Such evidence must be produced by 31 March of the year following such training. Alternatively students may produce a certificate showing evidence of completion of an approved structured intensive practical training course (e.g. at a Technikon/University of Technology).

Lecture times: Not applicable.

DP requirements:

Assessment:

MEC1002W ENGINEERING DRAWING

16 HEQF credits at level 5; 18 lectures, 20 tutorials, 5 CAD practical sessions, 5 lectures related to the specific EBE discipline. First year course.

Convener: Mrs C Findeis.

Course outline: Use of drawing instruments, plane geometry; principles of: orthographic projection; pictorial projection; auxiliary projection ; sections; intersection of solids; development; engineering drawing conventions; dimensioning; the measurement of areas; graphical integration; descriptive geometry of points, lines and planes in space; an introduction to the basics of CAD.

Lecture times:

DP requirements:

Assessment: CAD test – 10%.; 2½ hour practical drawing examination written in November – 50%; Fianl portfolio submission – 25%; Discipline specific Module – 15%; A minimum of 50% is required to pass this course. There is no supplementary examination for this course.

MEC1003F ENGINEERING DRAWING

8 HEQF credits at level 5; 12 lectures, 12 tutorials, 5 CAD practical sessions.

Convener: Mrs C Findeis.

Course outline: Use of drawing instruments, plane geometry; principles of: orthographic projection; pictorial projection; auxiliary projection; sections; the measurement of areas; descriptive geometry of points, lines and planes in space; an introduction to the basics of CAD.

Lecture times:

DP requirements:

Assessment: 2 ½ hour practical drawing examination written in June – 20%;; final portfolio submission – 25%. A minimum of 50% is required to pass this course. There is no supplementary examination for this course.

MEC1004W ENGINEERING I

32 HEQF credits at level 5; 6 lectures per week.

Convener: Mr B Kloot.

Prerequisites:

Course outline: This course has been designed to expose students to the real engineering world by way of hands-on project work. It will focus on the understanding of physical principles on which engineering is based as well as the development of the essential skills required in engineering. This course will include a module which specifically addresses the development of academic success skills, the role of engineer in society, the engineering curriculum, learning in a tertiary environment, and building a career in engineering.

Lecture times: Mon, Wed 2nd period; Tues 2nd& 3rd period; Thurs 4th& 5th period.

DP requirements: Pass the EBE Computer Literacy Assessment; write both class tests.

Assessment: Class mark (continuous assessment) 75%; Class test one 5%; Class test two 20%.

MEC2000X PRACTICAL TRAINING

0 HEQF credits at level 6.

Convener: Associate Professor F-J Kahlen.

Prerequisites:

Course outline: Electro-Mechanical and Mechanical Engineering students shall produce to the satisfaction of the head of the department, or a person designated by him / her, a certified employers report showing regular time-keeping and evidence of completion of suitable work in mechanical, electro-mechanical or materials engineering practice for a minimum period of six continuous weeks at the end of the Second Year. The student is expected to be involved with operation and maintenance of plant, under regular supervision and guidance. The student shall submit to the head of department or designee, his / her own report which shall include a description of the engineering task assigned to the student, the engineering approach taken by the student, and the outcomes of the project. The student's report to the department is to be submitted by the end of the week preceding the mid-semester break of the term immediately following the period of employment. In any case, reports of practical training carried out more than 12 months ago at the time of report submission will not be accepted. Selection of employment and acceptance of report require approval by head of department or designee.

Lecture times: Not applicable.

MEC2020W DESIGN I

32 HEQF credits at level 6; 2 lectures and 2 studio sessions per week. Second year, whole year course.

Convener: TBA.

Prerequisites: MEC1002W, MEC1004W, MEC1000X.

Co-requisites: All second year core courses.

Course outline: Machine drawing and foundations of graduate level engineering design. Specific knowledge areas are computer assisted machine drawing; the selection of machine elements; machine assembly design; production, fits, surface texture and geometric tolerancing; stresses in

components, design for static strength and simple failure theories; the Design Process.

Lecture times: TBA.

DP requirements: All design assignments submitted and a sub-minimum of 50% for the class mark.

Assessment: The class mark equals 70% of the project mark plus 30% of the test mark.The final mark equals the average of the class mark and the exam mark if the exam mark is equal to or greater than 50%, else the final mark equals the exam mark.A sub-minimum of 50% for the final mark is required.

MEC2022S THERMOFLUIDS I

This course is presented by the Department of Mechanical Engineering and is offered to students registered for the Electro-Mechanical, Mechanical and Mechatronics Programmes.

16 HEQF credits at level 6. Second year, second semester course.

Convener: Mr D Findeis.

Prerequisites: None.

Course outline: Fluids and their properties; Basic concepts of Thermodynamics; Pressure and Head; Hydrostatics; Buoyancy; Properties of pure substances; The First Law of Thermodynamics; Closed systems; Control Volumes; Introduction to Heat Transfer; Motion of Fluid particles; Momentum equation and applications.

Lecture times: Monday, Tuesday, Thursday, Friday 2nd period.

Tutorial Time: Wednesday 2nd period.

Practicals: 3 practicals, by arrangement.

DP requirements: At least 80% submission of pop quizes, a minimum of 50% for laboratory reports and 40% for class tests.

Assessment: Pop quizes count 10%; 3 laboratory reports count 10%; 2 class tests count 10%; the 3 hour November exam counts 70%. A subminimum of 40% is required in each section of the November exam.

MEC2023F/S DYNAMICS I

16 HEQF credits at level 6; 48 lectures, 12 tutorials. Second year, first and second semester course.

Convener: TBA.

Prerequisites: MAM1018F/S, MAM1042S, PHY1012F/S, PHY1013F/S.

Course outline: Particle kinematics; Coordinate systems; Particle kinetics, Newton's laws, Work and energy, Impulse momentum and impact. Rigid body dynamics, Plane kinematics, Plane kinetics.

Lecture times:

DP requirements:

Assessment: Class tests, tutorial tests and June examination 3 hours.

MEC2025F MECHANICS OF SOLIDS I

12 HEQF credits at level 6; 36 lectures, 10 tutorials. Second year, first semester course.

Convener: Professor RB Tait.

Prerequisites: MAM1042S, MAM1017S and PHY1012S, or DP for MAM1003W and PHY1010W.

Course outline: Statically determinate force systems, free body diagrams; Stress-strain relations, elastic constants; Statically determinate stress systems, direct stress, shear stress, bending stress, torsional stress; Bending moment diagrams, shear force diagrams, deflection of beams; Torsion, Struts. Stress and strain transformations, compound stress in 2 dimensions, Mohr's circle.

Lecture times: Tuesday, Wednesday, Friday 2nd period. No practicals or field work.

DP Requirements: +35% class record made of class tests, assignments and participation in all class tests

Assessment: Assignments: 10%, Class Tests 15%, Examination 75%, June examination 3 hours.

MEC2026S PROJECT MANAGEMENT

8 HEQF credits at level 6; 2 lectures per week, second semester course.

Convener: C Shaw (Lecturer: K Balchin).

Prerequisites: 3rd Year equivalent course or concession

Objective: Project Management can be practiced as a stand-alone professional discipline or as an integral part of the delivery mechanism for engineering services. All engineers need an understanding of Project Management theory, principles, practices, tools and techniques. This course has been structured to introduce student engineers to the discipline of Project Management and to equip them with sufficient knowledge of the discipline to meaningfully participate in project work.

Course outline: Project Life Cycles, Body of Knowledge, Initiation, Planning, Scope Management, Human Resource Management, Quality, Cost Management, Specifications and Standards, Procurement, Risk Management and Project Safety, Completion and Close Out.

Lecture times: Monday 7th and 8th periods.

DP requirements: A weighted average of at least 40% for all marked assignments and the class test.

Assessment: Assignments count 30%; class test counts 20%; theory examination written in June counts 50%.

MEC2042F MATERIALS SCIENCE IN ENGINEERING

12 HEQF credits at level 6; 36 lectures, 4 tutorials, 2 assignments.

Convener: Professor RD Knusten.

Prerequisites: CEM1008F or CEM1000W.

Course outline: An introduction to the science of engineering materials and the relationships between structure and properties. Testing for strength, hardness, toughness, fatigue and creep. Interpretation of data. Elastic and plastic deformation of solids. Fracture. Visco-elastic and time dependent behaviour. The structure of crystalline, semi-crystalline and amorphous materials. Phase equilibrium diagrams, equilibrium and non-equilibrium structures. Heat treatment. Models of electrical conduction-development of band theory in metals, semi-conductors and insulators. Elements of corrosion science, deterioration and degradation of materials. The principles of reinforcement and design on the properties of composites. The selection of materials. Case studies.

Lecture times: TBA.

DP requirements:

Assessment: Class tests, June examination 3 hours.

MEC2043F ELECTRICAL & MECHANICAL MATERIALS

12 HEQF credits at level 6; 36 lectures, 6 tutorials.

Convener: Professor CI Lang.

Prerequisites: PHY1010W.

Course outline: Models of electrical conduction - development of band theory in metals, semi-conductors and insulators. Semi-conductors - importance of impurities. Operation of the p-n junction with reference to materials parameters. Utilisation of the band structure of a semi-conductor to produce novel devices. An introduction to engineering materials and the relations of mechanical, electrical and chemical properties to the structure.

Lecture times:

DP requirements:

Assessment: Class tests, June examination 3 hours.

MEC3000X PRACTICAL TRAINING

Convener: Associate Professor F-J Kahlen.

Course outline: Electro-Mechanical and Mechanical Engineering students shall produce to the

satisfaction of the head of the department, or a person designated by him / her, a certified employers report showing regular time-keeping and evidence of completion of suitable work in mechanical, electro-mechanical or materials engineering practice for a minimum period of six continuous weeks at the end of the Third Year. The student is expected to work on a design project and to apply the knowledge gained during his / her studies to the project under reduced supervision (compared to MEC2000X). The student shall submit to the head of department or designee, his / her own report which shall include a description of the engineering task assigned to the student, the engineering approach taken by the student, and the outcomes of the project. The student's report to the department is to be submitted by the end of the week preceding the mid-semester break of the term immediately following the period of employment. In any case, reports of practical training carried out more than 12 months ago at the time of report submission will not be accepted. Selection of employment and acceptance of report require approval by head of department or designee.

Assessment: Students must submit a report to the Head of Department or his / her designee, which shall include a description of the engineering task assigned to the student, the engineering approach taken by the student, and the learning experience of the student.

MEC3023F MECHANICS OF SOLIDS II

12 HEQF credits at level 7; 36 lectures, 3 practicals.

Convener: TBA.

Prerequisites: MEC2025F, MAM2083S, MAM2084S (DP).

Course outline: Compound stresses and theories of failure; elastic strain energy; combined loading of shafts and beams; thin and thick cylinders; compound cylinders and shrink fits; elementary plasticity; rotating discs and shafts.

Lecture times: TBA.

DP requirements:

Assessment: Class tests, laboratory reports, June examination 3 hours.

MEC3031S DYNAMICS II

16 HEQF credits at level 7; 48 lectures, 2 practicals.

Convener: Associate Professor G Langdon.

Prerequisites: MEC2020W, MEC2023F/S, MEC2025F.

Course outline: Kinematics and efficiency of gears and gear trains. Balancing of rotating machines; Crank-effort diagrams, balancing of reciprocating machinery. Flywheels. Vibration including single degree of freedom systems. Natural frequencies, Gyroscopic motion.

Lecture times: TBA.

DP requirements:

Assessment: Class tests, take home assignment, lab classes, November examination 3 hours.

MEC3033F THERMOFLUIDS II

20 HEQF credits at level 7; 60 lectures, 4 laboratory sessions, 1 tutorial per week.

Convener: Dr George Vicatos.

Prerequisites: MEC2022S.

Course outline: Flow rates in pipelines; Wall orifice flow; Free surface flows; Friction head losses in pipes; Pitot-static tube; Hydraulic turbines; Euler head; maximum efficiency; Velocity triangles; Power output; Pelton wheel; radial and axial turbines; Laminar flow between flat surfaces; pressure gradients; flow in dashpots; hydrodynamic bearings.

Second Law of Thermodynamics; heat source and sink; thermal efficiency; reversible and irreversible processes; Carnot efficiency; Carnot heat engine; Carnot refrigeration cycle; entropy; isentropic processes; Efficiency of compressors; steady flow devices; isothermal; polytropic and isentropic processes; isentropic efficiencies for turbines, compressors, pumps and nozzles; Gas cycles: Otto; Diesel; Stirling; Ericsson; Brayton; jet-propulsion cycles; Vapour and combined

cycles; Rankine cycle; Refrigeration cycles; Gas and vapour mixtures; psychrometric charts.

Lecture times: TBA.

DP requirements: Attendance on all laboratory sessions; obtain minimum 50% for the report writing (average).

Assessment: Class tests, laboratory assignments, June examination 3 hours .

MEC3035F COMPUTER INTEGRATED MANUFACTURE & ROBOTICS

For Electro-Mechanical Engineering students only.

8 HEQF credits at level 7; 24 lectures.

Convener: Mr ST Marais.

Co-requisite:MAM282F Computer Programming in Matlab.

Course outline: Computer Integrated Manufacturing, Computer Numerical Control (CNC) of Machine Tools; Flexible Manufacturing systems (FMS); Materials handling and Robot directed transfer systems; robot kinematics; low cost automation; software control systems; hardware interfacing.

Lecture times: Monday & Wednesday 2nd period.

Practical: One practical that is an exit level outcome (ELO) for the Electro-mechanical degree. The practical will run in the afternoon for one hour, with a written submission one week later. The date for the practical will be scheduled as per the availability of the class.

Tutorials: Two, non compulsory, tutorials will be run to assist students with their programming project. The date for the tutorial will be scheduled as per the availability of the class.

DP requirements: 1) Attendance of the practical and submission of the report for the practical. A minimum of 50% for the report and a minimum of "Satisfactory" for the ELO must obtain. 2) Demonstration of the programming project to the external examiner. 3) A minimum of 40% class mark.

Assessment: One 2 hour June examination. This exam is divided into two sections held on the same day. The first hour counting 60% is on the written theory. The second hour is a practical examination and counting 40% of the exam. Class mark is made up of homework and projects. The main programming project counts 20% of the class mark.The final mark 50% class mark, 50% examination mark.

MEC3035S COMPUTER INTEGRATED MANUFACTURE & ROBOTICS

For Mechatronics students in their third year of study only.

8 HEQF credits at level 7; 24 lectures.

Convener: Mr ST Marais.

Prerequisites:

Course outline: Computer Integrated Manufacturing, Computer Numerical Control (CNC) of Machine Tools; Flexible Manufacturing systems (FMS); Materials handling and Robot directed transfer systems; Robot kinematics; low cost automation; software control systems; hardware interfacing.

Lecture times: Monday & Wednesday 4th period.

Practical: One practical will run in the afternoon for one hour. The date for the practical will be scheduled as per the availability of the class.

Tutorials: Two, non compulsory, tutorials will be run to assist students with their programming project. The date for the tutorial will be scheduled as per the availability of the class.

DP requirements: 1) Attendance of the practical. 2) Demonstration of the programming project to the external examiner. 3) A minimum of 40% class mark.

Assessment: One 2 hour June examination. This exam is divided into two sections held on the same day. The first hour counting 60% is on the written theory. The second hour is a practical examination and counting 40% of the exam. Class mark is made up of homework and projects. The main programming project counts 20% of the class mark.The final mark = 50% class mark + 50%

exam mark.

MEC3037S PROFESSIONAL COMMUNICATION STUDIES

For Electro-Mechanical and Mechanical Engineering students.

12 HEQF credits at level 7; 24 lectures.

Convener: Associate Professor J English.

Prerequisites:

Course outline: This course equips students with the skills required for the preparation and writing of technical reports with reference to design reports. It also covers effective delivery of technical material through presentations and visual aids. Students will be assessed in terms of their ability to plan, organise and select information; write and speak in a clear and appropriate style; and present technical information in a highly readable way. **(Second-year students may not register for MEC3037S.)**

Lecture times: TBA.

DP requirements:

Assessment: Class test, 2 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

MEC3044S THERMOFLUIDS III

12 HEQF credits at level 7; 36 lectures, 2 practicals.

Convener: Professor C Redelinghuys.

Prerequisites: MEC3033F (DP).

Course outline: Similarity. Boundary layer theory. Incompressible flow around bodies. Radial flow and flow in curved paths. Surge control. Compressible flow. Shock waves. Combustion Processes and IC Engines.

Lecture times: TBA.

DP requirements:

Assessment: Tests, November examination 3 hours.

MEC3045F EXPERIMENTAL METHODS

12 HEQF credits at level 7; 36 lectures, practical sessions.

Convener: Associate Professor BI Collier-Reed.

Prerequisites:

Course outline: Terminology, standards, data analysis, uncertainty. Dimensional Analysis. Displacement, strain, pressure, flow and temperature measurements. Classical flow visualization techniques using electrical measurement techniques. Non- Destructive Evaluation techniques.

Lecture times: Mon, Wed, and Fri 2nd period.

DP requirements: Attend all practical sessions and submit, within seven days of the session, if required, a written report; write the class test; pass the final examination; satisfactorily achieve learning outcomes 10-13.

Assessment: Class test 10%; Laboratory/practical reports 20%; Examination 70%.

MEC3050W DESIGN II

This course is presented by the Department of Mechanical Engineering and offered to Mechanical Engineering and Electro-Mechanical Engineering students.

24 HEQF credits at level 7; 3rd year, full-year course.

Convener: Associate Professor CJ von Klemperer.

Prerequisites:A pass in MEC2020W, and co-registration with all third year core courses. This course is only available to Mechanical and Electro-mechanical engineering students.

Co-requisites: All third year core courses.

Course outline: Detailed machine component design and basic machine system design. Specific knowledge areas are static and fatigue failure theories; fracture mechanics; Hertzian stresses; standard machine components such as shafts, gears, hydrodynamic bearings, springs, clutches, brakes and bolts; statistical considerations for design; design projects on the machine level.
Lecture times: 2 lectures a week, venues and times TBA.
Tutorial session: One full afternoon tutorial session per week, Tuesday, 14h00-17h00.
DP requirements: A final class mark $\geq$ 40%, with each class test $\geq$ 30%, and satisfactory completion as outlined in the handouts of all assignments. Attendance at the Tuesday afternoon tutorial sessions and at all class tests is compulsory.
Assessment: The final mark is made up 50% from the Class mark and 50% from the Exam mark. The exam has a Sub-minimum mark of 40%. The class mark is made up 50% from the class tests (all to count) and 50% from the design projects and assignments.

- 3 or 4 class tests will take place during the year. Should a test be missed for medical reasons, students must produce a medical certificate within one week of returning to University. In the event of an excused missed test, students will not write a make-up test, but will be given the class average for the missed test.
- Projects and assignments will be evaluated on the basis of submitted technical reports, calculations and designs and CAD drawings.
- Students will also complete and submit an ECSA ELO statistics assignment. Each student will submit an Excel Spreadsheet with their analysis / results and a mini report detailing their findings and explaining their results.

The final exam is three hours long and takes place in October/November examination period.

MEC3060F MATERIALS UNDER STRESS

8 HEQF credits at level 7; 24 lectures, 3 tutorials, 4 practicals.

Convener: Dr SL George.

Prerequisites: MEC2042F.

Course outline: Elasticity and importance of modulus in engineering design. The influence of bond strength and structure. Plastic flow in crystals and polycrystals by dislocation movement. Work hardening. Recrystallisation. Strengthening methods in metals. Effect of temperature, strain rate, stress state. Failure in metals. Ductile and brittle fracture. Critical flaw size and fracture toughness. Fatigue, creep, stress corrosion and wear processes; dislocation and other micro-mechanisms involved.
Lecture times: TBA.

DP requirements:

Assessment: Class tests, June examination 2 hours.

MEC3068C FUNCTIONAL MATERIALS

8 HEQF credits at level 7; 24 lectures, 3 tutorials.

Convener: Professor CI Lang.

Prerequisites: MEC2043F.

Course outline: Thermal properties of materials - specific heat, thermal conductivity, thermal expansion. Thermoelectric properties - Seebeck, Peltier, Thomson coefficients. The influence of electronic structure. Implications for design, figures of merit. Magnetic properties of materials - ferromagnetism, ferrimagnetism, paramagnetism, diamagnetism. Hysteresis in ferromagnetic and ferrimagnetic materials. Implications for design; case studies. Superconductivity - the influence of electronic structure; superconducting devices - applications and potential applications; material limitations. Dielectric properties of materials - dielectric constant; capacitance. Hysteresis; the influence of electronic structure. Selection of dielectrics for applications requiring different frequencies. Ferroelectric and piezoelectric materials and applications. Optical properties of materials - absorption and emission processes; optic fibres, solar cells. Sensor and actuator applications.

Lecture times: TBA.
DP requirements:
Assessment: Class tests, September examination 2 hours.

MEC3069S PRODUCTION PROCESSES

8 HEQF credits at level 7; 24 lectures, 2 tutorials. Third-year, second-semester course.
Convener: TBA.
Prerequisites: MEC2042F, MEC3033F.
Course outline: In this course, the students are introduced to a range of manufacturing processes. Typically, there are several manufacturing processes available to perform a certain operation. This course equips the students to select a manufacturing process from a number of available processes, based on the machine set-up, process complexity and reliability, lot size as well as the ability to automate a manufacturing process. The course will highlight the degree of precision machining achievable by the individual manufacturing process.
Lecture times: TBA
DP requirements: All assignments and mid-term exam submitted,minimum 8 points from homework and 10 pointsfrom mid-term exam.
Assessment: Marked homework counts 15%; marked class tests count 25%; one 2-hour theory examination counts 60%. A subminimum of 50% is required for the theory examination.

MEC4022Z INDUSTRIAL LAW

8 HEQF credits at level 8; 24 lectures.
Convener: Ms Corinne Shaw (Lecturer: Adv JT Evans).
Prerequisites:
Course outline: Elements of the law of contract; agency; partnership; companies; and patents. Labour Law.
Lecture times: TBA
DP requirements:
Assessment: September examination 2 hours.

MEC4035F FRACTURE MECHANICS

8 HEQF credits at level 8; 24 lectures, 2 practicals.
Convener: Professor RB Tait.
Prerequisites: MEC3050W.
Course outline: Fundamentals of fracture mechanics; triangle of integrity concept between fracture toughness, stress and flaw size. Review of linear elastic fracture mechanics (LEFM), stress intensity (K), and its shortcomings. Elastic plastic fracture mechanics (EPFM) and crack opening displacement (COD) and J integral toughness formulations.
Experimental measurement of COD and J integral and correlation of K, COD and J integral. Codified use of EPFM in practice and case studies. Review of fatigue from a fracture mechanics viewpoint.
Lecture times: Tuesdays and Fridays 3rd period.
Practical: One demonstration practical – arranged as convenient by lecturer No field work
DP requirements: 35% class record from 1 class test and 2 assignments. Practical attendance.
Assessment: Class record from class test, assignments 25% and examination 75%.

MEC4036C POWER PLANT

8 HEQF credits at level 8; 24 lectures, 2 practicals.
Convener: Professor K Bennett.
Prerequisites:

Course outline: Boilers; steam turbines; condensers and cooling circuits; renewable energy; solar power generation; hydrogen; energy conservation; fuel cells; energy storage; environmental aspects of power generation.
Lecture times: TBA.
DP requirements:
Assessment: September examination 2 hours.

MEC4042Z INDUSTRIAL MANAGEMENT

8 HEQF credits at level 8; 24 lectures, case study. Fourth year, second semester course.
Convener: Ms Corinne Shaw.
Prerequisites:
Fieldwork: Students will be required to visit organisations (3 half-day excursions).
Course outline: Introduction to Management and Organisational Theory, Leadership, Organisational culture, Customer Value, Human Resources, Finance, Economics, Strategic Thinking, ethics and roles of managers.
Lecture times: TBA.
DP requirements: An average of at least 40% on all marked class work and tests.
Assessment: Marked class work and projects 50%; A 2 hour examination written in September 50%.

MEC4044Z MAINTENANCE MANAGEMENT & RELIABILITY IN SYSTEMS

For non Electro-Mechanical Engineering students only.
8 HEQF credits at level 8; 24 lectures.
Convener: Ms Corinne Shaw.
Prerequisites:
Course outline: This course has been designed to be within a framework of System Engineering. The topics include reliability, maintainability, life cycle costs, maintenance planning, TPM and RCM problem solving, safety, organisational relationships and systems.
Lecture times: TBA.
DP requirements:
Assessment: Group report, continuous assessment tests, September examination 2 hours.

MEC4045F NUMERICAL METHODS IN HEAT & FLUID FLOW

12 HEQF credits at level 8; 36 lectures.
Convener: Associate Professor AG Malan.
Prerequisites: MEC3033F, MEC3044S and MAM2082F.
Course outline: The course is primarily an introduction to the Finite Volume method for problems of heat conduction, potential and convection-diffusion type flows. The latter will be extended to the full Navier-Stokes equations in two dimensions. An emphasis is placed on the implementation of the theory covered during the course. The student will be required to write a number of computer programs in a computer language of his/her choice. Topics include: discretisation, interpolation, boundary conditions, solution procedures, complex geometries.
Lecture times: TBA.
DP requirements:
Assessment: June examination 3 hours.

MEC4047F MECHANICAL VIBRATIONS

12 HEQF credits at level 8; 36 lectures.
Convener: Mr EB Ismail.
Prerequisites: MEC3031S.

Corequisite: MAM2082F.

Course outline: To introduce students to the modelling of vibration in machines and structures. This will include single- and multi-degree of freedom models; analytical and numerical solution techniques; and practical applications. Formulation of equations of motion for single- and multi-degrees of freedom by Newton's laws and energy methods; solution techniques for equations of motion via analytical and numerical methods; modal analysis; application of techniques to analysis and design; continuous systems (time allowing).

Lecture times: TBA.

Practical: One major practical is run, potentially over multiple sessions.

DP requirements: Attendance at all Laboratory sessions, submission of all Project and Laboratory reports.

Assessment: Laboratory report 5%, Computational Projects 15%, Class Tests 20%, 3-hour written examination 60%.

MEC4048F ADVANCED HEAT TRANSFER

For students registered for the Electro-Mechanical and Mechanical Engineering Programmes only.

12 HEQF credits at level 8. Fourth year, first semester course.

Convener: Mr D Findeis.

Prerequisites:

Course outline: Laws of heat transfer; principles of conduction; steady and unsteady state heat transfer, convection, radiation; pc interaction and problem solving.

Lecture times: Monday, Wednesday, Thursday, 2nd period.

Practicals: 2 practicals, by arrangement.

DP requirements: A minimum of 50% for laboratory reports and 40% for class tests.

Assessment: 2 laboratory reports count 10%; 2 class tests count 20%; the 3 hour June exam counts 70%.

MEC4049F TURBOMACHINES

8 HEQF credits at level 8; 24 lectures, 2 practicals.

Convener: Professor C Redelinghuys.

Prerequisites: MEC3044S.

Course outline: Types of turbomachines; dimensionless specific speed, head flow and power coeffecients; hydraulic pumps; hydraulic turbines; centrifugal compressors; axial flow compressors; steam and gas turbines.

Lecture times: TBA.

DP requirements:

Assessment: Class tests, June examination 2 hours.

MEC4051Z NEW VENTURE PLANNING

8 HEQF credits at level 8; 24 lectures.

Convener: Ms Corinne Shaw.

Prerequisites:

Course outline: The entrepreneurial perspective; developing a new venture (guest speaker); What is a feasibility plan? Product concept and description; market assessment; industrial analysis; marketing plan; operations, development plans and management; financial projections.

Lecture times: TBA.

DP requirements:

Assessment: Individual learning log, presentations, project report(s).

MEC4053Z MEASUREMENT & CONTROL IN ENGINEERING SYSTEMS

16 HEQF credits at level 8.

Convener: Mr ST Marais.

Prerequisites: EEE3062F, EEE3070S, MEC3050W.

Course outline: To bring together elements of engineering previously covered in electrical and mechanical courses in a way that is as close to that expected in industrial practice. To ensure that each student is equipped with the necessary skills to deal with the complexity that this integration brings. Skills include designing and building measurement and control systems using sensors, micro-processors, PCs, PLCs, electric motors, heater elements, etc. Students on this course will have gained the knowledge to: program a micro-processor, use this micro-processor to monitor and obtain information from various kinds of sensors, (for example: temperature, shaft speed, angular position of shafts, torque, power, and strain gauges); output this information and retrieve processed information from a host PC; control speed, torque, and the angular position of the shafts on AC and DC electric motors, and control heaters, valves, flow rates etc.

Lecture times: Wednesday & Friday, 3rd period.

Tutorial times: Friday, 4th -5th periods.

DP requirements: 1) Attendance of the 80% of the practicals.2)Submission of the reports for the two mandatory practical. 3) Submission of the solution for the two take-home tutorials. 4) A minimum of 40% class mark.

Assessment: Reports for the two mandatory practical. A solution set for the two take-home tutorials. One class test held midway through the term. One 2 hour written examination and one 2 hour practical examination held in June. Class mark is made up of tutorials and practicals and the class test. The final mark = 30% class mark + 70% exam mark.

MEC4054Z QUALITY, RELIABILITY & MAINTENANCE MANAGEMENT

12 HEQF credits at level 8; 24 lectures, field work.

Convener: Ms Corinne Shaw.

Prerequisites:

Course outline: Quality, Reliability, Maintenance Planning, Preventative Maintenance, Reliability Centred Maintenance, Total Productive Maintenance, condition monitoring, problem solving, safety, systems view.

Lecture times: Monday & Wednesday, 5thperiod.

DP requirements: A weighted average of at least 40% for all marked assignments and the class test.

Assessment: Assignments count 20%; group project report counts 15%; class test counts 15%; theory examination counts 50%.

MEC4055Z DESIGN III

16 HEQF credits at level 8; 1 lecture and 1 studio per week.

Convener: Associate Professor R Kuppuswamy.

Prerequisites: MEC3050W and prerequisite/corequisite MEC2026S.

Co-requisites: Fourth year elective courses.

Objective: To facilitate the development of knowledge and skills that will allow candidates to design a conventional electro-mechanical system working in a multi-disciplinary team. The design is to be performed holistically, duly considering user needs, planning and managing the process, evaluation of alternatives, analyzing techno-economic performance and communicating the design solution.

Course outline: Holistic system design. Specific knowledge areas are the design of a complex mechanical or electro-mechanical system in a professional and effective manner, to model, simulate and, where possible, optimize the performance of the product or its subsystems by means of a computer, to design holistically duly considering technical, techno-economic and environmental issues, to apply the Design Process to plan, structure and manage the design from idea to

implementation, documentation of design, oral presentation, effectively co-operate as a member of a design team, application of subject matter researched independently.

Lecture times: Monday & Wednesday, 5th period.

DP requirements: completion of all required assignments and meeting the exit level outcomes such as: problem solving (ELO 1), engineering design (ELO 3), engineering methods, skills, tools including IT (ELO 5), individual, team, multi-disciplinary working (ELO 8).

Assessment: Assignments and Project Report.

MEC4061F/Z INDIVIDUAL LABORATORY/RESEARCH PROJECT

48 HEQF credits at level 8.

Conveners: Associate Professor C von Klemperer.

Prerequisites:

Course outline: Each student is required to conduct and report upon an individual project, which will in general require both experimental and design skills. Each project will include aspects of problem solving, investigation, experiments, and data analysis. Students will be required to engage with the impact of the engineering activity in the context of their project as well as demonstrate an acceptable level of engineering professionalism throughout the course of the project. Furthermore, each student will be required to demonstrate that they have the ability to learn independently.

Lecture times: TBA.

DP requirements: Attend an oral examination and Open Day at a time allocated by the Department. This oral examination is used to moderate the final project mark but not impact on the assessment of the ELOs; produce a poster of their project; attend a safety demonstration and sign a safety declaration; satisfactorily achieve each of the ECSA outcomes associated with the course.

Assessment: Project report = 100%.

MEC4062Z AIR CONDITIONING & REFRIGERATION

12 HEQF credits at level 8; 36 lectures, 1 practical.

Convener: Dr G Vicatos.

Prerequisites:

Course outline: Evaluation and system performance of Compression Refrigeration. Optimising operating conditions in Absorption Refrigeration. Psychrometry; human comfort; Air-conditioning applications, heat losses, Solar radiation on buildings.

Lecture times: TBA.

DP requirements: 45% average on class tests.

Assessment: Class tests, practical/demonstration, September examination 3 hours.

MEC4063C INDUSTRIAL ECOLOGY

8 HEQF credits at level 8; 18 lectures/seminars.

Convener: Dr H Pearce.

Prerequisites:

Course outline: The discipline of Industrial Ecology is becoming increasingly important as industry recognizes the growing need to reduce energy and materials consumption as well as the emission of waste in an attempt to minimize environmental impacts. The course situates industrial ecology within the broader framework of sustainability and deals with matters of broad principle rather than great detail. Issues discussed include: the current state of the environment and the impact industry has on it; industrial metabolism and ecosystem; life cycle assessment; design for environment; ecological economics.

Lecture times: TBA.

DP requirements:

Assessment: Project, essays, assignments.

MEC4065F FINITE ELEMENTS IN MECHANICAL DESIGN

16 HEQF credits at level 8; 24 lectures, 12 studio sessions.

Convener: Mr TJ Cloete.

Prerequisites: MEC3023F.

Course outline: This course introduces the formulation and application of the finite element method (FEM) in the context of structural and stress analysis. The course content will focus on 2-D formulations, with reference to the conceptual approach to 3-D problems. The aim is to integrate both theory and practice into a coherent whole. To this end, the fundamental theory is addressed in detail and students will be required to implement the finite element method in a spreadsheet macro and/or MATLAB program. Furthermore, students will be required to complete a project using a commercial FEM package. Topics include: Element Stiffness Matrix; Global Stiffness Matrix; Boundary Conditions; Unit Displacement Method; Principle of Minimum Potential Energy; Truss, Beam and Frame Elements in 2D; Interpolation; Constant Strain Triangle, Isoparametric Formulation; Gauss Quadrature; Quadrilateral Elements; Shear Locking.

Lecture times: TBA.

DP requirements:

Assessment: Project, class tests, June examination 3 hours.

MEC4087Z FAILURE ANALYSIS

8 HEQF credits at level 8; 24 lectures, 2 practicals.

Convener: Professor RB Tait.

Prerequisites: MEC2042F.

Co-requisites: MEC4035F.

Course outline: The methods of failure analysis, categories of failures: design, manufacturing, time in service. Importance of stress analysis and fracture mechanics. Case histories taken from industry concerning brittle fracture, ductile fracture, fatigue, corrosion and stress corrosion cracking and wear.

Lecture times: Two lectures per week as per timetable. No practicals or fieldwork.

DP requirements: 35% class work average from 2 tutorials and 1 major assignment (experimental failure analysis case study)

Assessment: Marked class work (Tutorials and Failure analysis case study assignment) 25% October Examination 75% .

MEC4088Z MANUFACTURING WITH MATERIALS

12 HEQF credits at level 8; 36 lectures, 3 tutorials, 3 practicals.

Convener: Professor RD Knutsen.

Prerequisites: MEC2042F.

Course outline: Manufacturing materials. Modelling deformation during processing. Manufacturing process selection. Net shape casting processes. Forming processes, joining processes and machinability of materials. Surface engineering. Injection moulding, blow moulding and extrusion of polymeric materials. Manufacturing and business strategy. Case studies in product manufacture.

Lecture times: TBA.

DP requirements:

Assessment: Projects, class tests, September examination 3 hours.

MEC4091S RESEARCH PROJECT

48 HEQF credits at level 8.

Convener: Professor RD Knutsen.

Prerequisites: Completion of BSc degree.

Course outline: Students are required to attend a series of lectures and practicals on experimental

techniques. Each student will be given an individual laboratory project on a problem relating to materials. A period of ten weeks is allocated for the project and on completion a treatise must be submitted for examination.

Lecture times: TBA.

DP requirements:

Assessment: Project(s).

MEC4092F INTERNAL COMBUSTION ENGINES

This course is presented by staff from the Sasol Advanced Fuels Laboratory and forms part of the curriculum of the Mechanical Engineering Department

12 HEQF credits at level 8. Fourth-year, first-semester course.

Convener: Mr Marlan Perumal.

Prerequisites: MEC3033F.

Course outline: Spark-ignition engines; Diesel engines; normal combustion; modelling the thermodynamic processes; abnormal combustion; Engine design and combustion chamber influences; Practical causes of inefficiency; Engine performance maps, Fuels and Fuel systems; Exhaust emissions and their control, External environment, Future trends and technologies.

Lecture times: TBA.Lectures: 36, practicals: 2.

DP requirements: Attendance of all practicals and an average of 50% on class assignments.

Assessment: Assignments count 15%; final 3 hour examination counts 85%.

MEC4094F APPLIED OPERATIONS ENGINEERING

20 HEQF credits at level 8; 8 lectures. Fourth-year, first-semester course.

Convener: Associate Professor F-J Kahlen.

Prerequisites: Final year student.

Co-requisites: MEC4095A.

Course outline: This course takes a hands-on look at applied operations engineering and introduces a variety of optimisation strategies, from Continuous Business Improvement (CBI) to incremental steps or actual leaps. These strategies are applicable to a wide range, from procurement to engineering and sales/marketing. This course exposes the student to actual operational challenges in a factory where students will develop integrated strategies, create approaches to devise improvements and implement them. Students will gain practical experience in optimising individual process steps while bearing in mind the overall process performance.

Lecture times: TBA. No practicals.

DP requirements: None.

Assessment: Marked class test counts30%; project report counts 70%. A subminimum of 50% each is required for the marked class test and submitted project report.

MEC4095Z LEAN OPERATIONS

8 HEQF credits at level 8; 24 lectures, 4 tutorials.

Convener: Associate Professor F-J Kahlen.

Prerequisites: Final year student.

Course outline: The sum of all necessary individual processes may take minutes or hours to process, but the actual production may take anything from days to months to complete. In almost any organisation, this is the norm, rather than the exception. This course will equip students with the tools to understand the current state of the operations, map the actual value stream in an organisation, visualise the (impeded) flow in a fishbone diagram, and devise an optimised process. Students will be introduced to the concepts of kaizen, kaibaku, JIT, flow and waste and learn to apply them to create flow and flush out waste. Although the most prominent examples of applying lean are in the manufacturing sector, the contents of this course can be readily applied in other sectors, such as mining, health care or power generation.

Lecture times: TBA. No practicals or fieldwork.
DP requirements: All assignments submitted, minimum 15 out of 30 points.
Assessment: Marked homework counts 30%; one 2-hour theory examination counts 70%. A subminimum of 50% each is required for the homework and theory examination.

MEC4096Z MANUFACTURE & PROPERTIES OF COMPOSITES

12 HEQF credits at level 8; 36 lectures, 3 tutorials, 2 practicals, 1 site visit.
Convener: Dr C Woolard.
Prerequisites: MEC2042F.
Course outline: History of composites; carbon, glass and aramid fibres; functions of the reinforcement and matrix, polymer-, metal- and ceramic-matrix composites; manufacture of composites; elastic properties of fibre composites; fracture and toughness, the fibre/matrix interface; geometric aspects; laminate theory and the strength of laminates; testing of composites and environmental effects; selection, modification and design of composites.
Lecture times: TBA.
DP requirements:
Assessment: Class tests, examination 3 hours.

MEC4097Z MANUFACTURE & PROPERTIES OF CERAMICS

8 HEQF credits at level 8; 24 lectures, 2 tutorials, 2 practicals, 1 site visit.
Convener: Professor CI Lang.
Prerequisites: MEC2042F.
Course outline: History of ceramics; traditional ceramics; glasses and glass ceramics; advanced ceramics; chemical bonding in ceramics; physical, mechanical and chemical properties of ceramics, nucleation and growth phenomena; production and properties of engineering ceramics, refractories; fracture and reliability of ceramics; powder technologies; selection and design of ceramic components.
Lecture times: TBA.
DP requirements:
Assessment: Class tests, examination 2 hours.

MEC4098Z PROPERTIES & MANUFACTURE OF METALLIC MATERIALS

16 HEQF credits at level 8; 48 lectures, 4 practicals.
Convener: Professor RD Knutsen.
Prerequisites: MEC2042F.
Course outline: The course is divided into four modules (12 lectures each). The principal themes from the respective modules are as follows:

Phase transformations in metals and alloys.
Metallurgy and properties of ferrous alloys.
Metallurgy and properties of non-ferrous alloys.
Introduction to metallic corrosion.

Lecture times: TBA.
DP requirements:
Assessment: Projects, class tests, examination 3 hours.

MEC4099Z PHASE TRANSFORMATIONS IN MATERIALS

8 HEQF credits at level 8; 24 lectures.
Convener: Professor CI Lang.
Prerequisites: MEC3060F.
Course outline: Thermodynamics and kinetics of phase equilibria and phase transformations in

metals, alloys and ceramic materials.
Lecture times: TBA.
DP requirements:
Assessment: Class tests, examination.

MEC4100F MANUFACTURE & PROPERTIES OF POLYMERS

12 HEQF credits at level 8, 36 lectures, 2 tutorials, 2 practicals, 1 site visit.
Convener: Dr C Woolard.
Prerequisites: MEC2042F.
Course outline: Polymer nomenclature; morphology; bonding; molecular weight, polymerization, crystallisation; polymer types; rheology; manufacturing methods; applications; polymer identification; polymer modification, additives; analytical techniques; biodegradability; selection and design.
Lecture times: TBA.
DP requirements:
Assessment: Practicals, class tests, examination 3 hours.

MEC4101C ADVANCED MANUFACTURING & NANO TECHNOLOGY

8 HEQF credits at level 8; 24 lectures, 4 tutorials, 2 practicals.
Convener: Associate Professor Ramesh Kuppuswamy.
Co-requisites: 4th year courses.
Objective: This course is aimed to address how the machines and processes combine with: science, information technology, microelectronics, and new organizational practices for handling the new age manufacturing challenges.
Course outline: This course introduces advanced manufacturing and nano-technology sciences that are appropriate for the manufacturing industries. The course content would include: processing of materials at nano-metric accuracies; Instrumentation and fundamental sciences used for nano-measurements; system/subsystem design for micro/nano processing; Applications of nano-technology for: material removal processes, thin films, micro-molding, meta injection molding, metal forming and measurements; Manufacturing at ultra high speeds and related CAD/CAM for achieving high productivity.
Lecture times: TBA.
DP requirements: Nil.
Assessment: Examination and year mark.

MEC4102C HYDRAULICS & PNEUMATICS

8 HEQF credits at level 8; 24 lectures, 2 tutorials.
Convener: Associate Professor F-S Kahlan.
Prerequisites: MEC3033F.
Course outline: Positioning and translating units, conveying and handling units are part of nearly every industrial manufacturing process. Such units are integrated into pneumatic or hydraulic control circuits which control the sequences of operations and events. Further, such circuits are often times enhanced by and integrated with servo elements. This course introduces the students to the basics of pneumatics and hydraulics, circuitry design and the integration of servo elements into such circuits.
Lecture times: TBA. No practicals or fieldwork.
DP requirements: Submission of at least 2 of the 3 homework andgroup assignments.
Assessment: Marked class tests count 40%; one 2-hour theory examination counts 60%. A subminimum of 50% each is required for the marked class test and theory examination.

PHI2040S PHILOSOPHY OF SCIENCE

Not offered iin 2012.

24 HEQF credits at level 6.

Convener: Dr Jack Ritchie.

Prerequisites: At least second year status.

Course outline: The course aims to introduce the students to the epistemological, metaphysical and ethical issues that arise when science is considered from a philosophical perspective. Through the study of philosophers such as Popper, Kuhn and Feyerabend, among others, the following sorts of questions will be discussed: Do scientists employ a special method which sets them apart from non-scientists and gives their claims greater authority? Do electrons, genes and other entities that we can't see or touch really exist? Are scientists inevitably influenced by political and moral agendas or can pure science be value free?

Lecture times:

DP requirements: Regular attendance at lectures and tutorials; completion of all written tests, and submission of all essays and assignments by due dates.

Assessment: Coursework counts 40%; November examination 3 hours 60%.

PHY1004W MATTER & INTERACTIONS

36 HEQF credits at level 5.

An advanced calculus-based introductory course for Science students intending to continue with second-year Physics, featuring modelling of physical systems from fundamental principles, and computational problem solving using VPython.

Convener: Associate Professor A Buffler.

Prerequisites: Students will normally be expected to have passed Physical Science NSC level 5. MAM1000W (or equivalent) must have been passed or be taken concurrently.

Course outline:

MODERN MECHANICS: Conservation laws, the momentum principle, atomic nature of matter, conservation of energy, energy in macroscopic systems, energy quantization, multiparticle systems, exploring the nucleus, angular momentum, entropy, kinetic theory of gases, efficiency of engines.

ELECTRIC AND MAGNETIC INTERACTIONS:

Electric fields, electric potential, magnetic fields, electric circuits, capacitance, resistance, magnetic force, Gauss' law, Ampere's law, Faraday's law, induction, electromagnetic radiation, waves and particles.

Lecture times: Monday to Friday, 3rd period.

Practicals: One practical or tutorial per week, Tuesday, 14h00-17h00.

DP requirements: Minimum of 40% in class record; including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one June 2-hour examination counts 25%; one November 2-hour examination counts 25%.

PHY1012F/S ENGINEERING PHYSICS A

16 HEQF credits at level 5; 48 lectures, 12 exercise sessions, 12 tutorials/practicals. First-year first or second semester course.

Convener: Dr I Govender.

Prerequisites:

Course outline: Vectors, kinematics, dynamics, work, energy power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum.

Laboratory: One laboratory or tutorial session per week.

Lecture times:

DP requirements: An average of at least 40% forclass record, including 50% for laboratories.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one

June examination counts 50%; one November examination counts 50%.

PHY1013F/S ENGINEERING PHYSICS B

16 HEQF credits at level 5; 48 lectures, 12 exercise sessions, 12 tutorials/practicals. First-year, first or second semester course.

Convener: Dr I Govender.

Prerequisites: PHY1012F/S or PHY1014F/S.

Course outline: Electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance.

Laboratory: One laboratory or tutorial session per week.

Lecture times:

DP requirements: An average of at least 40% for class record, including 50% for laboratories.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one June examination counts 50%; one November examination counts 50%.

PHY1014F/S ENGINEERING PHYSICS A

16 HEQF credits at level 5; 72 lectures, 12 exercise sessions, 12 tutorials/practicals. First-year, first or second semester course.

Convener: Pierre le Roux.

Course outline: Vectors, kinematics, dynamics, work, energy power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum.

Lecture times: Monday, Tuesday, Wednesday, 4^{th} & 5^{th} period.

Workshop: Tuesday, 6^{th},7^{th}& 8^{th}periods.

Laboratory: One laboratory session per week, Thursday 14h00 – 17h00.

DP requirements: An average of at least 30% on the marked tests.

Assessment: Homework tests count 15%; class tests count 20%; weekly laboratory reports count 5%; one laboratory examination assessed in June counts 10%; one 2-hours theory examination written in June counts 50%. A subminimum of 40% is required for theory examination paper.

PHY1015F/S ENGINEERING PHYSICS B

16 HEQF credits at level 5; 72 lectures, 12 exercise sessions, 12 tutorials/practicals. First-year second semester course.

Convener: Pierre le Roux.

Prerequisites: PHY1014F/S or PHY1012F/S.

Course outline: Electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance.

Lecture times: Monday, Tuesday & Wednesday, 4^{th} & 5^{th} period.

Workshop: Tuesday, 6^{th},7^{th}& 8^{th} periods.

Laboratory: One laboratory session per week, Thursday 14h00 – 17h00.

DP requirements: An average of at least 30% on the marked tests.

Assessment: Homework tests count 15%; class tests count 20%; weekly laboratory reports count 5%; one laboratory examination assessed in June counts 10%; one 2-hours theory examination written in June counts 50%. A subminimum of 40% is required for theory examination paper.

PHY1023H PRINCIPLES OF PHYSICS A

18 HEQF credits at level 5.

Analgebra-based introductory course primarily for students on the General Entry Programme for

Science (GEPS). It is possible for students from other courses to transfer to this course during the year.

Convener: Ms D Taylor.

Prerequisites:

Course outline: The first half of this course provides students with the essential tools and skills that are required for dealing successfully with physics at first-year university level. The three broad areas that are covered are (a) mathematical techniques and their relationship with physical phenomena, (b) experimental procedures and (c) communication skills, in particular report writing.

Second semester:

MECHANICS: vectors, kinematics, dynamics, work, energy power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, static equilibrium, gravitation.

PROPERTIES OF MATTER: elasticity, elastic moduli, hydrostatics, hydrodynamics.

THERMAL PHYSICS: temperature, heat, kinetic theory of gases, thermodynamics, entropy.

Lecture times: Monday to Friday, 3rd period.

Practicals: One practical or tutorial per week, Tuesday, 14h00-17h00.

DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY1024F PRINCIPLES OF PHYSICS B

18 HEQF credits at level 5.

An algebra-based introductory course usually taken by students who have completed PHY1023H. Some calculus may be used.

Convener: Dr MR Nchodu.

Prerequisites: PHY1023H; MAM1000W (or equivalent) must have been passed or be taken concurrently.

Course outline: ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resitivity, networks, magnetic field, Biot-Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents.

VIBRATIONS AND WAVES: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound intensity, Doppler effect, interference, diffraction.

MODERN PHYSICS: electromagnetic waves, interference, diffraction, the electron, quantum physical phenomena, atomic structure, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.

Lecture times: Monday to Friday, 3rd period.

Practicals: One practical or tutorial per week, Wednesday, 14h00-17h00.

DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY1031F GENERAL PHYSICS A

18 HEQF credits at level 5.

An algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used.

Convener: Dr SM Wheaton.

Prerequisites: Students will be expected to have passed Physical Science at NSC level 5.

Course outline:MECHANICS: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics,

torque, rotational inertia, rotational energy, angular momentum, static equilibrium, gravitation.
PROPERTIES OF MATTER: elasticity, elastic moduli, hydrostatics, hydrodynamics.
THERMAL PHYSICS: temperature, heat, kinetic theory of gases, thermodynamics.
OPTICS: Geometrical optics, polarization, electromagnetic waves.
Lecture times: Monday to Friday, 3rd period.
Practicals: One practical or tutorial per week, Monday, Wednesday, Thursday or Friday, 14h00-17h00.
DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY1032S GENERAL PHYSICS B

18 HEQF credits at level 5.
An algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used.
Convener: Dr SW Peterson.
Prerequisites: At least 40% in PHY1031F, or PHY1023H.
Course outline: ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resitivity, networks, magnetic field, Biot-Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents.
VIBRATIONS AND WAVES: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference, diffraction.
MODERN PHYSICS: the electron, quantum physical phenomena, atomic structure, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.
Lecture times: Monday to Friday, 3rd period.
Practicals: One practical or tutorial per week, Monday, Wednesday, Thursday or Friday, 14h00-17h00.
DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY2009S INTERMEDIATE PHYSICS

(NOTE: This course may not run in 2012).
24 HEQF credits at level 6.
A course normally taken by students who have not completed PHY1004W, to prepare them for PHY2014F and PHY2015S.
Convener: Dr A Hamilton.
Prerequisites: PHY1023H and PHY1024F (or equivalent), and MAM1005H (or equivalent), MAM1006H must be taken concurrently.
Course outline: VECTOR FIELDS IN PHYSICS: Vector calculus, div, grad, curl, line, surface and volume integrals, Gauss' Theorem, Stokes' Theorem, applications to fluid dynamics and electromagnetism.
STATISTICAL MODELLING OF RADIATION AND MATTER: mathematical descriptions of solids, liquids and gases, entropy, temperature, the Boltzmann distribution, thermodynamics, statistical models of photons, statistical models in quantum mechanics, wave-particle duality.
Lecture times: Monday to Friday, 5th period.
Practicals: One practical or tutorial per week, Wednesday, 14h00-17h00.
DP requirements: Minimum of 35% in class record, completion of all laboratory reports and 75% of tutorial work, attendance at all class tests.

Assessment: Class record (tests, tutorials, projects, laboratory work) counts 50%, one 2-hour paper written in November counts 50%.

PHY2010S ELECTROMAGNETISM FOR ENGINEERS

16 HEQF credits at level 6; 6 practicals, 36 lectures.

Prerequisites: PHY1012F/S and PHY1013F/S; or PHY1014F/S and PHY1015F/S.

Co-requisites: MAM2084F/S.

Convener: Dr MR Nchodu.

Course outline: Coulomb's law, Gauss' law. The vector differential operator; div, grad curl. Poisson and Laplace's equations. The magnetic field. Biot-Savart law. Ampere's law. Electric and magnetic fields in materials. Geometrical optics. Propagation in optical fibres.

Lecture times:

DP requirements:

Assessment: Class work 25%, November examination 50%, laboratory work 25%.

PHY2014F WAVES & ELECTROMAGNETISM

24 HEQF credits at level 6.

Convener: Professor DG Aschman.

Prerequisites: PHY1004W or (PHY2009S and MAM1043H), a full first-year course in Mathematics and MAM2000W or (MAM2004H and MAM2046W) as corequisite.

Course outline: VIBRATIONS AND WAVES: Harmonic oscillations, damped and forced oscillations, resonance, Fourier analysis, harmonic chains, waves, dispersion, interference, diffraction.

ELECTROMAGNETISM: Vector calculus (div, grad, curl), electrostatics, special techniques for potentials, electric fields in matter, magnetostatics, Magnetic fields in matter, current, Ohm's law, circuits, electromagnetic induction, electrodynamics, Maxwell's equations.

Lecture times: Monday to Friday, 4th period.

Practicals: One practical per week, Monday, 14h00-17h00.

DP requirements: Minimum of 40% in class record; completion of all laboratory reports, 75% of tutorial work and problem sets; attendance at all tests.

Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour examination written in June counts 50%.

PHY2015S CLASSICAL & QUANTUM MECHANICS

24 HEQF credits at level 6.

Convener: Associate Professor RW Fearick.

Prerequisites: As for PHY2014F, and at least 40% in PHY2014F.

Course outline:

CLASSICAL MECHANICS: Review of Newton's laws, constraints, D'Alembert principle, Lagrangian formulation of mechanics, conservation laws, applications, central forces, planetary motion, small oscillations, normal co-ordinates.

QUANTUM MECHANICS: The basic assumptions of quantum mechanics, solutions of Schrödinger's equation, properties of wave functions and operators, one-dimensional applications, angular momentum in quantum mechanics, three-dimensional applications, the hydrogen atom, approximate methods.

Lecture times: Monday to Friday, 4th period.

Practicals: One computational practical per week, Monday, 14h00-17h00.

DP requirements: Minimum of 40% in class record; completion of all laboratory reports and 75% of tutorial work, attendance at all tests.

Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour

paper written in November counts 50%.

PHY3021F ADVANCED PHYSICS A

36 HEQF credits at level 7.

Convener: Associate Professor R W Fearick.

Prerequisites: PHY2014F and PHY2015S, and 40% in MAM2000W or (MAM2004H and MAM2046W) must have been completed or be taken concurrently.

Course outline:

ELECTROMAGNETISM: Maxwell's equations in vacuum and in matter, conservation laws, momentum and angular momentum in electromagnetic fields, electromagnetic waves, the Fresnel relations, laws of optics, absorption and dispersion, frequency dependence of permittivity, wave guides, gauge transformations, retarded potentials, electric and magnetic dipole radiation, power radiated by a point charge, special relativity, four-vectors, relativistic kinematics, relativistic electrodynamics, the electromagnetic field tensor.

THERMODYNAMICS AND STATISTICAL PHYSICS: Temperature, heat and work, First law of thermodynamics, Ensembles and entropy, Second law of thermodynamics, Boltzmann distribution and Helmholtz free energy, thermal radiation, chemical potential and Gibbs distribution, Fermi-Dirac statistics, electrons in metals, Bose-Einstein statistics, phonons, photons and the black-body distribution, the Bose-Einstein condensate, applications to classical and quantum systems.

Lecture times: Monday to Friday, 4th period.

Practicals: Two sessions per week, Monday and Thursday, 14h00-17h00.

DP requirements: Minimum of 40% in class record; completion of all laboratory reports, 75% of tutorial work and problem sets; attendance at all tests.

Assessment: Class record (class tests, essays, projects and laboratory reports) counts 50%; one 3-hour paper and one 2-hour paper count 50%.

PHY3022S ADVANCED PHYSICS B

24 HEQF credits at level 7.

Convener: Professor DG Aschman.

Prerequisites: PHY2014F and PHY2015S and at least 40% in PHY3021F.

Course outline:

ATOMIC PHYSICS: angular momentum,atomic structure and spectra, selection rules, spin, fine structure,Zeeman effect, time dependent and independent perturbation theory, molecular structure and spectra.

NUCLEAR AND PARTICLE PHYSICS: properties of nuclei, nuclear forces, nuclear structure and reactions, radioactivity, decay modes, interactions of elementary particles, quarks & leptons, symmetries and the gauge forces.

SOLID STATE PHYSICS: crystal structure; lattice vibrations, electron states in solids, energy band theory, semiconductor physics and devices.

Lecture times: Monday to Friday, 4th period.

Practicals: Two sessions per week, Monday and Thursday, 14h00-17h00.

DP requirements: Minimum of 40% in class record; completion of all laboratory reports, 75% of tutorial work and problem sets; attendance at all tests.

Assessment: Class record (class tests, essays, projects and laboratory reports) counts 50%; one 3-hour paper and one 2-hour paper count 50%.

SOC2033F/S DIVERSITY LITERACY

24 HEQF credits at level 6; 36 lectures, 24 tutorials.

Convener:

Prerequisites: Students should be in their second year of study.

Course outline: This course will prepare students to engage critically with local and international

contexts characterised by the increasing diversity of our globalising world. Drawing on a variety of academic, public and popular texts, students will reflect on the operations of power on and within different identity positions, such as "race" gender, sexuality, and (dis)ability, that have a significant impact on people's life opportunities. A combination of experiential reflection and engagement with contemporary social justice theory will enhance capacity to engage thoughtfully and ethically in contemporary professional and social environments.

Lecture times:

DP requirements: Attendance is required. Students must submit both individual essays and participate in group work in order to achieve the DP requirement.

Assessment: Coursework 50%; examination 50%.

STA1000F/S STATISTICS 1000

18 HEQF credits at level 5; 60 lectures.

Identical first year half courses offered in first and second semesters. Owing to the mathematics prerequisites, first year students must register for STA1000S in the second semester or MAM1006H.

Convener:

Prerequisites: STA1000F: A pass in any of MAM1004F/H or MAM1005H or MAM1000W or MAM1010F/S or MAM0102W/X or MAM1003W or MAM1017F/S or MAM1018F/S or STA1001F/S.

STA1000S: A pass in any of MAM1004F/H or MAM1005H or MAM1006H or MAM0102W/X or or MAM1017F/S or STA1001F or MAM1010F/S or decanted MAM1005H students.

Co-requisites: In addition students will be admitted to STA1000S if they are currently registered for MAM1000W or MAM1003Wor MAM1012S or MAM1018S or have a supplementary examination for STA1001F or MAM1004F in the same year.

Course outline: Explanatory data analysis and summary statistics. Probability theory. Random variables. Probability mass and density function. Binomial, Poisson, exponential, normal and uniform distributions. Sampling distributions. Confidence intervals. Introduction to hypothesis testing. Tests on means, variances and proportions. Determining sample size. Simple linear regression and measures of correlation.

Lecture times:

DP requirements:

Assessment: June/November examination 3 hours.

STA1001F STATISTICS 1001

18 HEQF credits at level 5; 60 lectures.

Note: No student will be permitted simultaneous credit any equivalent or subsuming first year Mathematics course.

Convener:

Prerequisites: A pass in matriculation Mathemathics with at least 50% on HG or a C-symbol on SG, or 5 (NSC) in Mathematics, or MAM1014F and MAM1015S. For foreign students a pass at A-level or a C-symbol at O-level is required.

Course outline: 1) The Mathematics of Finance. 2) Functions and graphs; straight lines, polynomials, exponential and logarithmic functions. 3) Matrix algebra and linear programming. 4) Counting rules and Binomial Theorem. 5) Differential calculus. 6) Integral calculus. Emphasis will be placed on areas of interest to Business Science students, including applications to Economics.

Lecture times:

DP requirements:

Assessment: June/November examination 3 hours.

STA2020F BUSINESS STATISTICS

18 HEQF credits at level 6; 48 lectures, 12 tutorials.

Convener:

Prerequisites: (MAM1000W or MAM1002W or MAM1004F/H or MAM1005H or MAM1006H or MAM1010 or MAM1012 or MAM1017F/S or MAM1018F/S or STA1001F) and (STA1000F/S or STA1006S or STA1007S).

Course outline: Analysis of variance (ANOVA) and experimental design; Revision and extension of simple linear regression; Multiple regression; Econometric models; Time series analysis; Non-parametric statistics; Index numbers.

Lecture times:

DP requirements:

Assessment: Class record 30%, June/November examination 3 hours 70%.

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