

## MISSION STATEMENT

*Our mission is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society.*

*Educating for life* means that our educational process must provide:

- \* a foundation of skills, knowledge and versatility that will last a lifetime, despite a changing environment;
- \* research-based teaching and learning;
- \* critical inquiry in the form of the search for new knowledge and better understanding; and
- \* an active developmental role in our cultural, economic, political, scientific and social environment.

*Addressing the challenges facing our society* means that we must come to terms with our past, be cognisant of the present, and plan for the future. In this, it is central to our mission that we:

- \* recognise our location in Africa and our historical context;
- \* claim our place in the international community of scholars;
- \* strive to transcend the legacy of apartheid in South Africa and to overcome all forms of gender and other oppressive discrimination;
- \* be flexible on access, active in redress, and rigorous on success;
- \* promote equal opportunity and the full development of human potential;
- \* strive for inter-disciplinary and inter-institutional collaboration and synergy; and
- \* value and promote the contribution that all our members make to realising our mission.

*To equip people with lifelong skills* we must and will:

- \* promote the love of learning, the skill of solving problems, and the spirit of critical inquiry and research; and
- \* take excellence as the benchmark for all we do.

We are committed to academic freedom, critical scholarship, rational and creative thought, and free inquiry. It is part of our mission to ensure that these ideals live; this necessarily requires a dynamic process of finding the balance in a range of choices: choices between freedom and responsibility, rights and obligations, autonomy and accountability, transparency and efficiency, and permanence and transience; and of doing this through consultation and debate.

# 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 timeously, 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.

# UNIVERSITY OF CAPE TOWN

## FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

### 2010

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

**Dean's & Faculty Offices:** Room 600, Menzies Building  
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](mailto:ebe-dean@uct.ac.za)  
Faculty Office [ebe-faculty@ebe.uct.ac.za](mailto:ebe-faculty@ebe.uct.ac.za)  
International Academic  
Programmes Office [int-iapo@uct.ac.za](mailto: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 Cashier's Office, in the Kramer Building, is open from 09h00 to 15h30.

**This handbook is part of a series that consists of**

- 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:** Financial assistance for undergraduate students  
**Book 14:** Financial assistance for postgraduate students

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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, 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.

## 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.



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# GENERAL INFORMATION

## Officers in the Faculty of Engineering & the Built Environment

### Academic

#### Dean of the Faculty:

Professor FW Petersen, PrEng BEng MEng PhD *Stell* MSAiChE

#### Personal Assistant to the Dean:

Mrs EA Schulschen

#### Deputy Deans:

Professor MG Alexander, PrEng BSc(Eng) MSc(Eng) PhD *Witwatersrand* FSAiCE FSAAE, MASSAf MICT

Professor PA Bowen, BSc(QS)BCom *Natal* MSc(Construction Management) *Heriot-Watt* PhD *UPE*

PrQS PMAQS FRICS FCIOB PrCM PrCPM MAACE Pr. Valuer

Professor CI Lang, BSc PhD *Cape Town*

#### Assistant Dean:

Professor DMcK Fraser, BSc(Eng)Chem PhD *Cape Town* MSAiChE

#### Heads of Departments:

##### Architecture, Planning and Geomatics:

Professor L le Grange, BArch *Cape Town* MArch(UD) *Rice* MIArch CIA

##### Chemical Engineering:

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

##### Civil Engineering:

Professor A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng

FIStructE FZweE MASSAf MIAESE FSAAE

##### Construction Economics and Management:

Professor KS Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

##### Electrical Engineering:

Professor BJ Downing, MSc *Bradford* PhD *Sheffield*

##### Mechanical Engineering:

Professor RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* M(SA)IMEchE

##### Senior Lecturer/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*

#### Deputy Faculty Manager (Academic Administration):

Mrs SD Donald, BCom *Cape Town*

## 2 GENERAL INFORMATION

### **Senior Administrative Officer (Postgraduate Studies):**

Mrs E Nobin

### **Administrative Officer and Statistician:**

Ms H Leather, BSc(Hons) *Witwatersrand*

### **Administrative Assistants:**

Ms B Hendricks

Ms I Newman

Mrs J Rumbelow

### **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 Engineering Structures *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 President for 2009/2010 is Ms Iketleng Letsoha and the Vice-President is Mr Lubabalo Luyaba. 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 2009/2010 Chair is David Wright and Vice-Chair is Vladmir Mtei. They can be contacted through the Department of Electrical Engineering or at room 338 Menzies Building.

## Postgraduate Centre

The Postgraduate Centre is situated in the Otto Beit Building, 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 Masters 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](mailto:gradcentre@uct.ac.za). or visited at [www.pgfo.uct.ac.za](http://www.pgfo.uct.ac.za).

## Distinguished Teachers

The University has instituted a Distinguished Teachers 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
Associate 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)
Professor CT O'Connor	(Chemical Engineering)
Professor H R��ther	(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 Masters 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

**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 Masters and Doctoral Study. Applications to be submitted to the Postgraduate Scholarships Office by 15 August for Honours and 31 December for Masters study and 30 April for Doctoral study.

**National Research Foundation: NRF Prestigious Awards:** Awarded on merit for full-time registered Masters 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 Bachelors and taught Masters 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

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### 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:

<b>APG1016F</b>	Geomatics
<b>APG2022W</b>	Design and Theory Studio 2
<b>APG3024W</b>	Design and Theory Studio 3
<b>APG6002S</b>	Studiowork ARCH6

### 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 Masters 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 BArch entailing the use of aluminium.

**ArcelorMittal South Africa Prize:** R1000 for the best innovative design using ArcelorMittal South Africa Steel Products.

**Association of Consulting Town and Regional Planners Prize:** R1000 and certificate for the best dissertation in the MCRP programme.

**Barry Heymann Prize:** R5000 for the final year BArch/MArch(Prof) student who shows the greatest progress in Architectural Design in the BArch/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:** R500 for the best student graduating in the BArch and MArch(Prof) programmes.

**Cape Institute for Architecture Prize:** R500 for the best student in Design and Theory Studio II.

**Cape Institute for Architecture:** R500 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 BArch and 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) or BArch student who produces the best essay.

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

**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 Thesis Term of the BArch 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 BArch and 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

## 8 GENERAL INFORMATION

**Ivor Prinsloo Prize:** R450 for the best essay in Architectural Theory in the BArch and BAS(Hons) programmes.

**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 BArch Student based on final two years of study.

**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:** Certificate for the best dissertation in the MCPUD Programme.

### **Construction Economics and Management**

**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:** R500, R500, R750 and R1000 for the best student in each year of study, respectively, for the BSc(Construction Studies) and the BSc(Hons) in Quantity Surveying.

**Bell-John Prize:** R1000 for the best all-round student registered for BSc(Construction Studies) or BSc(Hons) in Quantity Surveying in any year of study.

**Bernard James Prize:** R300 for the BSc(Hons) in Quantity Surveying student obtaining the highest award (Minimum First Class Pass) in Research Report (CON4047W).

**The Chartered Institute of Building (CIOB) Book Prize:** R800 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:** R850 for MSc Project Management student who has achieved the highest average overall mark.

**The Chartered Institute of Building (CIOB) Book Prize:** R2000. Nomination for a national award for the best undergraduate dissertation from any qualifying institution.

**Clay Brick Association Prizes:** Two of R1000 and R750 respectively for the best and second best students collectively in the subjects of Construction Technology 1, 2, 3 (CON1004W, CON2006W, CON3012W).

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

**George Strachan Prize:** R50 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 the best BSc(Construction Studies) or BSc(Hons) in Construction Management student in any year of study: R500 plus shield; best BSc(Construction Studies) student in third year of study: R500; and best BSc(Hons) in Construction Management student in fourth year of study: R500.

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

**Project Management Institute Western Cape Branch in conjunction with DVPM Book Prize:** (value to be announced) for the best overall student in the second year of study for the MSc(Project Management) degree.

**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.

**Walters, Simpson and Du Toit Prize:** R300 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 graduating BSc(Eng) student who first registered in the Faculty through the ASPECT Programme.

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

### Chemical Engineering

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

**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:** R1000 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

## **Mechanical Engineering/Electro-Mechanical Engineering**

**Aluminium Federation of South Africa Prize:** (R1000) for the best thesis in MEC4061F/Z Individual Laboratory Research Project or MEC4091S Research Report 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

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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 Masters 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%.

For Dean's Merit List purposes an ASPECT student is defined as a student registered for the ASPECT Programme, or a student who is registered for the Second or Third year of study, having completed the First Year of the ASPECT Programme.

## 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 Bachelor of Architecture degree (BArch) is a professional degree. It confers eligibility for registration, under Act No.44 of 2000, for membership of the Institute of South African Architects (MIA). The final examinations have the approval of the South African Council for the Architectural Profession and confer eligibility, under Act No. 44 of 2000, for registration as an Architect within the Republic of South Africa (ArchSA). The Bachelor of Architecture course merits exemption from Parts 1 and 2 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 SA Council of Planners (SACP). Registration with the Council, which is a statutory requirement to practise, can occur after two years of supervised practical experience.

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. Professional Land, 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**

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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**

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, London SW1P 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, Berkshire SL5 8BJ, England.

#### **South African Council for the Project and Construction Management Professions**

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.

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### **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/](http://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 of Engineering & the Built Environment

### Degrees

Bachelor of Architectural Studies.....	BAS
Bachelor of Architectural Studies (Honours).....	BAS(Hons)
+Bachelor of Architecture.....	BArch
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 Construction Management.....	BSc(Hons)(CM)
Bachelor of Science (Honours) in Geographical Information Systems.....	BSc(Hons)(GIS)
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 in Conservation of the Built Environment.....	MPhil(Cons BE)
*Master of Philosophy in Housing Development and Management.....	MPhil(HDM)
Master of Philosophy in Transport Studies.....	MPhil(Transport Studies)
Master of Philosophy in Urban Infrastructure Design and Management.....	MPhil(UID&M)
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). + No new intake from 2008 (to be discontinued).

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# RULES FOR DEGREES AND DIPLOMAS

## Undergraduate Degrees

**Bachelor of Architectural Studies (BAS)**

**Bachelor of Science in Construction Studies (BSc(ConstStudies))**

**Bachelor of Science in Property Studies (BSc(PropStudies))**

**Bachelor of Science in Engineering (BSc(Eng))**

**Bachelor of Science in Geomatics (BSc(Geomatics))**

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).

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### 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 EEE1003W, END1007W and MEC1003F. 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 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 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 thesis design/project or, (iii) for honours, a minimum of a second class pass in the thesis/design 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 thesis/design project is defined as one of APG4003/CHE4045/CHE4036/CIV4044/EEE4022/MEC4061/MEC4091.
- (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

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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.

## **Postgraduate Diplomas**

Postgraduate Diploma in Engineering (PGDipEng)

\*Postgraduate Diploma in Industrial Administration (PGDipIndAdmin)

Postgraduate Diploma in Engineering Management (PGDipEngMan)

\*Postgraduate Diploma in Housing Development & Management (PGDipHDM)

Postgraduate Diploma in Project Management (PGDipProjMgmt)

Postgraduate Diploma in Property Studies (PGDipPropStudies)

Postgraduate Diploma in Transport Studies (PGDipTransport Studies)

\* No new intake from 2007: to be discontinued.

## **Postgraduate Diploma in Engineering**

(NOTE: The rules must be read together with the general rules for degrees, diplomas and certificates in Handbook 3 of this series.)

The Postgraduate Diploma in Engineering is offered by the Faculty through the Departments of Chemical Engineering (programmes: Metallurgical Studies; and Minerals Beneficiation), Civil Engineering (programme: Structural Materials) and Electrical Engineering (programme: Telecommunications). There will be no new intake of students for the Telecommunications programme from 2010.

### **Minimum Admission Requirements**

FGA1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she

- (a) holds a four year bachelors degree or honours degree of the University or of any other university recognised for the purpose; or
- (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
- (c) has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for a degree in terms of (a) above; or
- (d) has in any other manner attained a level of competence which in the opinion of Senate on the recommendation of the Faculty, is adequate for the purpose of admission as a candidate for the degree.

### **Selection**

FGA2 Selection is based on an applicant's academic record and experience.

### **Duration**

FGA3 The minimum duration of the Postgraduate Diploma Programme is one academic year.

## Registration Requirements

- FGA4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FGA4.2 A candidate must register or reregister by not later than the end of Registration Week, or, if any of the courses begins earlier, by not later than the date on which the first course starts.
- FGA4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

## Obtaining the Postgraduate Diploma

- FGA5 A candidate shall comply with the curriculum requirements prescribed by Senate and shall complete approved coursework of a value not less than 120 credits, except if registered for the Postgraduate Diploma prior to 1 January 2004 in which case he/she shall complete approved coursework of a value not less than 144 credits in accordance with the rules applicable at the time of his/her first registration as a Postgraduate Diploma candidate.
- A candidate who wishes to proceed to a Postgraduate Diploma after qualifying for a degree of Master shall be required to complete further approved coursework of a value not less than 120 credits before qualifying for a Postgraduate Diploma.

## Courses Completed at this or another University/Institution

- FGA6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FGA6.2 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 Report

- FGA7 A candidate shall submit a written report to the Programme Director by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

## Readmission

- FGA8 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned.

## Examination

- FGA9 A candidate shall complete such examinations as are prescribed for the advanced level coursework.

## Award of the Postgraduate Diploma

- FGA10.1 The Postgraduate Diploma is not awarded with Distinction.

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FGA10.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

### Upgrading to Masters Degree Registration

FGA11 Senate may, on the recommendation of the Programme Director, upgrade a candidate's registration to candidature for a Masters Degree and permit the candidate to count the courses completed toward the Postgraduate Diploma as credits for the Masters Degree.

## Postgraduate Diploma in Industrial Administration and Postgraduate Diploma in Engineering Management

(NOTE: The rules must be read together with the general rules for degrees, diplomas and certificates in Handbook 3 of this series.)

There has been no new intake for the Postgraduate Diploma in Industrial Administration from 2007 (qualification to be discontinued). Candidates who registered prior to 2007 have the option of continuing or changing their registration to Postgraduate Diploma in Engineering Management.

### Minimum Admission Requirements

FGB1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she

- (a) holds a four year bachelors degree or honours degree of the University; or
- (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
- (c) has passed at any University or at any institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to the examinations prescribed for a four year bachelors degree or honours degree at this University; or
- (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the Postgraduate Diploma.

### Selection

FGB2 Selection is based on an applicant's academic record and experience.

### Duration

FGB3 The minimum duration of the Postgraduate Diploma Programme is eighteen months.

### Registration Requirements

FGB4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FGB4.2 A candidate must register or reregister by not later than the end of Registration Week, or, if any of the courses begins earlier, by not later than the date on which the first course starts.

FGB4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

### **Obtaining the Postgraduate Diploma**

FGB5 A candidate shall comply with the curriculum requirements prescribed by Senate and shall complete approved coursework of a value not less than 120 credits, except if registered for the Postgraduate Diploma prior to 1 January 2004 in which case he/she shall complete approved coursework of a value not less than 144 credits in accordance with the rules applicable at the time of his/her first registration as a Postgraduate Diploma candidate. (The curriculum requirements are obtainable on request from the Head of the Department concerned.)

### **Courses Completed at this or another University/Institution**

FGB6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FGB6.2 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 Report**

FGB7 A candidate shall submit a written report to the Programme Director by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FGB8 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned.

### **Examination**

FGA9 A candidate shall complete such examinations as are prescribed for the advanced level coursework.

### **Award of the Postgraduate Diploma**

FGB10.1 The Postgraduate Diploma is not awarded with Distinction.

FGB10.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

### **Upgrading to Masters Degree Registration**

FGB11 Senate may, on the recommendation of the Programme Director, upgrade a candidate's registration to candidature for a Masters Degree and permit the candidate to count the courses completed toward the Postgraduate Diploma as credits for the Masters Degree.

## **Postgraduate Diploma in Housing Development and Management**

This Postgraduate Diploma has been discontinued. Candidates who registered for this qualification prior to 2007 should refer to the Postgraduate Diploma rules in the 2006 edition of this Handbook.

## Postgraduate Diploma in Project Management

(NOTE: The rules must be read together with the general rules for degrees, diplomas and certificates in Handbook 3 of this series.)

The Postgraduate Diploma in Project Management is offered by the Faculty through the Department of Construction Economics & Management.

### Minimum Admission Requirements

- FGD1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she
- (a) holds a four year bachelors degree or honours degree of the University; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any University or at any institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to the examinations prescribed for a four year bachelors degree or honours degree at this University; or
  - (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the Postgraduate Diploma.

### Selection

- FGD2 Selection is based on an applicant's academic record and experience.

### Duration

- FGD3 A candidate must be registered for the degree for at least two academic years.

### Registration Requirements

- FGD4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FGD4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.
- FGD4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses or only a project.
- FGD4.4 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

### Obtaining the Postgraduate Diploma

- FGD5 A candidate shall comply with the curriculum requirements prescribed by Senate and shall complete approved advanced level coursework of a value of not less than 120 credits. The coursework and curriculum requirements are obtainable from the Head of Department.

### Courses Completed at this or another University/Institution

- FGD6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this

or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FGD6.2 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 Report**

FGD7 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FGD8.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned and for which a result is available in that year.

FGD8.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma fails to complete a course after having been registered for it twice.

### **Examination**

FGD9 A candidate shall complete such examinations as are prescribed for the advanced level coursework.

### **Award of the Postgraduate Diploma**

FGD10.1 The Postgraduate Diploma is not awarded with Distinction.

FGD10.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

### **Upgrading to Masters Degree Registration**

FGD11 Senate may, on the recommendation of the Head of Department, upgrade a candidate's registration to candidature for the Degree of Master of Science (Project Management) and permit the candidate to count the courses completed toward the Postgraduate Diploma as credits for the Masters Degree.

## **Postgraduate Diploma in Property Studies**

(NOTE: The rules must be read together with the general rules for degrees, diplomas and certificates in Handbook 3 of this series. Ministerial approval of this Postgraduate Diploma is pending.)

The Postgraduate Diploma in Property Studies is offered by the Faculty through the Department of Construction Economics & Management.

### **Minimum Admission Requirements**

FGE1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she

- (a) holds a four year bachelors degree or honours degree of the University; or

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- (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
- (c) has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for a degree in terms of (a) above; or
- (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the Postgraduate Diploma.

### **Selection**

FGE2 Selection is based on an applicant's academic record and experience.

### **Duration**

FGE3 A candidate must be registered for the degree for at least two academic years.

### **Registration Requirements**

FGE4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FGE4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.

FGE4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses or only a project.

FGE4.4 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

### **Obtaining the Postgraduate Diploma**

FGE5 A candidate shall comply with the curriculum requirements prescribed by Senate and shall complete approved advanced level coursework of a value of not less than 120 credits. The coursework and curriculum requirements are obtainable from the Head of Department.

### **Courses Completed at this or another University/Institution**

FGE6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FGE6.2 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 Report**

FGE7 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the

period of registration is less than twelve months, the period that is relevant.

### **Readmission**

- FGE8.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned and for which a result is available in that year.
- FGE8.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma fails to complete a course after having been registered for it twice.

### **Examination**

- FGE9 A candidate shall complete such examinations as are prescribed for the advanced level coursework.

### **Award of the Postgraduate Diploma**

- FGE10.1 The Postgraduate Diploma is not awarded with Distinction.
- FGE10.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

### **Upgrading to Masters Degree Registration**

- FGE11 Senate may, on the recommendation of the Head of Department, upgrade a candidate's registration to candidature for the Degree of Master of Science (Property Studies) and permit the candidate to count the courses completed toward the Postgraduate Diploma as credits for the Masters Degree.

## **Postgraduate Diploma in Transport Studies**

(NOTE: The rules must be read together with the general rules for degrees, diplomas and certificates in Handbook 3 of this series.)

The Postgraduate Diploma in Transport Studies is offered by the Faculty through the School of Architecture, Planning and Geomatics and the Department of Civil Engineering.

### **Minimum Admission Requirements**

- FGF1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she
- (a) holds a four year bachelors degree or honours degree of the University and has achieved a level of numeracy satisfactory to the Senate\*; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework and has achieved a level of numeracy satisfactory to Senate\*; or
  - (c) has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for a degree in terms of (a) above; or
  - (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the Postgraduate Diploma.

\* NOTE:

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- (i) a first year (one semester) University course in Mathematics (pure or applied) or Statistics
- (ii) Mathematics at Senior Certificate level with a symbol of D or better at the Higher Grade, or a symbol of B or better at the Standard Grade; or
- (iii) applicants without the required level of numeracy specified in (i) and (ii) above will be required to demonstrate a satisfactory level of numeracy in a test.

### Selection

FGF2 Selection is based on an applicant's academic record and experience.

### Duration

FGF3 A candidate must be registered for the degree for at least two academic years.

### Registration Requirements

FGF4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FGF4.2 A new candidate must register by not later than the date on which his/her first course starts.

FGF4.3 A continuing candidate must re-register by not later than 28 February.

FGF5 A candidate shall comply with the curriculum requirements prescribed by Senate and shall complete approved advanced level coursework of a value of not less than 120 credits. The coursework and curriculum requirements are obtainable from the Programme Convener.

### Courses Completed at this or another University/Institution

FGF6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FGF6.2 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.

### Minimum Number of Course Modules

FGF7 A candidate must register for at least two course modules, other than the dissertation or research project, per year, except where only one course module is required to complete the diploma.

### Readmission

FGF8.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned.

FGF8.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma fails to complete a course after

having been registered for it twice.

### Examination

FGF9.1 A candidate shall complete such examinations as are prescribed for the advanced level coursework.

FGF9.2 A candidate may be required to present himself or herself for an oral examination on an essay assignment.

FGF9.3 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice or, in the case of the Research Report, submits the Report and fails the examination.

### Award of the Postgraduate Diploma

FGF10.1 The Postgraduate Diploma is not awarded with Distinction.

FGF10.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

## Postgraduate Degrees

\*Bachelor of Architecture (BArch)

Bachelor of Architectural Studies (Honours) (BAS(Hons))

Bachelor of Science (Honours) in Construction Management (BSc(Hons)(CM))

Bachelor of Science (Honours) in Geographical Information Systems (BSc(Hons)(GIS))

Bachelor of Science (Honours) in Materials Science (BSc(Hons)(MatSc))

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 (Professional) (MArch Prof)

Master of City Planning and Urban Design (MCPUD)

Master of City and Regional Planning (MCRP)

Master of Engineering (MEng)

\*Master of Engineering Management (MEngMan)

\*Master of Industrial Administration (MIndAdmin)

Master of Landscape Architecture (MLA)

Master of Philosophy (MPhil)

Master of Philosophy in Conservation of the Built Environment (MPhil ConsBE)

\*Master of Philosophy in Housing Development and Management (MPhil(HDM))

Master of Philosophy in Transport Studies (MPhil(Transport Studies))

Master of Philosophy in Urban Infrastructure, Design and Management (MPhil(UID&M))

\*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 Science in Property Studies (MSc(PropStud))

Doctor of Architecture (DArch)

Doctor of Science in Engineering (DSc(Eng))

Doctor of Philosophy (PhD)

\* NOTE: To be discontinued. No new intake from 2007.

## Bachelor of Architecture

NOTE: This degree is being phased out. There will be no new first year intake from 2008. The

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degrees of BAS(Hons) and MArch(Professional) will be introduced from 2008 and 2009 respectively, subject to ministerial approval.

The BArch is a postgraduate professional degree offered by the Faculty through the School of Architecture, Planning and Geomatics. It confers eligibility for application for registration, under Act No. 44 of 2000, with the registration body SACAP and for membership of the South African Institute of Architects (SAIA). The final examinations have the approval of the South African Council for the Architectural professions. The Bachelor of Architecture course merits exemption from Parts 1 and 2 of the Royal Institute of British Architects', and the Commonwealth Association of Architects', own examination in Architecture.

### Duration of Degree

FPA1.1 The curriculum for the degree shall extend over a minimum of three academic years of study.

FPA1.2 Except with the permission of Senate, students who register for the Bachelor of Architecture degree, must register for and comply with the requirements of all three years of study.

### Obtaining the Degree and Validity of Credits

FPA2.1 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.

FPA2.2 Registration: Second year students are required to register for all first and second semester core courses as well as first semester coursework electives in February. Second semester electives are to be finalised in July by completion of a "Change of Curriculum" form.

### Studiowork Courses

FPA3 In the second half of the second year of study, studiowork BArch 4 consists of a Simulated Office Programme. This is mandatory for all students. The total work of the Simulated Office Programme consists of Studiowork APG5003S, Professional Practice, APG5036F and Practice Management, APG5037F courses. The studio work is subject to an oral examination and the course work to a written examination and assignments.

### Method of Assessment

*Courses within each semester will be assessed by formal examination or oral review or by satisfactory performance of the duly performed certificate (DP) requirements. If a course is assessed by examination or review, a student may be refused permission (DPR) to sit for the examination or review if he or she fails to satisfy the Senate 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.*

FPA4.1 *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.

FPA4.2 *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. The result of the review is published as an ungraded Pass (PA) or a Fail (F) grade.

FPA4.3 *Duly Performed (DP) Certificate* In DP courses the student 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).

A DP certificate may be withheld unless: all parts of each studiowork project, tutorial or other assignments are completed to an acceptable standard and submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in all sections of the courses.

### **Formal Examinations**

*Examinations or reviews are held at the end of each semester in which courses are offered.*

#### **FPA5.1 Studiowork Examinations**

At the end of ARCH4, an examination of the Professional Practice and Practice Management parts of Studiowork, is held.

At the end of Semester ARCH5, an examination is held in the work of the Studiowork courses of Semesters ARCH3, ARCH4, (design part) and ARCH5. The student is required to submit a portfolio of all the Studiowork and, at the discretion of the examiners, other coursework completed during this period for presentation at an oral examination.

In awarding a result for the studiowork examination, all other coursework in the portfolio may be taken into consideration.

At the end of Semester ARCH6 an examination is held of the final major Design project.

#### **FPA5.2 Examinations other than Studiowork**

(a) The examinations in History and Theory of Architecture (APG5005F) and Advanced Construction (Research) (APG5006F) are by means of term papers;

(b) The examination in APG5036F Professional Practice and APG5037F Practice Management is by means of two separate written examinations.

### **Studiowork Reviews**

FPA6.1 For the review of External Experience at the end of Semester ARCH2, a student is required to present all assignments carried out during the external experience period, together with evidence that he or she has acquired the requisite work experience.

FPA6.2 For the review of Studiowork ARCH3, a student is required to submit a portfolio of all studiowork projects and studio-related coursework done in the semester.

### **Progress through the Degree**

FPA7.1 Except with permission of the Senate, no student may register for any course between Semesters ARCH3 to ARCH5 more than twice.

FPA7.2 Except with permission of the Senate, students are required to complete an Advanced Theory essay or Advanced Technology essay in architecture.

FPA7.3 Except with permission of the Senate, students are required to complete three History/Theory courses, one Technology course and one course from Urban Design/Planning/Landscape.

FPA7.4 Except with permission of the Senate, all coursework must be completed prior to entry into ARCH6.

### Minimum Requirements for Readmission

- FPA8 Except with permission of the Senate, a candidate shall not be permitted to renew his or her registration for the degree if he or she has not completed at least:
- at the end of the second year of registration, one semester course in studiowork;
  - at the end of the third year of registration, two semester courses in studiowork;
  - at the end of the fourth year of registration, three semester courses in studiowork.
  - at the end of the fifth year of registration, completed the requirements for the degree.

### Distinction

FPA9.1 Except with the permission of Senate, a degree may only be awarded with distinction if the degree has been completed in the minimum period of time.

FPA9.2 *Award of Degree with Distinction and with Distinction in Design*

The degree may be awarded with distinction to a student who obtains a first class pass in the project component of the Semester ARCH6 Studiowork Examination, provided that he or she has obtained a mark of 75% or more in the ARCH5 examination, a first class pass in at least one other examination course, and at least an upper second in one further examination course.

FPA9.3 *Award of Degree with Distinction in Design* The degree may be awarded with distinction in design to a student who obtains a first class pass in the Semester ARCH6 Studiowork examination, where the examiners deem that the major Studiowork project submission is of special merit.

### Structure of the Curriculum

The curriculum comprises six semesters consisting of two semesters (ARCH1 and ARCH2) of external experience and four semesters of Advanced Courses (ARCH3 to ARCH6).

## Bachelor of Architectural Studies (Honours)

An honours degree in architecture that provides learners with advanced vocational and discipline-specific knowledge, skills and competencies related to the history, theory, technology and practice of architecture. The course of study extends the base of knowledge of the learner through graduate study with particular emphasis on architectural design. It is focused on developing creative and critical inquiry, reflective understanding and cultural, social and technical knowledge in preparation for self-motivated Independent learning. The 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).

### Minimum Admission Requirements

- FHA1.1 A person may be considered as a candidate for the degree if he or she:
- is a graduate of the Bachelor of Architectural Studies degree of this University; or
  - is the holder of any three-year bachelor's degree recognised by the Senate as equivalent to the Bachelor of Architectural Studies degree of this University; or
  - has completed three years of study at this or another university or institution which is, in the opinion of the Senate, the equivalent of the Bachelor of Architectural Studies degree of this University.
- FHA1.2 A person may apply for entry into the degree if he or she:
- has, after completion of the Bachelor of Architectural Studies degree or equivalent, gained a minimum of six months uninterrupted practical experience in the office of the same registered architect.
  - exceptions to (a) only with approval by Senate.

*Automatic Entry*

FHA1.3 In recognizing the BAS Programme presented at UCT as the main feeder degree for the Bachelor of Architectural Studies (Honours) Programme, all students who obtain 70% or higher in all of the following subjects will be afforded automatic entry into the Bachelor of Architectural Studies (Honours) programme: APG3023W (Technology III), APG3024W (Design and Theory Studio III), APG3000F (History and Theory of Architecture V), APG3001S (History and Theory of Architecture VI).

**Selection**

FHA2 Admission into the BAS(Hons) is limited and by application. Applicants must submit an application to the University on the prescribed UCT form, by the date stipulated by the University. In addition applicants must prepare a submission for the School of Architecture, the requirements of which are available from the School of Architecture. Selection is based on an applicant's design ability, academic record, and work experience. Selection is at the discretion of the Admissions Committee.

**Duration of Degree**

FHA3.1 The minimum duration of the Bachelor of Architectural Studies (Honours) is one year of full-time study.

FHA3.2 Except with the permission of Senate, students who register for the Bachelor of Architectural Studies (Honours) degree, must register for the full years study.

**Readmission Requirements**

FHA4 Except with permission of Senate, a student may not renew his or her registration if he or she fails to pass:

- (a) courses to the value of 50% of the credits registered for; and
- (b) a course after having been registered for it twice.

**Obtaining the Degree and Validity of Credits**

FHA5.1 The curriculum comprises two semesters, each consisting of a studio course and three non-studio courses of which one is an elective course. A candidate shall comply with the curriculum requirements prescribed by Senate, which are published in the Programmes of Study and Courses Offered section of Handbook.

FHA5.2 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.

FHA5.3 Registration: Students are required to register for all courses (including second semester elective course) in February. Should a student want to change their second semester elective in July, they can do so by completion of a 'Change of Curriculum' form.

**Method of Assessment**

FHA6.1 Satisfactory performance of the duly performed certificate (DP) requirements applies to all courses. A student gains entry to final assessment by satisfactory performance of the duly performed (DP) requirements. A student may be refused permission (DPR) to sit for the examination or review if he she fails to satisfy the Senate that he or she has satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.

FHA6.2 A DP certificate may be withheld unless: all parts of each studiowork project, tutorial or

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other assignment are completed to an acceptable standard submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in sections of the course.

FHA6.3 Assessment by formal examination may be by means of a written examination, term paper or presentation. An external examiner is appointed for each course assessed by examination.

### **Degree with Distinction**

FHA7 The degree will be awarded with distinction to a candidate who has obtained first class passes in both Studiowork I and II and an additional first class pass in either History and Theory of Architecture or Advanced Building Technology and has successfully completed all other courses required for the degree.

## **Bachelor of Science (Honours) in Construction Management**

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

The Bachelor of Science (Honours) in Construction Management degree is offered by the Faculty through the Department of Construction Economics and Management.

### **Minimum Admission Requirements**

FHC1 A person shall not be admitted as a candidate for the degree unless he or she:

- (a) is a graduate of the BSc in Construction Studies degree of this University; or
- (b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the Senate as equivalent to the BSc in Construction Studies degree of this University; or
- (c) has in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

### **Selection**

FHC2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors Degree with a weighted average of at least 60% (supplementary results are excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

### **Duration**

FHC3 A candidate must be registered for a minimum of one academic year.

### **Registration Requirements**

FHC4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FHC4.2 A candidate must register or reregister by not later than the end of registration week, or, if any of the courses begin earlier, by not later than the date on which the first course starts.

FHC4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

## Curriculum

- FHC5.1 A candidate:
- (i) 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; and
  - (ii) must complete approved coursework of a value not less than 144 credits.
- FHC5.2 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.
- FHC5.3 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.
- FHC5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

## Recognition of Courses

- FHC6 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.

## Method of Assessment

- FHC7.1 *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.
- FHC7.2 *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.
- FHC7.3 *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.
- FHC7.4 *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).

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### FHC7.5 *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**

FHC8 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. However, a supplementary examination will not be offered for any course offered by a department established in the Faculty of Engineering & the Built Environment.

### **Readmission Requirements**

FHC9 Except by permission of the Senate a candidate may not renew his or her registration

- (i) if he or she, in the courses recognised for the degree fails to pass courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned;
- (ii) if he or she, in courses recognised for the degree fails to complete a course after having been registered for it twice.

### **Award of the Degree with Distinction**

FHC10 In order to be considered for the award of the degree with distinction, a candidate must obtain a minimum average mark of 75%.

### **Exemption from or Modification of Rules**

FHC11 Any exemption or deviation from the rules requires the approval of Senate.

## **Bachelor of Science (Honours) In Geographical Information Systems**

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

The Bachelor of Science (Honours) in Geographical Information Systems degree is offered by the Faculty through the School of Architecture, Planning and Geomatics.

### **Minimum Admission Requirements**

FHG1 A person shall not be admitted as a candidate for the degree unless he or she:

- (a) is a graduate of the BSc degree of this University; or
- (b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the Senate as equivalent to the BSc degree of this University; or
- (c) has an approved first year (two semesters) University course in Mathematics OR an approved first year (one semester) University course in Mathematics and a first year (one semester) University course in Statistics; or
- (d) has in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

### **Selection**

FHG2 Selection is based on an applicant's academic record and experience. Applicants may be required to attend an interview and/or write an entrance examination.

## Duration

FHG3 A candidate must be registered for a minimum of one academic year.

## Registration Requirements

FHG4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FHG4.2 A candidate must register or reregister by not later than the end of registration week, or, if any of the courses begins earlier, by not later than the date on which the first course starts.

## Curriculum

FHG5.1 A candidate:

- (i) 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; and
- (ii) must complete approved coursework of a value not less than 144 credits.

FHG5.2 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.

FHG5.3 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.

FHG5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

## Method of Assessment

FHG6.1 *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.

FHG6.2 *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.

FHG6.3 *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

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satisfactory participation in all sections of the course.

### Readmission Requirements

- FHG7 Except by permission of the Senate a candidate may not renew his or her registration
- (i) if he or she, in the courses recognised for the degree fails to pass courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned;
  - (ii) if he or she, in courses recognised for the degree fails to complete a course after having been registered for it twice.

### Award of the Degree with Distinction

- FHG8 In order to be considered for the award of the degree with distinction, a candidate must complete the degree in one year and obtain at least 75% for the thesis project APG4003Z and an average of at least 75% for all coursework.

### Exemption from or Modification of Rules

- FHG9 Any exemption or deviation from the rules requires the approval of Senate.

## Bachelor of Science (Honours) In Materials Science

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

The Bachelor of Science (Honours) in Materials Science degree is offered by the Faculty through the Department of Mechanical Engineering.

### Minimum Admission Requirements

- FHM1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the BSc degree of this University; or
  - (b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the Senate as equivalent to the BSc degree of this University; or
  - (c) has in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

### Selection

- FHM2 Selection is based on an applicant's academic record and experience. Applicants may be required to attend an interview and/or write an entrance examination.

### Duration

- FHM3 A candidate must be registered for a minimum of one academic year.

### Registration Requirements

- FHM4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

- FHM4.2 A candidate must register or reregister by not later than the end of registration week, or, if any of the courses begins earlier, by not later than the date on which the first course starts.

### Curriculum

- FHM5.1 A candidate:
- (i) 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; and
- (ii) must complete approved coursework of a value not less than 144 credits.

FHM5.2 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.

FHM5.3 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.

FHM5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

## Method of Assessment

### FHM6.1 *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.

### FHM6.2 *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.

### FHM6.3 *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.

## Readmission Requirements

- FHM7 Except by permission of the Senate a candidate may not renew his or her registration
- (i) if he or she, in the courses recognised for the degree fails to pass courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned;
- (ii) if he or she, in courses recognised for the degree fails to complete a course after having been registered for it twice.

## Award of the Degree with Distinction

FHM8 In order to be considered for the award of the degree with distinction, a candidate must complete the degree in one year and obtain at least 75% for the thesis project MEC4091S and an average of at least 75% for all coursework.



## Exemption from or Modification of Rules

FHM9 Any exemption or deviation from the rules requires the approval of Senate.

## Bachelor of Science (Honours) in Property Studies

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

The Bachelor of Science (Honours) in Property Studies degree is offered by the Faculty through the Department of Construction Economics and Management.

### Minimum Admission Requirements

- FHP1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the BSc in Property Studies degree of this University; or
  - (b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the Senate as equivalent to the BSc in Property Studies degree of this University; or
  - (c) has in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

### Selection

- FHP2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors Degree with a weighted average of at least 60% (supplementary results are excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

### Duration

- FHP3 A candidate must be registered for a minimum of one academic year.

### Registration Requirements

- FHP4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FHP4.2 A candidate must register or reregister by not later than the end of Registration Week, or, if any of the courses begin earlier, by not later than the date on which the first course starts.
- FHP4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

### Curriculum

- FHP5.1 A candidate:
- (i) 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.
  - (ii) must complete approved coursework of a value not less than 144 credits.
- FHP5.2 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.
- FHP5.3 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

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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.

FHP5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

### Recognition of Courses

FHP6 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.

### Method of Assessment

#### FHP7.1 *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.

#### FHP7.2 *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.

#### FHP7.3 *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.

#### FHP7.4 *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).

#### FHP7.5 *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

FHP8 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. However, a supplementary examination will not be offered for any course offered by a department established in the Faculty of Engineering & the Built Environment.

## Readmission Requirements

- FHP9 Except by permission of the Senate a candidate may not renew his or her registration
- (i) if he or she, in the courses recognised for the degree fails to pass courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned;
  - (ii) if he or she, in courses recognised for the degree fails to complete a course after having been registered for it twice.

## Award of the Degree with Distinction

- FHP10 In order to be considered for the award of the degree with distinction, a candidate must obtain a minimum average mark of 75%.

## Exemption from or Modification of Rules

- FHP11 Any exemption or deviation from the rules requires the approval of Senate.

## Bachelor of Science (Honours) in Quantity Surveying

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

The Bachelor of Science (Honours) in Quantity Surveying degree is offered by the Faculty through the Department of Construction Economics and Management.

## Minimum Admission Requirements

- FHQ1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the BSc in Construction Studies degree of this University; or
  - (b) is the holder of any three-year bachelor's degree of this, or any other university recognised for the purpose by the Senate as equivalent to the BSc in Construction Studies degree of this University; or
  - (c) has in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

## Selection

- FHQ2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors Degree with a weighted average of at least 60% (supplementary results are excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

## Duration

- FHQ3 A candidate must be registered for a minimum of one academic year.

## Registration Requirements

- FHQ4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FHQ4.2 A candidate must register or reregister by not later than the end of Registration Week, or, if any of the courses begins earlier, by not later than the date on which the first course starts.
- FHQ4.3 A candidate must register or reregister by not later than end of registration week if taking only second semester courses.

## Curriculum

FHQ5.1 A candidate:

- (i) 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.
- (ii) must complete approved coursework of a value not less than 164 credits.

FHQ5.2 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.

FHQ5.3 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.

FHQ5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating

## Recognition of Courses

FHQ6 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.

## Method of Assessment

FHQ7.1 *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.

FHQ7.2 *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.

FHQ7.3 *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.

FHQ7.4 *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).

FHQ7.5 *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**

FHQ8 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. However, a supplementary examination will not be offered for any course offered by a department established in the Faculty of Engineering & the Built Environment.

**Readmission Requirements**

FHQ9 Except by permission of the Senate a candidate may not renew his or her registration

- (i) if he or she, in the courses recognised for the degree fails to pass courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned;
- (ii) if he or she, in courses recognised for the degree fails to complete a course after having been registered for it twice.

**Award of the Degree with Distinction**

FHQ10 In order to be considered for the award of the degree with distinction, a candidate must obtain a minimum average mark of 75%.

**Exemption from or Modification of Rules**

FHQ11 Any exemption or deviation from the rules requires the approval of Senate.

**Master of Architecture**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of March is offered by the Faculty through the School of Architecture, Planning and Geomatics.*

**Minimum Admission Requirements**

FMAA1 Except with permission of the Senate, a candidate for the degree must be a BArch graduate of this University, or a graduate of another University, who holds a degree recognised by Senate as being equivalent to a BArch degree in the University.

**Selection**

FMAA2 Selection is based on an applicant's academic record and the availability of a suitable supervisor. Submission of a satisfactory research proposal may be required.

**Duration**

FMAA3 A candidate must be registered for the degree for a minimum period of one academic year.

**Registration Requirements**

FMAA4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

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FMAA4.2 A candidate registering for the first time may register at any time during the year.

FMAA4.3 Returning candidates for the degree must reregister by not later than the last Friday of February of each year.

### **Obtaining the Degree**

FMAA5.1 A candidate shall present a dissertation (160 credits) incorporating any or all of the following:

- (a) a research project of a theoretical or practical nature;
- (b) a critical review of a specified topic based upon a comprehensive search of literature or available data;
- (c) design of all or part of an architectural project or group of projects to a specification involving advanced concepts and theoretical principles;
- (d) development of a technique involving novel technological features or advanced design;
- (e) any other study acceptable to the Faculty of Engineering and the Built Environment.

FMAA5.2 The candidate's supervisor shall submit written evidence to the Faculty Examinations Committee that the candidate has, with the approval of the supervisor, submitted a paper for presentation at a conference or for publication in a journal recognised by Senate.

### **Supervision**

FMAA6.1 A candidate shall work under the guidance of a supervisor appointed by Senate and shall be required to attend at the University for a minimum period of at least one month per annum for supervision purposes for as long as he/she continues to be a candidate for the degree.

FMAA6.2 A change of supervisor or a change to a candidate's field of study/research is subject to the approval of Senate.

### **Progress Report**

FMAA7 A candidate shall submit a written report to the supervisor by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months the period that is relevant.

### **Readmission**

FMAA8.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she fails to make progress with his/her research project or dissertation to the satisfaction of Senate.

FMAA8.2 A candidate who is required by the Faculty Examination Committee to correct or revise his or her research dissertation shall complete the corrections/revisions within one year of the date of the Committee's decision, failing which he/she shall not be permitted to continue with or reregister for his/her degree without the special permission of Senate.

### **Submission of Dissertation and Paper**

FMAA9.1 A candidate intending to submit a dissertation in the hope of the award of the degree in either June or December, must, in the year in which the dissertation is to be submitted, inform the Faculty Manager (Academic Administration) in writing of such intention by 15 February or 15 July respectively in the year in which the dissertation is to be submitted. The final date for receipt by the Faculty Manager (Academic Administration)

of a Master's dissertation submitted in the hope of the award of the degree either in June or December is 31 March or 31 August respectively.

FMAA9.2 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, two unbound copies and one copy on CD ROM in specified digital format to the Faculty Manager, (Academic Administration). Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.

FMAA9.3 The candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by the supervisor. The final date for receipt of the paper by the Faculty Office shall be 30 April in the case of a candidate who submits a dissertation in hope of the award of the degree in June or 31 October in the case of a candidate who submits a dissertation in hope of the award of the degree in December. *Note:* The Paper requirement is intended to develop a candidate's skills in academic communication through exposure to the discipline of preparing a scholarly, succinct overview of the subject of the research topic, with due attention to structure, detail, clarity of expression and referencing.

FMAA9.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Examination**

FMAA10.1 Examination is by dissertation unless otherwise stated. The dissertation must be satisfactory in arrangement and expression and must be typewritten or printed. Each candidate must comply with such other requirements as the Board of the Faculty of Engineering and the Built Environment, on the recommendation of the Director of the School of Architecture, Planning and Geomatics, may prescribe.

FMAA10.2 A candidate may be required to present himself or herself for an oral examination on the subject of the dissertation.

FMAA10.3 A candidate may not submit his/her dissertation for examination more than twice.

### **Publication**

FMAA11.1 When presenting his or her dissertation the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format.

FMAA11.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

FMAA12.1 The degree will not be awarded with distinction, except in the case of candidates registered for the degree prior to 1999 who may be considered in terms of the Rules applicable at the time of their first registration.

FMAA12.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## Upgrading to PhD

FMAA13 The Senate may on the recommendation of the Faculty and the candidate's supervisor upgrade a candidate's registration to PhD on the grounds of the quality and development of the candidate's work.

## Master of Architecture (Professional)

A qualifying degree in architecture that provides learners with the knowledge, values and skills to enter the profession of architecture and/or to pursue further qualifications in architecture or fields associated with the architectural profession and built environment. It is focused on developing independent critical inquiry in preparation for practice in a diverse and changing world. Students are given considerable freedom and support to develop a reflective, critical and speculative relationship to their work. The 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 exam set by SACAP.

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MArch is offered by the Faculty through the School of Architecture, Planning and Geomatics.*

## Minimum Admission Requirements

FMAB1 Except with permission of the Senate, a candidate for the degree must be a BAS(Hons) graduate of this University, or a graduate of another University, who holds a degree recognised by Senate as being equivalent.

## Selection

FMAB2.1 Graduates of the Bachelor of Architectural Studies (Honours) from this University will be eligible to enter the Master of Architecture (Professional).

FMAB2.2 Any graduate from the Bachelor of Architectural Studies (Honours) degree who wishes to enter the degree after an absence of more than three years, must, apply to Senate for entry by letter of motivation.

FMAB2.3 Any graduate wishing to enter the degree from another University must submit an application to the University on the prescribed UCT form, by the date stipulated by the University. In addition applicants must prepare a submission for the School of Architecture, the requirements of which are available from the School of Architecture. Selection is at the discretion of the Admissions Committee. Admission into the MArch(Prof) will depend on the applicant's design ability, academic record, work experience and student numbers.

## Duration

FMAB3.1 The minimum duration of the Master of Architecture (Professional) is one year of full-time study.

FMAB3.2 Except with the permission of Senate, students who register for the Master of Architecture (Professional) degree, must register for the full year's study.

## Obtaining the Degree

FMAB4.1 A candidate shall present a Theory Research Paper (30 credits) and Technology Research Paper (30 credits) in the first semester.

FMAB4.2 A candidate shall present a Design Dissertation (120 credits) incorporating:

- (a) a self-motivated design project (90 credits); and
- (b) a Design Research Report (30 credits) of a theoretical nature in support of the Design Project.

### **Readmission**

FMAB5.1 Except by permission of the Senate, a candidate who fails the Design Dissertation, on repeating the course, shall be required to select a new topic.

FMAB5.2 A candidate who fails a Research Paper will be allowed to repeat that component in the following year.

FMAB5.3 A candidate will be allowed to repeat a course only once.

### **Method of Assessment**

FMAB6.1 Satisfactory performance of the duly performed certificate (DP) requirements applies to all courses. A student gains entry to final assessment by satisfactory performance of the duly performed (DP) requirements. A student may be refused permission (DPR) to sit for the examination or review if he or she fails to satisfy the Senate that he or she has satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.

FMAB6.2 A DP certificate may be withheld unless: all parts of each studiówork project, tutorial or other assignment are completed to an acceptable standard and submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in all sections of the course.

FMAB6.3 Assessment by formal examination may be by means of a written or oral examination or term paper. An external examiner is appointed for each course assessed by examination.

### **Degree with Distinction**

FMAB7 The degree will be awarded with distinction to a candidate who obtains the degree in the first academic year of study with a first for the Design Dissertation and a minimum of 70% for each of the Research Papers.

## **Master of City Planning and Urban Design**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MCPUD is offered by the Faculty through the School of Architecture, Planning and Geomatics.*

The increasingly large scale, complex, and diverse nature of cities demands the expansion of traditional architectural capabilities to embrace an understanding of the structure and functioning, and three-dimensional design and management of, human settlements. The MCPUD degree curriculum comprises two years of full time study, open to graduates in Architecture from any recognised institution approved by Senate. However, in terms of rule FMB6.1, BArch graduates from the University who have completed prescribed work in the theory and studiówork of City Planning and Urban Design while registered for that degree, may obtain credit for and exemption from one semester of the curriculum for the MCPUD degree. All students entering the programme

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must do so in the first semester of the year. Course work in the programme includes the theoretical and practical subject matter necessary to meet the requirements of the Certification of Environmental Assessment Practitioners in South Africa.

### Minimum Admission Requirements

- FMB1 A person shall not be admitted as a candidate for the degree unless
- (a) he or she is a graduate in Architecture of the University or of another University recognised by the Senate for the purpose; or
  - (b) he or she has passed at any University or at any Institution recognised by the Senate for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for the Bachelor of Architecture degree at the University; or
  - (c) he or she has in any other manner attained a level of competence which in the opinion of Senate, on the recommendation of the Faculty of Engineering and the Built Environment is adequate for the purposes of admission as a candidate for the degree. Candidates holding the Bachelor of Architectural Studies degree of the University may be accepted on evidence of demonstrated spatial design ability.

### Selection

- FMB2 Entry into the programme is limited. All applicants must submit a portfolio of design work, and other material as specified in the Application Form, for consideration by an Admissions Committee.

### Duration

- FMB3 The curriculum for the degree shall extend over a minimum of two academic years of study. (Credits will add up to two years of full time study).

### Registration Requirements

- FMB4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FMB4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.
- FMB4.3 A candidate must register or reregister by not later than end of registration week if taking only second semester courses.
- FMB4.4 A candidate's registration for the second semester shall be provisional until he or she completes the work of the first semester.

### Obtaining the Degree

- FMB5 A candidate shall undertake advanced study by coursework and shall comply with the curriculum requirements prescribed by Senate. (The curriculum requirements are obtainable on request from the Programme Co-ordinator.)

### Recognition of Courses Taken at this or another Institution

- FMB6.1 The Senate may grant credit for and exemption from one semester of the curriculum to a Bachelor of Architecture graduate of the University who has completed prescribed work in the theory and practice of City Planning and Urban Design while registered for the Bachelor of Architecture degree.
- FMB6.2 The Senate may accept as part of the attendance of a candidate qualifying him or her for

admission to the degree, periods of attendance at this or another University or Institution recognised by the Senate for the purpose, and may further accept examinations passed at this or another University or Institution approved by the Senate as exempting a candidate from examinations in and for the purpose of granting him or her credit for such courses prescribed for the degree as Senate may consider equivalent, provided that a candidate for the degree:

- (a) shall attend the University as a candidate for the degree for at least eighteen months;
- (b) shall complete at least three quarters of the courses prescribed for the degree in the School of Architecture and Planning.

FMB6.3 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.

### Readmission

FMB7 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, fails to complete courses to the value of not less than 50% of the total credits for which he or she is registered in the year concerned or if he or she fails to make progress with his or her dissertation APG5050ZS to the satisfaction of Senate. With respect to studio work, the completion of APG4022F is a prerequisite for registration in APG4026S; the completion of APG4026S is a prerequisite for the registration of APG5055F; and completion of APG5055F is a prerequisite for registration of APG5050Z.

### Submission of Dissertation

FMB8.1 A candidate must complete a dissertation on a subject approved by the Senate under the supervision of a member of staff appointed by the Senate by due date.

Note. Detailed procedures for the dissertation will be made available to candidates at the time of registration. These procedures will give the dates for various stages, critically, the final date for submission. In exceptional cases the programme convener may allow a late submission, but in such cases a candidate will at best get a pass (third class) result.

FMB8.8 The candidate must submit two permanently bound copies of the dissertation to the Programme Secretary by due date.

Note. The work is examined by two examiners, one of whom is always external to the department, and one of whom is usually the supervisor. The external examiner retains his/her copy while the second copy is retained by the University after the examination result has been approved.

### Publication

FMB9.1 When presenting any written work for examination, a candidate shall by so doing grant a free licence to the University to publish it in whole or in part in any format that the University deems fit.

FMB9.2 Work produced as part of the requirements of courses prescribed for the degree remains the property of the University.

### Award of the Degree

FMB10.1 A candidate who obtains first class passes in at least five theory courses (constituted as APG4020F, APG4021F, APG4028F, APG4029F and APG4035F in the first year of the first semester; APG4023S, APG4024S, APG4025S, APG4038S in the second semester and APG5056F and APG5024S in the second year and two first class passes in

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studiowork projects (constituted as APG4022F, APG4026S, APG5055F and APG5050Z), one of which must be APG5050Z, shall be awarded the degree with distinction.

FMB10.2 A candidate who, in terms of the rules, is permitted to complete the degree in three semesters, and does so, and who, as a candidate for the degree obtains at least four first class passes in theory courses (as defined in Rule FMB 9.1), one of which must be APG5056F, and two first class passes in studiowork (as defined in Rule FMB 9.1), one of which must be APG5050Z, shall be awarded the degree with distinction.

FMB10.3 The University does not undertake to reach a decision on the award of the degree by any specific date.

### **Master of City and Regional Planning**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MCRP is offered by the Faculty through the School of Architecture, Planning and Geomatics.*

In South Africa at the present time there exists a strong need to produce professional planners capable of operating at both the city and regional scales. The study of city planning and regional planning has therefore been integrated in a single comprehensive programme.

The MCRP degree programme has been structured so as to accommodate the basic differences and overlaps between the city and regional planning stream, and city planning and urban design stream. Coursework in the programme includes the theoretical and practical subject matter necessary to meet the requirements of the Certification of Environmental Practitioners in South Africa.

### **Minimum Admission Requirements**

- FMC1 A person shall not be admitted as a candidate for the degree unless
- (a) he or she is a graduate of the University or of another University recognized by the Senate for the purpose; or
  - (b) he or she has passed at any University or at any Institution recognized by the Senate for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for a degree at the University; or
  - (c) he or she has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree of Master of City and Regional Planning.

### **Selection**

- FMC2 Selection is based on an applicant's academic record which for graduates of three-year undergraduate programmes, would normally be expected to reflect marks in SAQA Level 3 courses, which would qualify the applicant for entry into the appropriate Honours programme i.e. in the range 65% and above, together with his or her response to certain other requirements set by the Programme Convener, which may vary from time to time. Entry into the programme is limited by the space available.

### **Duration**

- FMC3 The curriculum for the degree shall extend over a minimum of two academic years of study.

### **Registration Requirements**

- FMC4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FMC4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.
- FMC4.3 A candidate must register or reregister by not later than end of registration week if taking only second semester courses or if registering only for a thesis or dissertation.
- FMC4.4 A candidate's registration for the second semester shall be provisional until he or she completes the work of the first semester.

### **Obtaining the Degree**

- FMC5 A candidate shall undertake advanced study by coursework and shall comply with the curriculum requirements prescribed by Senate. (The curriculum requirements are obtainable on request from the Programme Co-ordinator).

### **Courses Completed at this or another University**

- FMC6.1 The Senate may accept as part of the attendance of a candidate qualifying him or her for admission to the degree, periods of attendance at this or another University or Institution recognised by the Senate for the purpose, and may further accept examinations passed at this or another University or Institution approved by the Senate as exempting a candidate from examinations in and for the purpose of granting him or her credit for such courses prescribed for the degree as Senate may consider equivalent, provided that a candidate for the degree
- (a) shall attend the University as a candidate for the degree for at least eighteen months;
  - (b) shall complete at least three quarters of the courses prescribed for the degree in the School of Architecture, Planning and Geomatics.
- FMC6.2 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.

### **Readmission**

- FMC7 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, fails to complete courses to the value of not less than 50% of the total credits for which he or she is registered in the year concerned or if he or she fails to make progress with his or her dissertation APG5051Z to the satisfaction of Senate. With respect to studio work, the completion of APG4022F is a prerequisite for registration in APG4026S; the completion of APG4026S is a prerequisite for the registration of APG5020F and APG5022F; and completion of APG5020F and APG5022F are prerequisites for registration of APG5051Z.

### **Submission of Dissertation**

- FMC8.1 A candidate must complete a dissertation on a subject approved by the Senate under the supervision of a member of staff appointed by the Senate by due date.  
Note. Detailed procedures for the dissertation will be made available to candidates at the time of registration. These procedures will give the dates for various stages, critically, the final date for submission. In exceptional cases the programme convener may allow a late submission, but in such cases a candidate will at best get a pass (third class) result.

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FMC8.2 The candidate must submit two permanently bound copies of the dissertation to the Programme Secretary by due date.

Note. The work is examined by two examiners, one of whom is always external to the department, and one of whom is usually the supervisor. The external examiner retains his/her copy while the second copy is retained by the University after the examination result has been approved.

### Publication

FMC9.1 When presenting any written work for examination a candidate shall by so doing grant a free licence to the University to publish it in whole or in part in any format that the University deems fit.

FMC9.2 Work produced as part of the requirements of courses prescribed for the degree remains the property of the University.

### Award of the Degree

FMC10.1 A candidate who obtains first class passes in at least five theory courses (constituted as APG4020F, APG4021F, APG4028F, APG4029F and APG4035F in the first year of the first semester; APG4023S, APG4024S, APG4025S, APG4038S in the second semester and APG5023F and APG5024S in the second year and two first class passes in studiowork projects (constituted as APG4022F, APG4026S, APG5020F and APG5051Z), one of which must be APG5051Z, shall be awarded the degree with distinction.

FMC10.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## Master of Engineering

*This degree is offered through the Faculty for programmes in Minerals Beneficiation (Department of Chemical Engineering), Structural Engineering and Structural Materials (Department of Civil Engineering), Telecommunications (Department of Electrical Engineering) and Transport Studies (jointly by the Department of Civil Engineering and the School of Architecture, Planning and Geomatics). There will be no new intake of students for the Telecommunications programme from 2010.*

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

### Minimum Admission Requirements

FMD1 A person shall not be admitted as a candidate for the degree unless he or she:

- holds a four year bachelors degree or honours degree of the University or of any other university recognised for the purpose; or
- holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
- has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for a degree in terms of (a) above; or
- has in any other manner attained a level of competence which in the opinion of Senate on the recommendation of the Faculty, is adequate for the purpose of admission as a candidate for the degree.

### **Selection**

FMD2 Selection is based on an applicant's academic record and the availability of a suitable programme and research project supervisor. Submission of a satisfactory research topic may be required.

### **Duration**

FMD3 A candidate shall be registered for the degree for a period of not less than one year.

### **Registration Requirements**

FMD4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMD4.2 A new candidate must register by not later than the date on which his or her first course starts. A continuing candidate must reregister by not later than 28 February.

### **Obtaining the Degree**

FMD5 A candidate shall undertake advanced study by coursework to the value of a minimum of 120 credits and a research project to the value of 60 credits.

### **Courses Completed at this or another University/Institution**

FMD6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMD6.2 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.

### **Examination**

FMD7.1 A candidate for the degree shall complete prescribed courses to the value of 120 credits and a project report on the subject of the research project to a value of 60 credits.

FMD7.2 A candidate shall not be permitted to submit his/her research report for examination more than twice.

FMD7.3 A candidate may be required to present himself or herself for an oral examination on the research project, or an essay assignment.

### **Readmission**

FMD8.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation and/or research project to the satisfaction of Senate).

FMD8.2 Except by permission of the Senate, a MEng (in Transport Studies) candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice or, in the case of the Research Report, submits the Report and fails the examination.

### **Submission of Project Report**

FMD9.1 A candidate intending to submit a project in the hope of the completion of the requirements for the award of the degree in either June or December, must, in the year in which the project is to be submitted, inform the supervisor in writing of such intention by 15 March or 15 August respectively in the year in which the report is to be submitted. The final date for receipt of a Master of Engineering project report submitted in the hope of the award of the degree either in June or December is 30 April or 30 September respectively.

FMD9.2 After consultation with the supervisor, a candidate shall submit two copies of his/her project report in temporary binding and a CD ROM in specified format to the supervisor who is responsible for appointing an external examiner of the project report. Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.

FMD9.3 No project report or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Publication**

FMD10 When presenting his or her project report the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.

### **Award of the Degree**

FMD11.1 The degree is not awarded with distinction.

FMD11.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

### **Changing to MSc(Eng) or MSc(ApplSc)**

FMD12 The Senate may on the recommendation of the Faculty and the candidate's supervisor upgrade a candidate's registration to MSc(Eng) or MSc(ApplSc) on the grounds of the quality and development of the candidate's work. Upgrading an MEng to PhD is not possible.

### **Changing to PGDip (in Transport Studies)**

FMD13 The Senate may change a candidate's registration from MEng (in Transport Studies) to PGDip (in Transport Studies) if a weighted mean mark of 55% is not attained in prescribed core coursework.

## **Master of Engineering Management**

Note: There has been no new intake of candidates for this Degree from 2007 as it is being discontinued. Candidates registered prior to 2007 will have the option of continuing or registering for the Degree of Master of Engineering. Candidates from 2007, will be registered for the Degree of Master of Engineering. Candidates who are continuing should refer to the Degree rules in the 2006 edition of this Handbook. A copy is available from the Faculty Office.

## **Master of Industrial Administration**

Note: There has been no new intake of candidates for this Degree from 2007 as it is being discontinued. Candidates registered prior to 2007 will have the option of continuing or registering

for the Degree of Master of Engineering. Candidates from 2007, will be registered for the Degree of Master of Engineering. Candidates who are continuing should refer to the Degree rules in the 2006 edition of this Handbook. A copy is available from the Faculty Office.

## Master of Landscape Architecture

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MLA is offered by the Faculty through the School of Architecture, Planning and Geomatics.*

### Minimum Admission Requirements

- FMG1 A person shall not be admitted as a candidate for the degree Master of Landscape Architecture unless he or she:
- (a) is a graduate holding the degree of Bachelor of Architectural Studies from the University; or;
  - (b) has passed at any university or at any Institution recognized by the Senate for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examination prescribed for the Bachelor of Architectural Studies degree at the University; or
  - (c) has in any other manner attained a level of competence which in the opinion of Senate, on the recommendation of the Faculty of Engineering and the Built Environment is adequate for the purposes of admission as a candidate for the degree. Candidates holding non-design Bachelors degrees will be required to complete, for non degree purposes, an initial year of design studies via the Bachelor of Architectural Studies programme before applying for entry into the two-year full time MLA programme. All courses comprising the Conversion Course need to be completed before application into the MLA programme will be considered. Course requirements does not automatically guarantee an entry into the MLA programme.

### Selection

- FMG2 Selection is based on the applicant's academic record (which must be of a standard sufficient to admit the student to Honours level studies, generally an average of 65% or above), a written motivation, the submission of a portfolio of design work (if a design portfolio is not available, this must be substituted by evidence of creative work, such as hand-drawn sketches (compulsory), painting or photography etc), a critical response to a polemical article on landscape architecture, and consideration of the views of referees. The number of students accepted into the programme in any year is restricted by resource capacity of the programme.

### Duration

- FMG3 The degree programme shall extend over a minimum of two academic years of study.

### Registration Requirements

- FMG4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FMG4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.
- FMG4.3 A candidate must register or reregister by not later than 28 February if taking only

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second semester courses or if registering only for a thesis or dissertation.

FMG4.4 A candidate's registration for the second semester shall be provisional until he or she completes the work of the first semester.

### **Obtaining the Degree**

FMG5 A candidate shall undertake advanced study by coursework and shall comply with the curriculum requirements prescribed by Senate. (The curriculum requirements are obtainable on request from the Programme Co-ordinator).

### **Courses Completed at this or another University**

FMG6.1 The Senate may accept as part of the attendance of a candidate qualifying him or her for admission to the degree, periods of attendance at this or another University or Institution recognised by the Senate for the purpose, and may further accept examinations passed at this or another University or Institution approved by the Senate as exempting a candidate from examinations in and for the purpose of granting him or her credit for such courses prescribed for the degree as Senate may consider equivalent, provided that a candidate for the degree

- (a) shall attend the University as a candidate for the degree for at least eighteen months;
- (b) shall complete at least three quarters of the courses prescribed for the degree in the School of Architecture, Planning and Geomatics.

FMG6.2 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.

### **Readmission**

FMG7 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned

### **Publication**

FMG8.1 When presenting any written work for examination, a candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.

FMG8.2 Work produced as part of the requirements of courses prescribed for the degree remains the property of the University.

### **Award of the Degree**

FMG9.1 A candidate who obtains first class passes in five or more courses, of which at least two shall be in theory courses and two in studio work courses, and who completes the degree within the prescribed two year period, shall be awarded the degree with distinction.

FMG9.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## Master of Philosophy

NOTE: The degree of MPhil will normally be awarded for a dissertation or for a combination of coursework and dissertation.

*The Degree of MPhil is offered by the Faculty for work of an inter-disciplinary nature.*

### Minimum Admission Requirements

- FMH1 A person shall not be admitted as a candidate for the degree unless he or she
- (a) holds a four year bachelors' degree, or honours degree of the University or of any other university recognised by the Senate for the purpose; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for an approved degree in terms of (a) above; or
  - (d) has in any other manner attained a level of competence which in the opinion of Senate on the recommendation of the Faculty, is adequate for the purpose of admission as a candidate for the degree.

### Selection

- FMH2 Selection is based on an applicant's academic record and the availability of a suitable supervisor. Submission of a satisfactory research proposal may be required.

### Duration

- FMH3 The degree programme shall extend over not less than one year.

### Registration Requirements

- FMH4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.
- FMH4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.
- FMH4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.
- FMH4.4 A candidate, other than one registering for the first time, must reregister by not later than 28 February if registering only for the dissertation. A candidate who is registering for the degree for the first time and only for the dissertation, may register at any time during the year.

### Obtaining the Degree

- FMH5.1 A candidate may obtain the degree in one of the following ways:
- (i) by completing a dissertation (180 credits) which may incorporate any or all of the following:
    - design of all or part of a project to a specification involving advanced concepts and theoretical principles applicable to some branch of the built environment.
    - a research project of a theoretical or practical nature
    - a critical review of a specified topic based upon a comprehensive search of the literature or available data

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- development of an item of equipment or a technique involving novel features or advanced design; or
  - any other study acceptable to the Faculty.
- (ii) by completing advanced study by coursework (as prescribed) of a minimum value of 60 credits (some programmes may require more) AND a dissertation (120 credits) which may incorporate any or all of the elements referred to in subparagraph (i) above.

**NOTE: Option (ii) may not be offered by all Departments.**

FMH5.2 The candidate's supervisor shall submit written evidence to the Faculty's Examinations Committee that the candidate has, with the approval of the supervisor, submitted a paper for presentation at a conference or for publication in a journal recognised by Senate, provided that this requirement shall not apply to a candidate who undertakes a structured programme of coursework to a value of 120 credits and a research project to a value of 60 credits.

### **Courses Completed at this or another University/Institution**

FMH6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMH6.2 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.

### **Examination**

FMH7.1 A candidate shall complete

- (a) a dissertation on the subject of the research project (180 credits); or
- (b) if proceeding by research and coursework, prescribed courses of a minimum value of 60 credits and a dissertation (120 credits) on the subject of the research project.

FMH7.2 A candidate shall not be permitted to submit his/her dissertation for examination more than twice.

### **Progress Report**

FMH8 A candidate shall submit a written report to the supervisor by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FMH9.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation to the satisfaction of Senate).

FMH9.2 A candidate who is required by the Faculty Examination Committee to correct or revise his or her research dissertation shall complete the corrections/revisions within one year

of the date of the Committee's decision, failing which he/she shall not be permitted to continue with or reregister for his/her degree without the special permission of Senate.

### **Submission of Dissertation and Paper**

- FMH10.1 A candidate intending to submit a dissertation in the hope of the award of the degree in either June or December, must, in the year in which the dissertation is to be submitted, inform the Faculty Manager (Academic Administration) in writing of such intention by 15 February or 15 July respectively in the year in which the dissertation is to be submitted. The final date for receipt by the Faculty Manager of a Master's dissertation submitted in the hope of the award of the degree either in June or December is 31 March or 31 August respectively.
- FMH10.2 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, two unbound copies and one copy on CD ROM in specified digital format to the Faculty Manager, (Academic Administration). Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.
- FMH10.3 The candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by the supervisor. The final date for receipt of the paper by the Faculty Office shall be 30 April in the case of a candidate who submits a dissertation in hope of the award of the degree in June or 31 October in the case of a candidate who submits a dissertation in hope of the award of the degree in December. *Note:* The Paper requirement is intended to develop a candidate's skills in academic communication through exposure to the discipline of preparing a scholarly, succinct overview of the subject of the research topic, with due attention to structure, detail, clarity of expression and referencing.
- FMH10.4 No dissertation or part thereof, which has previously been submitted for examination for any degree at any university shall be accepted for a Masters degree in the Faculty of Engineering and the Built Environment.

### **Publication**

- FMH11.1 When presenting his or her dissertation the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.
- FMH11.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

- FMH12.1 The degree is not awarded with distinction.
- FMH12.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

### **Upgrading to PhD**

- FMH13 The Senate may on the recommendation of the Faculty and the candidate's supervisor upgrade a candidate's registration to PhD on the grounds of the quality and development of the candidate's work.

## **Master of Philosophy in Conservation of the Built Environment**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this

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series.

*This programme is offered by the Faculty through the School of Architecture, Planning & Geomatics.*

### Minimum Admission Requirements

- FMHA1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the University with a four-year bachelor level or honours degree in a field related to the built environment; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any University or at any Institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to a degree in terms of (a) above; or
  - (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree.

### Selection

FMHA2 Selection is based on an applicant's academic record and experience.

### Duration

FMHA3 A candidate must be registered for the degree for at least two academic years.

### Registration Requirements

FMHA4.1 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.

FMHA4.2 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

FMHA4.3 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

FMHA4.4 A candidate, other than one registering for the first time for the degree must reregister by not later than 28 February if registering only for a dissertation or only for a project. A candidate who is registering for the degree for the first time and, only for a dissertation, may register at any time during the year.

### Minimum Number of Courses

FMHA5 A candidate must register for at least two courses, other than the dissertation or the research project, per year except where only one course module is required to complete the degree.

### Obtaining the Degree

FMHA6 A candidate shall be required to complete advanced study by coursework (as prescribed) of a minimum value of 120 credits and a research report on the subject of a research project of a minimum value of 60 credits.

### Courses Completed at this or another University/Institution

FMHA7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMHA7.2 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.

### **Examination**

FMHA8.1 A candidate shall complete prescribed courses to the value of 120 credits and a research report on the subject of the research project to a value of 60 credits.

FMHA8.2 A candidate who fails the Research Report examination shall not be permitted to reregister for the Research Report.

FMHA8.3 A candidate may be required to present himself or herself for an oral examination on the subject of the research report.

### **Progress Report**

FMHA9 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FMHA10.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation and/or research project to the satisfaction of Senate).

FMHA10.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice, or in the case of the Research Report, submits the report and fails the examination.

### **Method of Assessment**

FMHA11.1 Satisfactory performance of the duly performed certificate (DP) requirements applies to all courses. A student gains entry to final assessment by satisfactory performance of the duly performed (DP) requirements. A student may be refused permission (DPR) to sit for the examination or review if he or she fails to satisfy the Senate that he or she has satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.

FMHA11.2 A DP certificate may be withheld unless: all parts of each studiomwork project, tutorial or other assignment are completed to an acceptable standard and submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in all sections of the course.

FMHA11.3 Assessment by formal examination may be by means of a written or oral examination or

term paper. An external examiner is appointed for each course assessed by examination.

### **Publication**

FMHA12.1 When presenting his or her project report the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.

FMHA12.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

FMHA13.1 The degree is not awarded with distinction.

FMHA13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## **Master of Philosophy in Housing Development and Management**

Note: There has been no new intake of candidates for this Degree from 2007 as it is being discontinued. Candidates registered prior to 2007 will have the opportunity of completing their degrees.

## **Master of Philosophy in Transport Studies**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MPhil in Transport Studies is offered by the Faculty through the School of Architecture, Planning and Geomatics and the Department of Civil Engineering.*

### **Minimum Admission Requirements**

- FMI1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the University with a four-year bachelor level or honours degree and has achieved a level of numeracy satisfactory to the Senate\*; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework and has achieved a level of numeracy satisfactory to Senate\*; or
  - (c) has passed at any University or at any Institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to a degree in terms of (a) above and has achieved a level of numeracy satisfactory to the Senate\*; or
  - (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree.

\* NOTE:

- (i) a first year (one semester) University course in Mathematics (pure or applied) or Statistics
- (ii) Mathematics at Senior Certificate level with a symbol of D or better at the Higher Grade, or a symbol of B or better at the Standard Grade; or
- (iii) applicants without the required level of numeracy specified in (i) and (ii) above will be required to demonstrate a satisfactory level of numeracy in a test.

### **Selection**

FMI2 Selection is based on an applicant's academic record and experience.

### **Duration**

FMI3 A candidate must be registered for the degree for at least two academic years.

### **Registration Requirements**

FMI4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMI4.2 A new candidate must register by not later than the date on which his or her first course starts.

FMI4.3 A continuing candidate must reregister by not later than 28 February.

### **Minimum Number of Course Modules**

FMI5 A candidate must register for at least two course modules, other than the dissertation or the research project, per year, except where only one course module is required to complete the degree.

### **Obtaining the Degree**

FMI6.1 A candidate may obtain the degree in one of the following ways:

- (a) by completing advanced coursework (as prescribed) of a minimum value of 120 credits and a research report on the subject of a research project of a minimum value of 60 credits; or
- (b) by completing advanced study by coursework of a minimum value of 80 credits and a dissertation (120 credits); or
- (c) by completing a dissertation (180 credits).

FMI6.2 A candidate with a three year entrance qualification or equivalent shall, in addition to FMI6.1 above, complete 144 credits of approved coursework.

### **Courses Completed at this or another University/Institution**

FMI7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMI7.2 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.

### **Examination**

FMI8.1 A candidate shall complete

- (a) prescribed courses to the value of 80 credits and a dissertation (120 credits), or
- (b) prescribed courses to the value of 120 credits and a research report on the subject of the research project to a value of 60 credits, or
- (c) a dissertation to the value of 180 credits.

FMI8.2 A candidate shall not be permitted to submit his/her dissertation or research report for

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examination more than twice.

- FMI8.3 A candidate may be required to present himself or herself for an oral examination on the dissertation, research report, or an essay assignment.

### **Readmission**

- FMI9.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation and/or research project to the satisfaction of Senate).
- FMI9.2 A candidate who is required by the Faculty Examination Committee to correct or revise his or her research dissertation shall complete the corrections/revisions within one year of the date of the Committee's decision, failing which he/she shall not be permitted to continue with or reregister for his/her degree without the special permission of Senate.
- FMI9.3 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice or, in the case of the Research Report, submits the Report and fails the examination.

### **Submission of Project Report**

- FMI10.1 A candidate intending to submit a project in the hope of the completion of the requirements for the award of the degree in either June or December, must, in the year in which the project is to be submitted, inform the supervisor in writing of such intention by 15 March or 15 August respectively in the year in which the report is to be submitted. The final date for receipt of a project report submitted in the hope of the award of the degree either in June or December is 30 April or 30 September respectively.
- FMI10.2 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, two unbound copies and one copy on CD ROM in specified digital format to the Programme Convener. Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.
- FMI10.3 No project report or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Submission of Dissertation and Paper**

- FMI11.1 A candidate intending to submit a dissertation in the hope of the award of the degree in either June or December, must, in the year in which the dissertation is to be submitted, inform the Faculty Manager (Academic Administration) in writing of such intention by 15 February or 15 July respectively in the year in which the dissertation is to be submitted. The final date for receipt by the Faculty Manager (Academic Administration) of a Master's dissertation submitted in the hope of the award of the degree either in June or December is 31 March or 31 August respectively. This shall not apply in the case of a candidate who undertakes a structured programme of coursework to a value of 120 credits and a research project to a value of 60 credits.
- FMI11.2 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, two unbound copies and one copy on CD ROM in specified digital format to the Faculty Manager, (Academic Administration). Where

more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.

- FMI11.3 The candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by the supervisor. The final date for receipt of the paper by the Faculty Office shall be 30 April in the case of a candidate who submits a dissertation in hope of the award of the degree in June or 31 October in the case of a candidate who submits a dissertation in hope of the award of the degree in December. *Note:* The Paper requirement is intended to develop a candidate's skills in academic communication through exposure to the discipline of preparing a scholarly, succinct overview of the subject of the research topic, with due attention to structure, detail, clarity of expression and referencing.
- FMI11.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Publication**

- FMI12.1 When presenting his or her research report the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.
- FMI12.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

- FMI13.1 The degree is not awarded with distinction.
- FMI13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

### **Changing to PGDip (in Transport Studies)**

- FMI14 The Senate may change a candidate's registration to PGDip (in Transport Studies) if a weighted mean mark of 55% is not attained in prescribed core coursework.

## **Master of Philosophy in Urban Infrastructure Design and Management**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*This programme is offered by the Faculty through the Department of Civil Engineering.*

### **Minimum Admission Requirements**

- FMJ1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the University with a four-year bachelor level or honours degree in a field related to the built environment; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any University or at any Institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to a degree

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- in terms of (a) above; or
- (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree.

### **Selection**

FMJ2 Selection is based on an applicant's academic record and experience.

### **Duration**

FMJ3 A candidate must be registered for the degree for at least two academic years.

### **Registration Requirements**

- FMJ4.1 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.
- FMJ4.2 A candidate must register or reregister by not later than 28 February if taking only second semester courses.
- FMJ4.3 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.
- FMJ4.4 A candidate, other than one registering for the first time for the degree must reregister by not later than 28 February if registering only for a dissertation or only for a project. A candidate who is registering for the degree for the first time and, only for a dissertation, may register at any time during the year.

### **Minimum Number of Courses**

FMJ5 A candidate must register for at least two courses, other than the dissertation or the research project, per year except where only one course module is required to complete the degree.

### **Obtaining the Degree**

FMJ6 A candidate shall be required to complete advanced study by coursework (as prescribed) of a minimum value of 120 credits and a research report on the subject of a research project of a minimum value of 60 credits.

### **Courses Completed at this or another University/Institution**

- FMJ7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FMJ7.2 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.

### **Examination**

FMJ8.1 A candidate shall complete prescribed courses to the value of 120 credits and a research report on the subject of the research project to a value of 60 credits.

- FMJ8.2 A candidate who fails the Research Report examination shall not be permitted to reregister for the Research Report.
- FMJ8.3 A candidate may be required to present himself or herself for an oral examination on the subject of the research report.

### **Progress Report**

- FMJ9 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

- FMJ10.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation and/or research project to the satisfaction of Senate).
- FMJ10.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice, or in the case of the Research Report, submits the report and fails the examination.

### **Submission of Project Report**

- FMJ11.1 A candidate intending to submit a project in the hope of the completion of the requirements for the award of the degree in either June or December, must, in the year in which the project is to be submitted, inform the supervisor in writing of such intention by 15 March or 15 August respectively in the year in which the report is to be submitted. The final date for receipt of the project report submitted in the hope of the award of the degree either in June or December is 30 April or 30 September respectively.
- FMJ11.2 After consultation with the supervisor, a candidate shall submit two bound copies and one CD ROM in specified digital format of his/her project report to the supervisor who is responsible for appointing an external examiner of the project report. Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional bound copies.
- FMJ11.3 No project report or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Publication**

- FMJ12.1 When presenting his or her project report the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.
- FMJ12.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

- FMJ13.1 The degree is not awarded with distinction.

FMJ13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## **Master of Science in Applied Science**

NOTE: There has been no new intake of candidates for this Degree from 2007 as it is being discontinued. Candidates registered prior to 2007 will have the option of continuing or registering for the Degree of Master of Science in Engineering. From 2007 candidates, will be registered for the Degree of Master of Science in Engineering. Candidates who are continuing should refer to the Degree rules in the 2006 edition of this Handbook. A copy is available from the Faculty Office.

## **Master of Science in Construction Economics and Management**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MSc(Const. Econ. & Mgmt.) is offered by the Faculty through the Department of Construction Economics & Management. The Department intends developing a new programme to offer for this Degree. There has been no new intake of candidates from 2007. Candidates registered prior to 2007 must consult the Degree Rules in the 2006 Faculty Handbook. A copy is available from the Faculty Office.*

## **Master of Science in Engineering**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MSc(Eng) is offered by the Faculty through the Departments of Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering; the School of Architecture, Planning and Geomatics; and through the Energy Research Centre.*

## **Minimum Admission Requirements**

- FMM1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the Faculty or of an engineering or geomatics programme of any other university recognized for the purpose; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any university or institution recognized for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for the degree of BSc(Eng) or BSc(Geomatics) at the University; or
  - (d) has in any other manner attained a level of competence which in the opinion of Senate on the recommendation of the Faculty, is adequate for the purpose of admission as a candidate for the degree.

## **Selection**

FMM2 Selection is based on an applicant's academic record and the availability of a suitable supervisor. Submission of a satisfactory research proposal may be required.

## Duration

FMM3 The degree programme shall extend over not less than one year.

## Registration Requirements

FMM4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMM4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.

FMM4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

FMM4.4 A candidate, other than one registering for the first time for the degree must reregister by not later than 28 February if registering only for the dissertation. A candidate who is registering for the degree for the first time and, only for the dissertation, may register at any time during the year.

## Supervision

FMM5 A candidate shall work under the guidance of a supervisor appointed by Senate and shall be required to attend at the University for a minimum period of at least one month per annum for supervision purposes for as long as he/she continues to be a candidate for the degree.

## Obtaining the Degree

FMM6.1 A candidate may obtain the degree in one of the following ways:

- (i) by completing a dissertation (180 credits) which may incorporate any or all of the following:
  - design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles
  - a research project of a theoretical or practical nature
  - a critical review of a specified topic based upon a comprehensive search of the literature or available data
  - development of an item of equipment or a technique involving novel features or advanced design
  - any other study acceptable to the Faculty; or
- (ii) by completing advanced study by coursework (as prescribed) of a minimum value of 60 credits (some programmes require more) and a dissertation (120 credits) which may incorporate any or all of the elements referred to in sub-paragraph (i) above.

FMM6.2 The candidate's supervisor shall submit written evidence to the Faculty's Examinations Committee that the candidate has, with the approval of the supervisor, submitted a paper for presentation at a conference or for publication in a journal recognised by Senate.

## Courses Completed at this or another University/Institution

FMM7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than

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one year

FMM7.2 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.

### Examination

FMM8.1 A candidate for the degree shall complete

- (a) a dissertation (180 credits) on the subject of the research project indicating an advanced study of applications, methods or theories, in some branch of engineering or geomatics; or,
- (b) if proceeding by research and coursework, prescribed courses of a minimum value of 60 credits (some programmes may require more) and a dissertation on the subject of the research project, (to the value of 120 credits).

FMM8.2 A candidate may be required to attend an oral examination on the subject of the dissertation or technical report.

FMM8.3 A candidate shall not be permitted to submit his/her dissertation for examination more than twice.

### Progress Report

FMM9 A candidate shall submit a written report to the supervisor by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### Readmission

FMM10.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her dissertation and/or research project to the satisfaction of Senate).

FMM10.2 A candidate who is required by the Faculty Examination Committee to correct or revise his or her research dissertation shall complete the corrections/revisions within one year of the date of the Committee's decision, failing which he/she shall not be permitted to continue with or reregister for his/her degree without the special permission of Senate.

### Submission of Dissertation and Paper

FMM11.1 A candidate intending to submit a dissertation in the hope of the award of the degree in either June or December, must, in the year in which the dissertation is to be submitted, inform the Faculty Manager (Academic Administration) in writing of such intention by 15 February or 15 July respectively in the year in which the dissertation is to be submitted. The final date for receipt by the Faculty Manager (Academic Administration) of a Master's dissertation submitted in the hope of the award of the degree either in June or December is 31 March or 31 August respectively.

FMM11.2 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, two unbound copies and one copy on CD ROM in specified digital format to the Faculty Manager, (Academic Administration). Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional copies in temporary bindings.

FMM11.3 The candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by the supervisor. The final date for receipt of the paper by the Faculty Office shall be 30 April in the case of a candidate who submits a dissertation in hope of the award of the degree in June or 31 October in the case of a candidate who submits a dissertation in hope of the award of the degree in December. *Note:* The Paper requirement is intended to develop a candidate's skills in academic communication through exposure to the discipline of preparing a scholarly, succinct overview of the subject of the research topic, with due attention to structure, detail, clarity of expression and referencing.

FMM11.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

### **Publication**

FMM12.1 When presenting his or her dissertation the candidate shall by so doing grant a free licence to the University to publish it in whole or part at any time and in any manner or format that the University deems fit.

FMM12.2 No publication may, without the prior permission of the University, contain a statement that the published material was or is to be submitted in part or in full for this degree.

### **Award of the Degree**

FMM13.1 The degree is not awarded with distinction

FMM13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

### **Upgrading to PhD**

FMM14.1 The Senate may on the recommendation of the Faculty and the candidate's supervisor upgrade a candidate's registration to PhD on the grounds of the quality and development of the candidate's work, provided that this shall not apply to a candidate registered for the 120 credit coursework/60 credit project option.

FMI4.2 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

## **Master of Science in Project Management**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MSc in Project Management is offered by the Faculty through the Department of Construction Economics & Management.*

### **Minimum Admission Requirements**

- FMN1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) is a graduate of the University with a bachelors degree of a minimum duration of four years, or, an honours degree; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - (c) has passed at any university or at any institution recognised by Senate for the

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- purpose, such examinations as are, in the opinion of Senate, equivalent to a degree in terms of (a) above; or
- (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree.

### **Selection**

FMN2 Selection is based on an applicant's academic record and experience.

### **Duration**

FMN3 A candidate must be registered for the degree for at least two academic years.

### **Registration Requirements**

FMN4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMN4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.

FMN4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

FMN4.4 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

FMN4.5 A candidate, other than one registering for the first time for the degree must reregister by not later than 28 February if registering only for a project.

### **Minimum Number of Courses**

FMN5 A candidate must register for at least two courses, other than the research project, per year except where only one course module is required to complete the degree.

### **Obtaining the Degree**

FMN6 A candidate may obtain the degree by completing advanced study by coursework (as prescribed) of a minimum value of 140 credits and a research report on the subject of a research project of a minimum value of 60 credits.

### **Courses Completed at this or another University/Institution**

FMN7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMN7.2 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.

### **Examination**

FMN8.1 A candidate shall complete prescribed courses to the value of 140 credits and a research

report on the subject of the research project to a value of 60 credits.

FMN8.2 A candidate who fails the Research Report examination shall not be permitted to reregister for the Research Report.

FMN8.3 A candidate may be required to present himself or herself for an oral examination on the research report.

### **Progress Report**

FMN9 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FMN10.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her research project to the satisfaction of Senate).

FMN10.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice, or in the case of the Research Report, submits the Report and fails the examination.

### **Award of the Degree**

FMN11.1 The degree is not awarded with distinction.

FMN11.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## **Master of Science in Property Studies**

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

*The Degree of MSc in Property Studies is offered by the Faculty through the Department of Construction Economics & Management.*

### **Minimum Admission Requirements**

FMO1 A person shall not be admitted as a candidate for the degree unless he or she:

- (a) is a graduate of the University with a bachelors degree of a minimum duration of four years, or an honours degree, in a field related to the built environment; or
- (b) holds an approved three year degree and (i) who has a minimum of five years experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
- (c) has passed at any university or at any institution recognised by Senate for the purpose, such examinations as are, in the opinion of Senate, equivalent to a degree in terms of (a) above; or
- (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the degree.

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### Selection

FMO2 Selection is based on an applicant's academic record and experience.

### Duration

FMO3 A candidate must be registered for the degree for at least two academic years.

### Registration Requirements

FMO4.1 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMO4.2 A candidate must register or reregister by not later than the end of Registration Week if taking first semester courses or, if any of the courses begins earlier, by not later than the date on which the first course starts.

FMO4.3 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

FMO4.4 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

FMO4.5 A candidate, other than one registering for the first time for the degree must reregister by not later than 28 February if registering only for a project.

### Minimum Number of Courses

FMO5 A candidate must register for at least two courses, other than the research report, per year except where only one course module is required to complete the degree.

### Obtaining the Degree

FMO6 A candidate may obtain the degree by completing advanced study by coursework (as prescribed) of a minimum value of 140 credits and a research report on the subject of a research project of a minimum value of 60 credits.

### Courses Completed at this or another University/Institution

FMO7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FMO7.2 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.

### Examination

FMO8.1 A candidate shall complete prescribed courses to the value of 140 credits and a research report on the subject of the research project to a value of 60 credits.

FMO8.2 A candidate who fails the Research Report examination shall not be permitted to reregister for the Research Report.

FMO8.3 A candidate may be required to present himself or herself for an oral examination on the

research report.

### **Progress Report**

FMO9 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### **Readmission**

FMO10.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her research project to the satisfaction of Senate).

FMO10.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree fails to complete a course after having been registered for it twice or, in the case of the Research Report, submits the Report and fails the examination.

### **Award of the Degree**

FMO11.1 The degree is not awarded with distinction.

FMO11.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

## **Doctor of Architecture**

Note: Details of the preliminary screening, registration and examination procedures are obtainable on request from the Faculty Manager (Academic Administration).

The degree of Doctor of Architecture is the highest and most prestigious degree awarded in the fields of architecture, planning, urban design and construction economics and management by the University of Cape Town. It is awarded rarely, for substantial, original and scholarly contributions to knowledge, which would normally be the result of work carried out, built and/or published over a period of years.

### **Admission**

FDA1 The degree of Doctor of Architecture may be conferred upon:

- (a) holders of Bachelor degrees in Architecture, and Honours degrees in Property Studies, Construction Management and Quantity Surveying of the University, of not less than five years standing;
- (b) holders of Masters degrees in City and Regional Planning or City Planning and Urban Design of the University, of not less than five years standing; or
- (c) holders of equivalent degrees from other universities recognised by the Senate for the purpose, of not less than five years standing, provided a close and ongoing association with this University can be demonstrated.

### **Application for Admission**

FDA2.1 Before a person may be registered as a candidate for the Degree he or she must submit a provisional application for admission, in confidence, to the Dean. The provisional application shall be accompanied by a *curriculum vitae*, six copies of the work to be submitted for the degree and also six copies of a brief summary of its contents and a statement as to how the work contributes to learning. A person submitting a provisional application shall also submit a written statement affirming

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- that the work submitted is the original work of the applicant as sole author, and/or indicating the extent to which joint work is the original work of the applicant;
- that the work submitted has not been accepted for a degree at this or any other university.

FDA2.2 Senate may decide, having received the advice of a Committee of Assessors appointed for the purpose, either to accept or to refuse the application. If accepted, the Dean shall invite the applicant to formally apply and register as a candidate and examination of the work will proceed. If refused, the Dean shall inform the candidate in confidence and return the submitted material.

### Requirements for the Award of the Degree

FDA3.1 The work submitted shall comprise documentation of built and/or published work which shall constitute a substantial, original and important contribution to learning in the field of either architecture, planning, urban design or construction economics and management. A candidate may, in addition, submit any supporting collateral evidence. The work must be satisfactory in arrangement and expression.

FDA3.2 No work will be accepted which has been accepted by another university for the purpose of obtaining a degree.

FDA3.3 If, at the date of its presentation, any portion of the work submitted has not been published, or is not being published, in a manner satisfactory to the University, the candidate must grant the University in writing a free licence to reproduce the work in whole or in part for the purpose of research. The University may be prepared to waive the right so granted if the candidate subsequently makes arrangements for publication in a manner satisfactory to the University.

FDA3.4 The examination shall consist primarily of an assessment of the published work submitted by the candidate, but a candidate shall, if required by Senate, attend for written or oral examination on the subject of the work presented, and on any work undertaken under supervision.

### Doctor of Science in Engineering

Note: Details of the preliminary screening, registration and examination procedures are obtainable on request from the Faculty Manager (Academic).

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

The Degree of Doctor of Science in Engineering is a senior doctorate and is awarded for substantial and original contributions to knowledge in one or more fields of Engineering or Geomatics. Such contributions will normally be the result of work carried out and published over a period of years, and will normally be such as to have established the candidate's position as an authority in the field on the subject of the research project

### Admission

FDC1 The degree of Doctor of Science in Engineering may be conferred upon:

- (a) bachelors of science in engineering or geomatics of the University of not less than four years standing; and
- (b) graduates in engineering or geomatics of any other university recognised by Senate for the purpose of not less than five years standing.

### Application for Admission

- FDC2.1 Before a person may be registered as a candidate for the degree he/she must submit a provisional application for admission, in confidence, to the Dean. The provisional application shall be accompanied by a *curriculum vitae*, six copies of the work to be submitted for the degree, and a detailed synopsis of the contents of the work including a statement as to how the work contributes to learning. A person applying for admission shall also submit written statements affirming
- (i) that the work submitted is the original work of the applicant as sole author, and/or indicating the extent to which joint work is the original work of the applicant;
  - (ii) that the work submitted has not been accepted for a degree at this or any other university.
- FDC2.2 Senate may decide, having received the advice of a Committee of Assessors appointed for the purpose, either to accept or to refuse the application. If accepted, the Dean shall invite the applicant to formally apply and register as a candidate. If refused, the Dean shall inform the candidate in confidence and return the submitted material.

### Requirements for the Award of the Degree

- FDC3.1 The work submitted shall comprise published papers or other documents which shall constitute a substantial, original and important contribution to learning in one or more fields of engineering or geomatics. A candidate may submit other published and unpublished work as collateral testimony of fitness for the degree.
- FDC3.2 No work will be accepted which has been accepted by another university for the purpose of obtaining a degree.
- FDC3.3 The examination shall consist primarily of an assessment of the published work submitted by the candidate, but a candidate shall, if required by Senate, attend for written or oral examination on the subject of the work presented, and on any work undertaken under supervision.

### Doctor of Philosophy

NOTE: The rules for the degree of Doctor of Philosophy (PhD) are published in Handbook No.3 **General Rules and Policy**. Prospective candidates should consult the Head of the Department in which they propose to study/carry out their research, before making formal application. PhD candidates are asked to note that there is a limitation of 80 000 words for PhD theses. The special approval of the Dean is required if this limit is to be exceeded. Applications to exceed the limit must be addressed to the Dean and must have the endorsement of the supervisor and the Head of Department concerned.

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## DEPARTMENTS IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT:

### PROGRAMMES AND DEPARTMENTAL INFORMATION

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## ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following Degree Programmes:

**Bachelor of Architectural Studies**  
**Bachelor of Science (Geomatics)**

#### **Post Graduate Programmes in**

Architecture  
Landscape Architecture  
City and Regional Planning  
City Planning and Urban Design  
Geomatics  
Geographical Information Systems  
Transport Studies (jointly with the Department of Civil Engineering)  
Conservation Studies

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

### **Staff**

#### **Professor and Director:**

L le Grange, BArch *Cape Town* MArch(UD) *Rice* MIArch CIA

#### **Professors:**

D Dewar, BA(Hons) MURP PhD *Cape Town* TRP(SA) MSAPI BP Chair of Urban and Regional Planning  
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* SARChI  
V Watson, BA(Hons) *Natal* MCRP *Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

#### **Adjunct Professor:**

A van der Merwe Miszewski, BAS BArch(*Dist*) AAGradDip(Hist&Theory) ARB(*UK*) PrArchs

#### **Emeritus Professor:**

H R  ther, 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:**

A Steenkamp, MArch *Pretoria* PrArch  
JF Whittall, BSc(Surv) MSc(Eng) *Cape Town*, PhD *Calgary* PrL(SA) MIPLS (*West Cape*)  
PB Wilkinson, BSc(Eng) *Natal* MCRP *Cape Town*

#### **Emeritus Associate Professor:**

CL Merry, BSc(Surv) *Cape Town* PhD *New Brunswick* FAIG

**Senior Lecturers/Studiomasters:**

F Carter, BAS BArch MPhil *Cape Town* PrArch, PRCPM MIA RIBA

N Coetzer, BArch *Natal* MArch *Denver* PhD *London*

PF de Beer, BArch *Pret* MArch *Pratt Inst New York*

C Hindes, BLA *Pretoria* MLArch

T Sanya,

G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TU Delft(NL)* LSZ(*Zim*)

JL Smit, BSc(Surv) PhD *Cape Town*

**Lecturers:**

F Isaacs, BArch *Cape Town* MIP *Stuttgart*

T Katzschner, BSocSc MCRP *Cape Town*

SS Papanicolaou, BArch *Cape Town*

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

**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*

SA Le Fevre, BArch *Cape Town*

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:**

Ms M Armstrong

Mrs J Meyer

Mrs JM Thompsett

**Administrative Assistant:**

Ms N Walker

**Senior Secretaries:**

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

## Undergraduate Programme

### Bachelor of Architectural Studies (BAS) [EB012]

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 APG3024W. 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.

**Programme Convener:**  
F Isaacs, BArch *Cape Town* MIP *Stuttgart*

#### First Year

##### Core Courses

Number	Course	Credits
<b>APG1003W</b>	Technology I (major course).....	24
<b>APG1004F</b>	History & Theory of Architecture I .....	12
<b>APG1005S</b>	History & Theory of Architecture II .....	12
<b>APG1017F</b>	Academic Development Class .....	0

APG1018S	Academic Development Class .....	0
APG1020W	Design & Theory Studio I (major course).....	72
APG1021W	Representation I.....	24
	Total credits.....	144

## Second Year

### Core Courses

Number	Course	Credits
APG2000F	History & Theory of Architecture III.....	8
APG2003S	History & Theory of Architecture IV.....	8
APG2009F	Theory of Structures III.....	6
APG2011S	Theory of Structures IV.....	6
APG2021W	Technology II.....	24
APG2022W	Design & Theory Studio II.....	72
APG2025W	Representation III.....	8
APG2028W	Environment & Services II.....	12
APG2027X	Work Experience.....	0

## Third Year

### Core Courses

Number	Course	Credits
APG3000F	History & Theory of Architecture V.....	8
APG3001S	History & Theory of Architecture VI.....	8
APG3008F	Theory of Structures V.....	4
APG3010S	Theory of Structures VI.....	4
APG3023W	Technology III (major course).....	24
APG3024W	Design & Theory Studio III (major course).....	84
APG3026F	Management Practice Law III.....	4
APG3028X	Independent Research.....	0
APG3029W	Environment & Services III.....	8

### Notes

- (i) *Core courses are sequential.*
- (ii) *The Theory of Structures courses (APG2009F, APG2011S, APG3008F, APG3010S) are sequential.*
- (iii) *Mandatory Fieldwork: APG1003W Technology I, APG2021W Technology II, APG1020W Design and Theory Studio I, APG2022W Design & Theory Studio II and APG3024W 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 Masters degree in Planning (MCRP) and a BSc(Geomatics) degree in five years and is targeted at students wishing to work as a Professional Planner.

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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, tachometers, 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 GRASS 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 Leica 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 Science In Geomatics : Surveying Stream [EB019]**

### **Programme Convener:**

JL Smit, BSc(Surv) PhD *Cape Town*

### **First Year Core Courses**

Number	Course	Credits
<b>APG1016F</b>	Geomatics I .....	18
<b>CSC1015F</b>	Computer Science I A (recommended only for those with prior computing or experience) .....	18
<i>or</i>		
<b>APG1015S</b>	Programming for Geomatics.....	18
<b>GEO1009F</b>	Introduction to Earth and Environmental Sciences.....	18
<b>MAM1017F</b>	Engineering Mathematics A .....	16
<b>MAM1018S</b>	Engineering Mathematics B.....	16
<b>STA1000S</b>	Statistics .....	18
	Elective.....	36
	Total credits .....	140

### **Second Year Core Courses**

Number	Course	Credits
<b>APG2014S</b>	Geomatics II .....	24
<b>APG2015F</b>	Geographic Information Systems I .....	24
<b>APG2016W</b>	Surveying I .....	24
<b>APG2017X</b>	Basic Survey Camp .....	4
<b>APG2018X</b>	Geographic Information Systems Camp .....	4
<b>MAM2083F</b>	Vector Calculus for Engineers A .....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B .....	16
<b>PHY1031F</b>	Physics of Natural Systems I .....	18
<b>PHY1032S</b>	Physics of Natural Systems II .....	18
<b>APG2019X</b>	Practical Training I .....	18
	Total credits .....	148

### **Third Year Core Courses**

Number	Course	Credits
<b>APG3011S</b>	Geographic Information Systems II.....	24
<b>APG3012S</b>	Geomatics III.....	24
<b>APG3013F</b>	Numerical Methods in Geomatics.....	16
<b>APG3014X</b>	Control Survey Camp .....	4
<b>APG3016C</b>	Surveying II.....	12
<b>APG3017D</b>	Surveying III.....	12
<b>APG3027Z</b>	Cadastral Survey & Registration Projects.....	24
<b>APG3033W</b>	Land & Cadastral Survey Law .....	16
<b>CON2027F</b>	Real Property Law .....	16
<b>APG3015X</b>	Practical Training I .....	18
	Total credits .....	148

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### Fourth Year Core Courses

Number	Course	Credits
APG4001S	Geodesy .....	24
APG4002Z	Land Use Planning & Township Design .....	16
APG4003Z	Research Report .....	40
APG4004F	Remote Sensing .....	24
APG4005F	Engineering Surveying & Adjustment .....	18
APG4006S	Geomatics Practice & Land Management .....	12
MEC4042Z	Industrial Management .....	8
CHE3062S	Professional Communication Studies .....	12
	Total credits .....	154

### Bachelor of Science in Geomatics : Planning Stream [EB019]

#### Programme Convener:

JL Smit, BSc(Surv) PhD *Cape Town*

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

### Fourth Year Core Courses

Number	Course	Credits
APG4003Z*	Research Report.....	40
APG4004F	Remote Sensing .....	24
APG4020F	Planning Theory and Practice .....	8
APG4021F	Urban Systems .....	12
APG4022F	Planning Project A .....	32
APG4023S	Urban Development Processes .....	12
APG4024S	Planning & Governmental Systems .....	12
APG4025S#	Regulatory and Legal Framework .....	12
APG4028F	Aspects of City Design .....	12
APG4029F	Natural Systems .....	12
	Total credits .....	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	Credits
	Fifth Year MCRP Core Courses .....	160

### Bachelor of Science in Geomatics : Geoinformatics Stream [EB019]

#### Programme Convener:

JL Smit, BSc(Surv) PhD *Cape Town*

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	Credits
APG1016F	Geomatics I .....	18
CSC1015F	Computer Science I A.....	18
<i>or</i>	(Recommended only for those with prior computing exposure or those who are	

	likely to choose to complete a computer science major)	
<b>APG1015S</b>	Programming for Geomatics.....	18
<b>GEO1009F</b>	Introduction to Earth and Environmental Sciences.....	18
<b>MAM1017F</b>	Engineering Mathematics A.....	16
<b>MAM1018S</b>	Engineering Mathematics B.....	16
	Elective.....	18
	Elective Core (e.g. 2nd Semester Computer Science, 1st year EGS).....	18
	Total credits.....	140

### Second Year Core Courses

Number	Course	Credits
<b>APG2014S</b>	Geomatics II.....	24
<b>APG2015F</b>	Geographic Information Systems I.....	24
<b>APG2016W</b>	Surveying I.....	24
<b>APG2017X</b>	Basic Survey Camp.....	4
<b>APG2018X</b>	Geographic Information Systems Camp.....	4
<b>MAM2083F</b>	Vector Calculus for Engineers A.....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B.....	16
<b>PHY1031F</b>	Physics of Natural Systems I.....	18
<b>PHY1032S</b>	Physics of Natural Systems II.....	18
<b>APG2019X</b>	Practical Training I.....	
	Total credits.....	148

### Third Year Core Courses

Number	Course	Credits
<b>APG3011S</b>	Geographic Information Systems II.....	24
<b>APG3012S</b>	Geomatics III.....	24
<b>APG3013F</b>	Numerical Methods in Geomatics.....	16
<b>APG3016C</b>	Surveying II.....	12
<b>APG3020X</b>	Spatial Data Analysis Project.....	4
<b>APG3027Z</b>	Cadastral Survey & Registration Projects.....	24
<b>CON2027F</b>	Real Property Law.....	16
	Elective core 2nd Year Computer Science or EGS.....	48
	Total credits.....	168
<b>APG3015X</b>	Practical Training II.....	

### Fourth Year Core Courses

Number	Course	Credits
<b>APG4002Z</b>	Land Use Planning & Township Design.....	16
<b>APG4003Z</b>	Research Report.....	40
<b>APG4004F</b>	Remote Sensing.....	24
<b>APG4006S</b>	Geomatics Practice & Land Management.....	12
<b>CHE3062S</b>	Professional Communication Studies.....	12
<b>MEC4042Z</b>	Industrial Management.....	8
	Elective Core (e.g. 3rd Year Computer Science or EGS).....	72
	Total credits.....	160

### 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.

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Number	Course	Credits
CSC1015F	Computer Science I A .....	18
CSC1016S	Computer Science I B .....	18
CSC2001F	Computer Science II A .....	24
CSC2002S	Computer Science II B .....	24
EGS1002S	Human Geography .....	18
GEO1006S	Introduction to Minerals, Rocks & Structure .....	18
MEC1002W	Engineering Drawing .....	16
SEA2000F	Descriptive Physical Oceanography .....	24

### Curriculum for Technikon/University of Technology Transferees to the Bachelor of Science in Geomatics [EB019]

- 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	Credits
APG2014S	Geomatics II .....	24
CSC1015F	Computer Science .....	18
<i>or</i>		
APG1015S	Programming for Geomatics .....	18
APG2015F	Geographical Information Systems .....	24
APG2018X	Geographical Information Systems Camp .....	4
GEO1009F	Introduction to Earth and Environmental Sciences .....	18
MAM1017F	Engineering Mathematics A .....	16
MAM1018S	Engineering Mathematics B .....	16

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.

## Postgraduate Programme

### Honours in Geographical Information Systems [EH007]

The curriculum of the BSc(Hons) in Geographic Information Systems programme is aimed at graduates intending to work in disciplines associated with the natural, geographical and computer sciences. The degree is intended to equip graduates with the practical skills and theoretical knowledge they need to incorporate GIS techniques in their every day work routine.

A candidate shall complete approved courses of a value required to bring the total to a minimum of 144 credits and shall comply with all the prescribed curriculum requirements.

**Programme Convener:**

JL Smit, BSc(Surv) PhD *Cape Town*

**Core Courses**

Number	Course	Credits
<b>APG2018X</b>	GIS Camp.....	4
<b>APG4003Z</b>	Research Report.....	40
<b>APG4004F</b>	Remote Sensing.....	24
<b>APG4006S</b>	Geomatics Practice & Land Management.....	12
<b>APG4007F</b>	Introductory GIS.....	24
<b>APG4008S</b>	Advanced GIS.....	24
<b>APG4009F</b>	Computing for GIS.....	18
	Total credits.....	146

**Bachelor of Architecture (BArch) [EP001]**

NOTE: The BArch degree is being phased out and the courses listed below will only be made available to repeat or existing students within the degree. This curriculum must be read together with the BArch rules in the General Information Section of this Handbook.

**Professor and Programme Convener:**

I Low, BArch *Cape Town* MArch(Urban Design)*Penn* PrArch MIA Arch CIA

Number	Course	Credits
<b>APG4029F*</b>	Natural Systems I.....	12

\* Prerequisites and numbers might be determined by relevant programme convener.

Note: Students are required to complete three History/Theory courses, one Technology course and one course from Urban Design/Planning/Landscape.

**Semester ARCH6**

**Studiowork Course**

Number	Course	Credits
<b>APG6002S</b>	Studiowork ARCH6.....	76

**Bachelor of Architectural Studies (Honours) [EH006]**

An honours degree in architecture that provides students with advanced vocational and discipline specific knowledge, skills and competencies related to the history, theory, technology and practice of architecture. The course of study extends the base of knowledge of the student through graduate study with particular emphasis on architectural design. It is focused on developing creative and critical inquiry, reflective understanding and cultural, social and technical knowledge in preparation for self-motivated independent learning. The 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).

**Professor and Programme Convener:**

I Low, BArch *Cape Town* MArch(Urban Design)*Penn* PrArch MIA Arch CIA

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### Studiowork Courses

Number	Course	Credits
APG4042F	Architectural Design Studio I .....	48
APG4043S	Architectural Design Studio II .....	48

### Non-Studio Courses

The following courses are compulsory:

Number	Course	Credits
APG4039F	Advanced History & Theory of Architecture.....	12
APG4040F	Architectural Research Methods.....	12
APG4041S	Advanced Building Technology .....	12
APG4044S	Professional Practice.....	12
APG4045S	Architectural Research Project.....	12

### Elective Core Courses

Select one 12-credit elective for the First Semester from the following: (see note below)\*

Number	Course	Credits
APG4021F	Urban Systems.....	12
APG4028F	Aspects of City Design .....	12
APG4029F	Natural Systems.....	12
APG4030F	History and Theory of Architecture .....	12
APG5014F	Introduction to Urban Design Theory.....	12

Or any 12 credit course presented at honours level, approved by the Programme Convener.

\* Note: APG4042F *Architectural Design Studio I* is a pre-requisite for APG4043S *Architectural Design Studio II* in the second semester.

APG4040F *Architectural Research Methods* is a pre-requisite for APG4045S *Architectural Research Project* in the second semester.

## Master of Architecture (Professional) [EM021]

A qualifying degree in architecture that provides students with the knowledge, values and skills to enter the profession of architecture and/or to pursue further qualifications in architecture or fields associated with the architectural profession and built environment. It is focused on developing independent critical enquiry in preparation for practice in a diverse and changing world. Students are given considerable freedom and support to develop a reflective, critical and speculative relationship to their work. The 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 exam set by SACAP.

NOTE: These rules must be read with the general rules for Masters degrees in Handbook 3 of this series.

### Professor and Programme Convener:

J Noero, BArch *Natal* MPhil (Architecture) *Newcastle-Upon-Tyne* Hon DSc *Brighton* MIArch

### Design Dissertation - Year Course

#### Studiowork Course

Number	Course	Credits
APG5060W	Major Design Project.....	90

**Non-Studio Courses**

Number	Course	Credits
APG5059F	Advanced Theory Research .....	30
APG5057F	Advanced Technology Research .....	30
APG5058S	Design Research Project .....	30

**Master of Architecture [EM006]****Professor and Programme Convener:**

I Low, BArch *Cape Town* MArch(Urban Design)*Penn* PrArch MIA Arch CIA

The Master of Architecture degree may be awarded to a candidate who shall present a dissertation incorporating any or all of the following:

- a) a research project of a theoretical or practical nature;
- b) a critical review of a specified topic based upon a comprehensive search of literature or available data;
- c) design of all or part of an architectural project or group of projects to a specification involving advanced concepts and theoretical principles;
- d) design of all or part of an architectural project or group of projects to a specification involving advanced concepts and theoretical principles;
- e) any other study acceptable to the Faculty of Engineering and the Built Environment.

**Master of City and Regional Planning [EM007] and  
Master of City Planning and Urban Design [EM008]**

The MCPUD and MCRP degree Programmes consist of either two years of full-time study or a three year extended programme. The extended programme is not 'part-time' in the usual meaning of the term. Rather, it enables candidates to undertake the first year of study over two years, by attending theory only in the first year and studio work only in the second year. The material covered in the two year full-time and the three year extended programme is precisely the same. The curricula for both programmes comprise courses in theory and project work. However, because a great deal of both project and theory work is self- or group initiated, and is innovative in form, more than half of the content of the MCRP and MCPUD degree programmes can be described as research related.

Projects are selected for both academic utility and professional relevance and are carried out by students under staff supervision. The studio is a vehicle for exploration into development and planning in real situations. The programmes require considerable field work in the Cape Town area and in some cases field trips to other parts of the country are arranged. Each project culminates in the submission of a document and the oral presentation of project work. Assessment is based on project products. Theory courses are concerned with procedural and substantive theory. Planning skills are imparted and honed throughout the duration of the programmes.

In part of the third and all of the fourth semester, MCRP and MCPUD students undertake a dissertation. This may, under certain conditions specified in the year guide, allow students to undertake a topic incorporating both the relevant theory and project work, of their own choice. In these cases, the dissertation allows students the opportunity to undertake an assignment which incorporates their particular interests and concerns. However, the School reserves the right to replace this option with a topic selected by staff members, if this is considered to be in the best interests of the student. The dissertation is normally undertaken individually. In special cases, a group submission comprising no more than two students may, at the discretion of staff, be allowed.

**Master of City and Regional Planning [EM007]****Associate Professor and Programme Convener:**

PB Wilkinson, BSc(Eng) *Natal* MCRP *Cape Town*

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This curriculum must be read together with the Degree Rules in the General Information section of this Handbook. Candidates for the MCRP degree are required to complete the core courses listed below, totalling 168 credits in the first year and 180 credits in the second year.

### First Year: first semester

Number	Course	Credits
APG4020F	Planning Theory & Practice .....	8
APG4021F	Urban Systems .....	12
APG4022F	Planning Project A .....	32
APG4028F	Aspects of City Design .....	12
APG4029F	Natural Systems .....	12
APG4035F	Planning Techniques I .....	12

### First Year: second semester

Number	Course	Credits
APG4023S	Urban Development Processes .....	12
APG4024S	Planning & Governmental Systems .....	12
APG4025S	Regulatory & Legal Framework .....	12
APG4026S	Planning Project B .....	32
APG4038S	Planning Techniques II .....	12
	Total first year credits .....	168

### Second Year: first semester

Number	Course	Credits
APG5020F	Regional Planning Project .....	32
APG5023F	Regional Planning Theory .....	20

### Second Year: second semester

Number	Course	Credits
APG5024S	Planning Techniques III .....	8
APG5051Z	MCRP Dissertation .....	120
	Total second year credits .....	180

## Master of City Planning and Urban Design [EM008]

### Programme Convener:

To be announced

This curriculum must be read together with the Degree Rules in the General Information section of this Handbook. Each student must complete all of the courses. (The curriculum may be taken over a period of three years by candidates in part-time employment.)

### First Year: first semester

Number	Course	Credits
APG4020F	Planning Theory and Practice .....	8
APG4021F	Urban Systems .....	12
APG4022F	Planning Project A .....	32
APG4028F	Aspects of City Design .....	12
APG4029F	Natural Systems .....	12
APG4035F	Planning Techniques I .....	12

### First Year: second semester

Number	Course	Credits
APG4023S	Urban Development Processes .....	12

APG4024S	Planning & Governmental Systems .....	12
APG4025S	Regulatory & Legal Framework .....	12
APG4026S	Planning Project B .....	32
APG4038S	Planning Techniques II .....	12
	Total first year credits.....	168

**Second Year: first semester**

Number	Course	Credits
APG5055F	Urban Design Projects .....	35
APG5056F	Urban Design Theory .....	25

**Second Year: second semester**

Number	Course	Credits
APG5024S	Planning Techniques III.....	8
APG5050Z	MCPUD Dissertation.....	120
	Total second year credits .....	188

**Master of Landscape Architecture Conversion Course [EZ001]**

**Purpose of the Conversion Course:** The conversion course is a 1-year preparation course for those students who are qualified to enter the MLA degree programme but who have a non-design background such as the environmental sciences, horticulture etc. including mature students with work experience in the landscape field.

The main focus of the conversion year is on design studio and on graphics, with additional courses on theory and technical aspects from the Bachelor of Architectural Studies (BAS) Programme. On completion (all courses of the Conversion Course), students will need to apply for entry into the two-year full time MLA programme. Completion of all of the Conversion Course requirements does not automatically guarantee entry into the MLA Programme.

Number	Course	Credits
APG1003W	Technology I.....	24
APG1020W	Design & Theory Studio I .....	72
APG1021W	Representation I .....	24
APG2000F	History & Theory of Architecture III .....	8
APG2003S	History & Theory of Architecture IV .....	8

**Master of Landscape Architecture [EM015]****Senior Lecturer and Programme Convener:**

C Hindes, BLA *Pretoria* MLArch

**Studiowork Courses**

Studiowork, the central activity of the degree programme, requires students to exercise considerable initiative and undertake research, and consumes up to two-thirds of the students time allocation to the Programme. Projects are selected for both academic and professional relevance and will start at the smaller scale and work steadily towards the comprehension of larger and larger natural and urban systems. Fieldwork is an indispensable component of each project and involves trips into Metropolitan Cape Town and selected parts of the Western Cape region. Each project culminates in the submission of a document and an oral presentation. Assessment is based on a variety of project products and a Studiowork examination held at the end of each semester.

**Lecture courses**

Lecture courses focus on imparting values, knowledge, and skills of relevance to landscape architecture. Landscape skills and techniques are developed progressively throughout the duration of

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the study programme. Theory courses are accompanied by extensive reading lists and students are expected to undertake extensive structured reading. The courses are assessed through term papers, practicals, seminars and other forms of examination.

This curriculum must be read together with the Degree Rules in the General Information section of this Handbook. Each student must complete all of the courses.

### First Year: first semester

Number	Course	Credits
APG4028F	Aspects of City Design .....	12
APG4029F	Natural Systems .....	12
APG4030F	History & Theory of Landscape Architecture A .....	12
APG4031F	Landscape Techniques I .....	12
APG4036F	Local Area Landscape Architecture Project .....	32

### First Year: second semester

Number	Course	Credits
APG4025S	Regulatory & Legal Framework .....	12
APG4032S	Landscape Design .....	12
APG4033S	Landscape Techniques II .....	8
APG4034S	Terrain Analysis .....	12
APG4037S	Metro Landscape Project .....	36
	Total first year credits .....	160

### Second Year: first semester

Number	Course	Credits
APG5025F	History & Theory of Landscape Architecture B .....	12
APG5026F	Landscape Construction and Practice .....	12
APG5029F	Landscape Architecture Project .....	36
APG5053F	Plants and Design .....	12

### Second Year: second semester

Number	Course	Credits
APG5024S	Planning Techniques III .....	8
APG5052S	MLA Dissertation .....	120
	Total second year credits .....	200

## Master of Philosophy in Transport Studies [EM027] Postgraduate Diploma in Transport Studies [EG009]

Offered jointly with the Department of Civil Engineering.

### Associate Professor and Programme Convener:

R Behrens, BA MCRP PhD *Cape Town* TRP (SA) MSAPI

The primary aim of the Postgraduate Diploma, MEng and MPhil in Transport Studies is to produce diplomates and graduates with the necessary knowledge and skills to engage effectively with the challenge of creating affordable, efficient, sustainable, safe, equitable and environmentally sound urban transport systems. The emphasis of the Programme is on developing competence in the field of urban transport planning as it adapts to meet the requirements of new and demanding policy directives both locally and internationally. The content of the Programme curriculum is cross-disciplinary in orientation and exposes students to a broad range of the analytical, evaluative, planning and management issues they are likely to encounter in the field. A candidate for the Postgraduate Diploma in Transport Studies is required to complete core courses totalling not less than 60 credits plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum. A candidate for the MEng in Transport Studies is required to complete

core courses totalling 120 credits (including a 60 credit Research project) plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum. A candidate for the MPhil in Transport Studies is required to complete core courses totalling 120 credits (including a 60 credit Research project) plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum.

### Core Courses

Number	Course	Credits
<b>CIV5017Z</b>	Minor Dissertation (MEng candidates).....	60
<b>END5035Z</b>	Management of Transport Supply and Demand (MPhil/PGDip candidates).....	20
<b>END5037Z</b>	Minor Dissertation (MPhil candidates).....	60
<b>END5038Z</b>	Integrated Land Use-Transport Planning (MPhil/PGDip candidates).....	20
<b>END5045Z</b>	Intermodal Public Transport Planning and Economics (MEng candidates ).....	20
<b>END5047Z</b>	Transport Demand Analysis & Project Assessment.....	20
<b>END5048Z</b>	Transport Modelling (MEng candidates).....	20

### Elective Courses (for MPhil candidates only)

Number	Course	Credits
<b>END5036Z</b>	Local Area Transport Planning Management & Design.....	20
<b>END5039Z</b>	Non-motorised Transportation.....	20
<b>END5045Z</b>	Intermodal Public Transport Planning & Economics.....	20
<b>END5046Z</b>	Rural Transport.....	20
<b>END5048Z</b>	Transport Modelling.....	20
<b>END5067Z</b>	Rail Planning & Operations Management.....	20
<b>END5068Z</b>	Bus Planning & Operations Management.....	20

Subject to approval by the Programme Convener, candidates for the Postgraduate Diploma and the MPhil are required to select an appropriate course or courses totalling a minimum of 40 credits as their elective. Candidates for the MEng in Transport Studies are required to select an appropriate engineering focused course or courses totalling a minimum of 60 credits as an elective. Candidates may nominate other courses offered at this or any other university for consideration in this regard.

## Master of Philosophy in Conservation of the Built Environment [EM027]

*The Master of Philosophy in Conservation of the Built Environment is offered part-time over two years.*

### Programme Convener:

S Townsend, PhD *Cape Town*

The primary aim of the M Phil in Conservation of the Built Environment is to produce graduates with the necessary knowledge, values and skills to engage effectively with the challenges arising in the very diverse multi-disciplinary intellectual, cultural and physical environments where heritage and heritage resources are present. The emphasis of the programme is on developing competence in the professional and practical fields of conservation of and in the built environment and of heritage resource management. The Programme curriculum is cross-disciplinary in orientation and exposes students to the very broad range of research, analytical, evaluative, planning and management issues and challenges that they are likely to encounter in the field. While this Programme is focused on the built environment and on practical and technical aspects of conservation and heritage resource management, it does also introduce students to critical issues in heritage arenas and, in particular, public history and shares several courses with a related Programme offered in the Centre for African Studies which is more theoretically and critically oriented. The Programme is, therefore, designed to produce professional training for professionals working in or wishing to enter the fields of conservation of the built environment and heritage resource management and to produce research that is practically oriented and that is publishable.

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Number	Course	Credits
<b>APG5063F</b>	History of Conservation.....	10
<b>APG5064F</b>	Law of Conservation, Heritage Management & Development .....	10
<b>APG5065F</b>	Conservation Disciplines & Practices .....	10
<b>APG5066F</b>	Surveying, Measuring & Recording Heritage Resources .....	10

Number	Course	Credits
<b>APG5069F</b>	Conservation, Development & Impact Assessment II.....	20
<b>APG5070F</b>	Research Methodologies.....	20

Number	Course	Credits
<b>APG5067S</b>	Researching & Assessing Heritage Resources .....	12
<b>APG5068S</b>	Conservation, Development & Impact Assessment I.....	8
<b>CAS5009S</b>	Critical Issues in Heritage.....	36

Number	Course	Credits
<b>APG5071S</b>	Research Project .....	60

**Course descriptions are set out in the section Courses Offered. The course code abbreviation for Architecture, Planning and Geomatics is APG.**

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# CHEMICAL ENGINEERING

The Department offers the following Degree Programmes:

## BSc(Eng) Programme in Chemical Engineering

### Postgraduate structured coursework in:

Bioprocess Engineering  
Catalysis and Catalytic Processing  
Hydrometallurgical Engineering

### Research Entities:

Centre for Bioprocess Engineering Research  
Centre for Catalysis Research  
Centre for Minerals Research  
DST-NRF Centre of Excellence in Catalysis  
National Hydrogen Catalysis Competence Centre  
Precipitation and Crystallisation Unit

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](http://www.chemeng.uct.ac.za)

## Staff

### Professor and Head of Department:

JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE  
Mrs D de Jager (PA to the Head of Department)

### Professors:

M Claeys, Dipl.Ing (Chem Eng) *Ding Karlsruhe*  
J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHE MSAIMM SARChI  
DMcK Fraser, BSc(Eng)Chem PhD *Cape Town* MSAICHE  
STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHE SASM FSAAE ASSAf SARChI  
AE Lewis, PrEng BSc(Eng)Chem MSc (Eng) PhD *Cape Town* MSAICHE  
KP Möller, BSc(Eng)Chem PhD *Cape Town*  
CT O'Connor, PrEng BSc *Unisa* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM  
FSAICHE FSAAE FRSSAf  
E van Steen, MSc(Eng) *Eindhoven* PhD *Karlsruhe* FSAICHE (Director of Postgraduate Studies)

### Emeritus Professor:

GS Hansford, BSc(Eng)Chem MSc *Cape Town* MSE PhD *Pennsylvania* CEng MICHEM FSAICHE  
FSAIMM

### Associate Professors:

JM Case, BSc(Hons) *Stell* HDE *Cape Town* MEd *Leeds* PhD *Monash* MASSAf (Director of Undergraduate Studies)  
DA Deglon, BSc(Eng) *Witwatersrand* MBA PhD *Cape Town* MSAIMM  
HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTH Aachen* MSAICHE MESSA

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### **Adjunct Professor:**

PJ Harris, BSc(Hons) PhD *Witwatersrand MSACI*

### **Honorary Professors:**

ME Dry, MSc *Rhodes* PhD *Bristol*

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

### **Senior Lecturers:**

A Jsafiade, 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*

J Petersen, BSc(Eng)Chem *Witwatersrand* PhD *Cape Town MSAIMM*

R Rawatlal, BSc(Hons) PhD *KwaZulu-Natal*

### **Honorary Senior Lecturers:**

W Böhringer, Diplom-Chemiker *Karlsruhe*

MC Harris, BSc(Eng)Chem MSc (Eng) *Cape Town*

### **Academic Development Lecturer:**

Ms L Kotta, BSc(Eng)Chem *Natal* MEd *Witwatersrand*

### **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 Vasic, Dip Analytical Chemistry

### **Building Supervisor:**

Mr E Matthews

### **Administration Manager:**

Mrs R September, Nat Dip HRM BTech HRD *CPUT*

### **Administrative Staff:**

Ms N Dili (Receptionist)

Ms A Haddon (Academic)

Mrs J Broadley (Senior Secretary)

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.

## Undergraduate Programme

### Bachelor of Science In Engineering In Chemical Engineering [EB001]

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.

#### Associate Professor and Programme Convener:

JM Case, BSc(Hons) *Stell HDE Cape Town* MEd *Leeds* PhD *Monash*

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

#### First Year Core Courses

Number	Course	Credits
CEM1000W	Chemistry 1000 .....	36
CHE1004W	Engineering I .....	32
MAM1017F	Engineering Mathematics A .....	16
MAM1018S	Engineering Mathematics B.....	16
MEC1002W	Engineering Drawing .....	16
PHY1012F	Engineering Physics A.....	16
PHY1013S	Engineering Physics B.....	16

#### Second Year Core Courses

Number	Course	Credits
CEM2007F	Chemistry 2007 .....	24
CEM2008S	Chemistry 2008 .....	24
CHE2031F	Material & Energy Balances .....	20
CHE2032Z	Design of Chemical Processes .....	8
CHE2033W	Chemical Engineering Laboratory I .....	4
CHE2035S	Thermodynamics I .....	12
CHE2040S	Design of Fluid Flow & Heat Transfer Systems .....	20

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<b>MAM2083F</b>	Vector Calculus for Engineers A .....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B.....	16
	Total credits .....	144

### Third Year Core Courses

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

### 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 3rd year courses. A concession for carrying more than one 3rd year core course per semester will not be considered.

Number	Course	Credits
<b>CHE4029Z</b>	Professional Communication Studies .....	8
<b>CHE4036Z</b>	Chemical Engineering Design .....	28
<b>CHE4042F</b>	Process Dynamics & Control .....	16
<b>CHE4045Z</b>	Chemical Engineering Project .....	32
<b>CHE4048F</b>	Business, Society & Environment .....	20
<b>CHE4049F</b>	Process Synthesis & Equipment Design .....	20
	Total credits .....	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	Credits
<b>CHE3035S</b>	Bioprocess Technology I .....	8
<b>CHE3039S</b>	Chemistry & Chemical Engineering of Catalytic Processes.....	8
<b>CHE3064S*</b>	Mineral and Metallurgical Processing I .....	8
<b>CHE3065S</b>	Numerical Simulation for Chemical Engineers.....	8
<b>CHE3066S</b>	Crystallisation & Precipitation.....	8

<b>CHE4024F</b>	Introduction to Environmental Process Engineering.....	8
<b>CHE4050F*</b>	Mineral & Metallurgical Processing II.....	8
<b>EEE4103F+</b>	Nuclear Power Sources.....	12

\* **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 Science Graduates to Bachelor of Science in Engineering In Chemical Engineering [EB001]**

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	Credits
<b>CHE1000Z</b>	Introduction to Chemical Engineering .....	16
<b>CHE2031F</b>	Material & Energy Balances .....	20
<b>CHE2032Z</b>	Design of Chemical Processes .....	8
<b>CHE2033W</b>	Chemical Engineering Laboratory I .....	4
<b>CHE2035S</b>	Thermodynamics I .....	12
<b>CHE2040S</b>	Design of Fluid Flow & Heat Transfer Systems .....	20
<b>CHE3044F</b>	Reactor Design I .....	12
<b>CHE3049W</b>	Chemical Engineering Laboratory II .....	16
<b>CHE3053S</b>	Separation Processes .....	13
<b>CHE3054S</b>	Reactor Design II .....	13
<b>CHE3062S</b>	Professional Communication Studies .....	12
<b>MAM3080F</b>	Numerical Methods .....	12
<b>MEC1003F</b>	Engineering Drawing .....	8
	Total credits .....	172
<b>CHE3000X</b>	Practical Training	

### **Second Year of Conversion Programme (2-year programme)**

Number	Course	Credits
<b>CHE3040S</b>	Solid-Fluid Operations .....	12
<b>CHE3046F</b>	Thermodynamics II .....	12
<b>CHE3063F</b>	Mass Transfer .....	16
<b>CHE4029Z</b>	Professional Communication Studies .....	8
<b>CHE4036Z</b>	Chemical Engineering Design .....	28
<b>CHE4042F</b>	Process Dynamics & Control .....	16
<b>CHE4045Z</b>	Chemical Engineering Project .....	32
<b>CHE4048F</b>	Business, Society & Environment .....	20
<b>CHE4049F</b>	Process Synthesis & Equipment Design .....	20
	Total credits .....	164

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### First Year of Conversion Programme (3-year programme)

Number	Course	Credits
<b>CHE1000Z</b>	Introduction to Chemical Engineering .....	16
<b>MEC1003F</b>	Engineering Drawing .....	8
<b>CHE2031F</b>	Material & Energy Balances .....	20
<b>CHE2032Z</b>	Design of Chemical Processes .....	8
<b>CHE2033W</b>	Chemical Engineering Laboratory I .....	4
<b>CHE2035S</b>	Thermodynamics I .....	12
<b>CHE2040S</b>	Design of Fluid Flow & Heat Transfer Systems .....	20
	Humanities Electives .....	16
	Total credits .....	104

### Second Year of Conversion Programme (3-year programme)

Number	Course	Credits
<b>CHE3040S</b>	Solid-Fluid Operations .....	12
<b>CHE3044F</b>	Reactor Design I .....	12
<b>CHE3046F</b>	Thermodynamics II .....	12
<b>CHE3049W</b>	Chemical Engineering Laboratory II .....	16
<b>CHE3050S</b>	Chemical Process Unit Design.....	6
<b>CHE3053S</b>	Separation Processes .....	13
<b>CHE3054S</b>	Reactor Design II .....	13
<b>CHE3062S</b>	Professional Communication Studies .....	12
<b>CHE3063F</b>	Mass Transfer .....	16
<b>MAM3080F</b>	Numerical Methods .....	12
	Total credits .....	124
<b>CHE3000X</b>	Practical Training	

### Third Year of Conversion Programme (3-year programme)

Number	Course	Credits
<b>CHE4036Z</b>	Chemical Engineering Design .....	28
<b>CHE4042F</b>	Process Dynamics & Control .....	16
<b>CHE4045Z</b>	Chemical Engineering Project .....	32
<b>CHE4048F</b>	Business, Society & Environment .....	20
<b>CHE4049F</b>	Process Synthesis & Equipment Design .....	20
<b>CHE4029Z</b>	Professional Communication Studies.....	8
	Total credits.....	124

## Access Programme for Technikon/University of Technology Transferees [EB001]

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.

## Postgraduate Programme

The Department offers Master of Engineering in Chemical Engineering [EM023], Master of Philosophy [EM025] and PhD [ED001] degrees by dissertation only in any of its research areas. Master of Engineering in Chemical Engineering [EM024] or Master of Philosophy [EM026] by structured coursework and dissertation are offered in the areas of specialisation listed below. Master of Engineering by structured coursework and minor dissertation is also offered [EM017]. All new postgraduate students are obliged to complete CHE5055Z.

### Bioprocess Engineering [EM024]

#### Professor and Convener:

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIchE SASM FSAAE ASSAF SARChI

#### Core Courses (to total 52 credits)

Number	Course	Credits
CHE5049Z	Chemical Engineering Topics for Scientists <sup>#2</sup> .....	16
CHE5051Z	Microbial Physiology & Dynamics <sup>#1</sup> .....	8
CHE5052Z	Molecular Biology & Catalysis <sup>#1</sup> .....	8
CHE5054Z	Biotechnology Laboratory.....	4
CHE5055Z	Research Communication & Methodology.....	16
CHE5070Z	Advanced Bioprocess Engineering.....	16

**Optional courses: to meet a minimum requirement of 60 credits in total**

<sup>#1</sup> core courses for engineering graduates.

<sup>#2</sup> core courses for life science graduates, but may be replaced by CHE2031F, CHE2035S or CHE3044F.

Physical Science graduates will complete all or a selection of <sup>#1</sup> and <sup>#2</sup>, dependent on their previous studies.

### Catalysis and Catalytic Processing [EM024]

#### Professor and Convener

JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE

#### Core Courses (to total 44 credits)

Number	Course	Credits
CHE5022Z	Introduction to Catalysis.....	16
CHE5055Z	Research Communication & Methodology.....	16
	and at least one of:	
CHE5040Z	Fuels & Chemicals from Oil.....	12
CHE5045Z	Fuels & Chemicals from Coal & Syngas.....	12

**Optional courses: to meet a minimum requirement of 60 credits in total.**

### Hydrometallurgical Engineering [EM024]

#### Professor and Convener

J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAIchE MSAIMM SARChI

A candidate for the Masters in Hydrometallurgical Engineering programme shall complete coursework to the maximum of 60 credits, which includes all core courses and at least one of the elective core courses, listed below.

**Core Courses**

Number	Course	Credits
<b>CHE5055Z</b>	Research Communication & Methodology .....	16
<b>CHE5057Z</b>	Fundamentals of Hydrometallurgy .....	12
<b>CHE5058Z</b>	Leaching Hydrometallurgy .....	12
<b>CHE5059Z</b>	Hydrometallurgical Separation Processes .....	12

**Elective Core Course**

Select one course from the following:

Number	Course	Credits
<b>CHE5056Z</b>	Bioleaching of Sulphide Minerals .....	8
<b>CHE5060Z</b>	Solvent Extraction .....	8
<b>CHE5062Z</b>	Electrowinning/Refining: Practice, Modelling & Control .....	8
<b>CHE5063Z</b>	Advanced Topics in Adsorption & Ion Exchange .....	8

**Master of Engineering in Minerals Beneficiation [EM017]****Postgraduate Diploma in Minerals Beneficiation [EG004]****Professor and Convener**

J-P Franzidis, BSc(Eng)/Chem MSc(Eng) *Cape Town* PhD *Open* MSAIChe MSAIMM SARChI

A candidate for the Postgraduate Diploma in Engineering in Minerals Beneficiation shall complete approved courses of a value required to bring the total to a minimum of 120 credits and shall comply with the prescribed curriculum requirements. A candidate for the MEng in Minerals Beneficiation programme shall complete approved courses of a value required to bring the total to a minimum of 180 credits and shall comply with all the prescribed curriculum requirements.

**This programme is site based.**

**Core Courses Stream A (Concentrators)**

Number	Course	Credits
<b>CHE4029Z</b>	Professional Communication Studies .....	8
<b>CHE5073Z</b>	Essential Technical Tools .....	16
<b>CHE5074Z</b>	Advanced Comminution I .....	16
<b>CHE5075Z</b>	Advanced Comminution II .....	16
<b>CHE5076Z</b>	Conceptual Framework of Minerals Beneficiation .....	8
<b>CHE5077Z</b>	Introduction to Hydrometallurgy .....	8
<b>CHE5080Z</b>	Advanced Flotation I .....	16
<b>CHE5081Z</b>	Advanced Flotation II .....	16
<b>CHE5084Z</b>	Minor Dissertation (MEng candidates only) .....	60

**Core Courses Stream B (Hydrometallurgy)**

Number	Course	Credits
<b>CHE5057Z</b>	Fundamentals of Hydrometallurgy .....	12
<b>CHE5058Z</b>	Leaching Hydrometallurgy .....	12
<b>CHE5059Z</b>	Hydrometallurgical Separation Processes .....	12
<b>CHE5060Z</b>	Solvent Extraction .....	8
<b>CHE5061Z</b>	Advanced Topics in Reduction .....	8
<b>CHE5062Z</b>	Electrowinning/Refining: Practice, Modelling and Control .....	8
<b>CHE5063Z</b>	Advanced Topics in Adsorption & Ion Exchange .....	8
<b>CHE5073Z</b>	Essential Technical Tools .....	16
<b>CHE5074Z</b>	Advanced Comminution I .....	16
<b>CHE5076Z</b>	Conceptual Framework of Minerals Beneficiation .....	8
<b>CHE5077Z</b>	Introduction to Hydrometallurgy .....	8
<b>CHE5079Z</b>	Integrated Analysis of Mineral Beneficiation Systems .....	16

<b>CHE5080Z</b>	Advanced Flotation I .....	16
<b>CHE5084Z</b>	Minor Dissertation (MEng candidates only) .....	60

### **Optional Courses for all Postgraduate Programmes**

In addition to the courses listed below, the core courses of the three programmes above may be used as optional courses in the other programmes.

Number	Course	Credits
<b>CHE5027Z</b>	Advanced Reaction Kinetics in Heterogeneous Systems .....	8
<b>CHE5030Z</b>	Advanced Engineering Statistics I .....	8
<b>CHE5040Z</b>	Fuels & Chemicals from Oil .....	12
<b>CHE5041Z</b>	Instrumental Analysis I - General Measurement .....	4
<b>CHE5042Z</b>	Instrumental Analysis II - Chromatography .....	4
<b>CHE5043Z</b>	Instrumental Analysis III - Spectroscopy .....	4
<b>CHE5045Z</b>	Fuels & Chemicals from Coal & Syngas .....	12
<b>CHE5047Z</b>	Molecular Modelling .....	8
<b>CHE5048Z</b>	Crystallisation and Precipitation .....	12
<b>CHE5056Z</b>	Biobleaching of Sulfide Minerals .....	8
<b>CHE5061Z</b>	Advanced Topics in Reduction .....	8
<b>CHE5064Z</b>	Sustainability in Chemical Engineering .....	8
<b>CHE5066Z</b>	Computing for Engineers .....	8
<b>CHE5069Z</b>	Advanced Thermodynamics and Separation Processes .....	8
<b>CHE5070Z</b>	Advanced Bioprocess Engineering .....	16
<b>CHE5071Z</b>	Applied Numerical Analysis in Biochemical Systems .....	8
<b>CHE5072Z</b>	Fundamentals of Process Modelling .....	4
<b>CHE5078Z</b>	Advanced Numerical Methods for Engineers .....	16
<b>CHE5079Z</b>	Integrated Analysis of Mineral Beneficiation Systems .....	16
<b>CHE5083Z</b>	Translating Technology from the Laboratory to the Marketplace .....	8
<b>CIV5010F</b>	Aquatic Chemistry .....	20
<b>CIV5101F</b>	Wastewater Treatment Part I .....	32
<b>EEE4103F</b>	Nuclear Power Sources .....	12
<b>END5049Z</b>	Research Communication & Methods .....	16
<b>MEC5035Z</b>	Project Management .....	20

## **Research Entities**

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

### **Centre for Bioprocess Engineering Research (CoBER)**

### **Centre for Catalysis Research**

### **Centre for Minerals Research**

### **CREE - Centre for Research In Engineering Education**

### **Crystallisation and Precipitation Research Unit**

### **DST - NRF Centre of Excellence In Catalysis**

### **DST Hydrogen Catalysis Competence Centre**

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

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## CIVIL ENGINEERING

The Department offers the following Degree Programmes:

### **BSc Engineering Degree in Civil Engineering**

#### **Postgraduate areas of specialisation:**

Structural Engineering and Materials  
Geotechnical Engineering  
Water Quality Engineering  
Transport Studies  
Integrated Urban Water Management  
Urban Engineering and Urban Management  
Spatial Information Systems and GIS

#### **Research Entities:**

Structural Engineering and Mechanics  
Construction Materials  
Geotechnical Engineering  
Water Quality Engineering  
Transport Studies  
Integrated Urban Water Management  
Urban Engineering and Urban Management

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 single storey laboratory block by a grassed quadrangle. The laboratories and workshops are equipped for teaching and research, and cover a total floor area of about 3000m<sup>2</sup>.

## **Staff**

### **Professor and Head of Department:**

A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng FIStructE FZweIE MASSAf MIABSE 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 MCRP PhD *Cape Town* TRP (SA) MSAPI  
R Del Mistro PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP *Cape Town* PhD *Pretoria*  
P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang*  
UK Rivett, DipEng *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

RE Loewenthal, BSc(Eng) *Witwatersrand* MSc(Eng) PhD *Cape Town* MWISA  
ADW Sparks, PrEng BSc(Eng) *Natal* MSc(Eng) *Witwatersrand* MICE FSAICE MOpResSocSA  
MRoySocSA CEng

**Senior Lecturers:**

H Beushauser, Deil-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 Lecturer:**

NS Wolmarans, MSc Eng *Cape Town*

**Research Officers:**

AM Loudon, MSc *Cape Town* MSc *Manchester*  
H Schalekamp, BAS BArch MPhil *Cape Town*

**Part-time Lecturer:**

CB Prisman, BA LLB *Cape Town*

**Honorary Research Associate:**

LA Kane, BEng *Wales (Cardiff)* MSc(Eng) *Cape Town*

**Principal Technical Officer:**

Mr CJ Nicholas

**Laboratory Manager/Principal Scientific Officer:**

Mr N Hassen

**Chief Technical Officer:**

Vacant

**Water Quality Laboratory Manager:**

Mr MT Lakay

**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 bacteriological investigations into water supplies and waste water. Laboratory scale activated sludge, flotation, coagulation, settling and filtration units are operated for developing design criteria for full-scale plants.

**Bachelor of Science in Engineering in Civil Engineering [EB002]**

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 Thesis allow students to integrate their knowledge and develop advanced problem-solving skills. Professional aspects are covered by courses in communication and civil engineering practice.

**Associate Professor and Programme Convener**

NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE  
 Mem IAHR Mem IAHS Mem IWA

**First Year Core Courses**

Number	Course	Credits
CEM1008F	Chemistry for Engineers .....	16
CIV1004W	Engineering I .....	32
MAM1017F	Engineering Mathematics A .....	16
MAM1018S	Engineering Mathematics B .....	16
MAM1042S	Engineering Statics .....	16

<b>MEC1002W</b>	Engineering Drawing.....	16
<b>PHY1012F</b>	Engineering Physics A.....	16
<b>PHY1013S</b>	Engineering Physics B.....	16
	Total credits.....	144

### Second Year Core Courses

Number	Course	Credits
<b>CIV2011F</b>	Mechanics of Materials.....	16
<b>CIV2031S</b>	Structural Engineering I.....	16
<b>CIV2034S</b>	Spatial Data Acquisition & Management.....	16
<b>CIV2035X</b>	Civil Engineering Camp.....	4
<b>CIV2037F</b>	Experimental Methods & Statistics.....	16
<b>CIV2039S</b>	Geotechnical Engineering I.....	16
<b>CIV2040S</b>	Fluid Mechanics.....	8
<b>GEO1008F</b>	Geology for Engineers.....	12
<b>MAM2083F</b>	Vector Calculus for Engineers A.....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B.....	16
<b>MEC2042F</b>	Materials Science in Engineering.....	12
	Total credits.....	148
<b>CIV2020X</b>	Practical Experience	

### Third Year Core Courses

Number	Course.....	Credits
<b>CIV3031F</b>	Structural Engineering II.....	16
<b>CIV3035S</b>	Structural Engineering III.....	16
<b>CIV3042F</b>	Geotechnical Engineering II.....	16
<b>CIV3043F</b>	Hydraulic Engineering.....	16
<b>CIV3044F</b>	Engineering Hydrology.....	8
<b>CIV3045F</b>	Transportation Planning.....	16
<b>CIV3046S</b>	Water Treatment.....	12
<b>CIV3047S</b>	Urban Water Services.....	12
<b>ECO1007S</b>	Economics for Engineers.....	16
<b>GEO1008F</b>	Geology for Engineers.....	12
	Elective.....	18
	Total credits.....	158

### Fourth Year Core Courses

Number	Course	Credits
<b>CIV4031F</b>	Structural Engineering IV.....	16
<b>CIV4034F</b>	Geotechnical Engineering II.....	16
<b>CIV4035C</b>	Design Project.....	24
<b>CIV4041F</b>	Professional Practice.....	16
<b>CIV4042F</b>	Waste Water Treatment.....	12
<b>CIV4043F</b>	Urban Design & Management.....	16
<b>CIV4044S</b>	Thesis.....	48
<b>EGS4006F</b>	Introduction to Environmental Assessment & Management.....	12
	Total credits.....	160

### 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).

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.

### **Postgraduate Programme**

The Department offers Master of Engineering in Civil Engineering [EM023], Master of Philosophy [EM025] and PhD [ED001] degrees by dissertation only in any of its research areas. Master of Engineering in Civil Engineering [EM024] or Master of Philosophy [EM026] by structured coursework and dissertation are offered in the areas of specialisation listed below. Master of Engineering by structured coursework and minor dissertation is also offered [EM017]. Note: Course offerings in particular years vary, and should be ascertained by reference to the department's annual postgraduate brochure. Courses are offered provided there is sufficient demand.

### **Water Quality Engineering [EM024/EM026]**

Advanced courses are offered in theory, design, modelling and operation of biological and chemical wastewater and sludge treatment systems.

### **Urban Water Management [EM024/ EM026]**

This group includes researchers from, *inter alia*, Environmental and Geographical Science and Social Anthropology. Courses may be taken from any of these disciplines subject to the student meeting the specific entrance requirements and on approval from the supervisor. Courses on integrated urban water management and urban infrastructure management and design (see below) are offered by the Civil Engineering Department.

### **Urban Infrastructure Design and Management [EM024/EM026]**

Advanced courses are offered in Developing Cities: Issues and strategies; Community Development, Urban Renewal, Sustainable Urban Systems, Municipal Infrastructure Management and Information Technology in urban infrastructure provision ([www.urbaninfrastructure.uct.ac.za](http://www.urbaninfrastructure.uct.ac.za)).

### **Master of Engineering In Structural Engineering and Structural Materials [EM017]**

Advanced courses are offered in the fields of structural analysis, structural mechanics, reinforced and prestressed concrete structures, plate and shell structures, concrete materials and geotechnical engineering.

### **Postgraduate Diploma In Transport Studies [EG009]**

### **Master of Engineering In Transport Studies [EM017]**

Offered jointly with the School of Architecture, Planning and Geomatics.

#### **Associate Professor and Programme Convener:**

R Behrens, BA MCRP PhD *Cape Town* TRP (SA) MSAPI

The primary aim of the Postgraduate Diploma, MEng and MPhil in Transport Studies is to produce diplomates and graduates with the necessary knowledge and skills to engage effectively with the challenge of creating affordable, efficient, sustainable, safe, equitable and environmentally sound urban transport systems. The emphasis of the Programme is on developing competence in the field of urban transport planning as it adapts to meet the requirements of new and demanding policy

directives both locally and internationally. The content of the Programme curriculum is cross-disciplinary in orientation and exposes students to a broad range of the analytical, evaluative, planning and management issues they are likely to encounter in the field. A candidate for the Postgraduate Diploma in Transport Studies is required to complete core courses totalling not less than 60 credits plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum. A candidate for the MEng in Transport Studies is required to complete core courses totalling 120 credits (including a 60 credit Research project) plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum. A candidate for the MPhil in Transport Studies is required to complete core courses totalling 120 credits (including a 60 credit Research project) plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum.

#### Core Courses

Number	Course	Credits
<b>CIV5017Z</b>	Minor Dissertation (MEng candidates) .....	60
<b>END5035Z</b>	Management of Transport Supply and Demand (MPhil/PGDip candidates) .....	20
<b>END5036Z</b>	Local Area Transport Planning, Management & Design .....	20
<b>END5037Z</b>	Minor Dissertation (MPhil candidates) .....	60
<b>END5038Z</b>	Integrated Land Use-Transport Planning (MPhil/PGDip candidates) .....	20
<b>END5045Z</b>	Intermodal Public Transport Planning & Economics (MEng candidates) .....	20
<b>END5047Z</b>	Transport Demand Analysis & Project Assessment .....	20
<b>END5048Z</b>	Transport Modelling (MEng candidates) .....	20

#### Elective Courses (for MPhil candidates only)

Number	Course	Credits
<b>END5036Z</b>	Local Area Transport Planning Management & Design .....	20
<b>END5039Z</b>	Non-motorised Transportation .....	20
<b>END5045Z</b>	Intermodal Public Transport Planning & Economics .....	20
<b>END5046Z</b>	Rural Transport .....	20
<b>END5048Z</b>	Transport Modelling .....	20
<b>END5067Z</b>	Rail Planning & Operations Management .....	20
<b>END5068Z</b>	Bus Planning & Operations Management .....	20

Subject to approval by the Programme Convener, candidates for the MEng in Transport Studies are required to select an appropriate engineering-focused course or courses totalling a minimum of 60 credits as their elective. Candidates may nominate other courses offered at this or any other university for consideration in this

## Master of Philosophy in Urban Infrastructure Design & Management [EM027]

#### Associate Professor and Programme Convener:

R Del Mistro PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP *Cape Town PhD Pretoria*

A central issue for both South Africa and the broader African continent is the delivery of urban services and infrastructure to rapidly growing urban populations, such that they are enabled to live and work in sustainable and integrated environments. This Masters programme, leading to an MPhil in Urban Infrastructure Design and Management, is aimed at building capacity among those in government and the private sector who are committed to the future of African cities and to the servicing of particularly poorer inhabitants. The programme has a strong inter-disciplinary focus, as the Faculty believes that urban problems can only be addressed through an integration of approaches which come from specific disciplinary backgrounds. To this end the programme draws on staff from engineering, architecture, planning, environmental sciences, geography, the social sciences, and management. To obtain the MPhil degree students are required to complete four core module, two electives and the minor dissertation. ([www.urbaninfrastructure.uct.ac.za](http://www.urbaninfrastructure.uct.ac.za))

**Core Courses**

Number	Course	Credits
<b>CIV5064Z</b>	Developing Cities: Issues and Strategies.....	20
<b>CIV5065Z</b>	Urban Renewal .....	20
<b>END5037Z</b>	Minor Dissertation .....	60
<b>END5042Z</b>	Sustainable Urban Systems.....	20
<b>END5043Z</b>	Community Development.....	20

**Elective Courses**

Number	Course	Credits
<b>CIV5067Z</b>	Municipal Infrastructure Management.....	20
<b>CIV5107Z</b>	Integrated Urban Water Management .....	20
<b>CON5016Z</b>	Project Implementation and Management.....	20
<b>END5036Z</b>	Local Area Transport Planning, Management & Design .....	20
<b>END4038Z</b>	Integrated Land-Use & Transport Planning .....	20

**Other Postgraduate Courses**

Other courses offered from time to time include topics in:  
 Contract and Construction Law  
 Hydraulics

**Course descriptions are set out in the section Courses Offered. The course code abbreviation for Civil Engineering is CIV. The code abbreviation for interdisciplinary courses offered through the Faculty is END.**

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# CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following degree programmes:

## **BSc Degree Programmes in**

Construction Studies

Property Studies

## **Postgraduate Degree Programmes in**

Construction Management

Housing Development and Management

Project Management

Property Studies

Quantity Surveying

The Department is housed in Centlivres Building, situated at the southern end of University Avenue opposite the Robert Leslie Building. 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 FCIQB PrCM PrCPM MAACE Pr.Valuer

### **Associate Professors:**

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

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)

PhD(Construction Management) *Bath* MRICS FCIQB PrCPM

### **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* FCIQB FIHSA

F Viruly BA(Hons) *Witwatersrand* MA(Dev.Econ) *Kent*

### **Senior Lecturers:**

S Allen BSc(QS) PhD *Salford*

K Evans, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS

CI Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA*

J Marks, MBA *Cape Town*

MW Massyn, BSc(Building) *UPE* FCIQB

MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pretoria*

A Windapo, BSc(Building) IFE MSc(Construction Management) PhD *Lagos* FNIOB

## 116 PROGRAMMES OF STUDY

### **Adjunct Senior Lecturer:**

DMC Owen, BCom Grad Dip Acc *Cape Town* CA(SA)

### **Lecturer:**

K Le Jeune, BSc(QS) *Cape Town* PrQS PMAQS MRICS

### **Academic Development Lecturer:**

E Hurst, BA(Hons) MA *Nottingham* PhD *Cape Town*

### **Administrative Officers:**

Mrs M Fagodien

Mrs E Koch

### **Administrative Assistant:**

Mrs B Stoffberg

### **Senior Secretary:**

Mrs 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 [EB015]**

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:**

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)

PhD(Construction Management) *Bath* MRICS FCIOB PrCPM

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	Credits
<b>CIV1006S</b>	Building Science I .....	16

<b>CON1004W</b>	Construction Technology I .....	32
<b>CON1010S</b>	Construction Information Systems .....	8
<b>CON1020F</b>	Management & Enterprise .....	18
<b>ECO1010F</b>	Microeconomics .....	18
<b>ECO1011S</b>	Macroeconomics .....	18
<b>MEC1002W</b>	Engineering Drawing .....	16
<b>STA1001F</b>	Statistics 1001 .....	18
	Total credits .....	144
<b>CON1007X</b>	Practical Training	

### Second Year Core Courses

Number	Course	Credits
<b>ACC1006S</b>	Financial Accounting I .....	18
<b>APG2026F</b>	Elementary Surveying .....	16
<b>CML1001F</b>	Business Law I .....	18
<b>CML2005F</b>	Labour Law .....	18
<b>CON1019S</b>	Professional Communication Studies .....	16
<b>CON2006W</b>	Construction Technology II .....	32
<b>CON2020S</b>	Construction Management I .....	16
<b>CON2022W</b>	Measurement & Design Appraisal I.....	16
	Total credits .....	150
<b>CON2013X</b>	Practical Training	

### Third Year Core Courses

Number	Course	Credits
<b>CON3012W</b>	Construction Technology III .....	32
<b>CON3030S</b>	Construction Costing .....	16
<b>CON3031W</b>	Measurement & Design Appraisal II .....	32
<b>CON3032W</b>	Applied Contract Law I .....	12
<b>CON3033F</b>	Property Studies I .....	16
<b>CON3038W</b>	Construction Management II .....	32
<b>CON3043W</b>	Cost Engineering under Uncertainty .....	16
	Total credits .....	156
<b>CON3023X</b>	Practical Training	

## Bachelor of Science In Property Studies [EB017]

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 (SACPPV) and the Royal Institution of Chartered Surveyors (RICS).

## 118 PROGRAMMES OF STUDY

### Associate Professor and Programme Convener:

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)  
PhD(Construction Management) *Bath* MRICS FCIOB PrCPM

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	Credits
CON1011F	Property Studies I A .....	16
CON1012S	Property Studies I B .....	16
CON1015S	Property Information Systems .....	8
CON1017S	Property Investment Mathematics I .....	8
CON1018W	Building Technology I T .....	16
CON1020F	Management & Enterprise .....	18
ECO1010F	Microeconomics .....	18
ECO1011S	Macroeconomics .....	18
STA1000S	Statistics 1000 .....	18
STA1001F	Statistics 1001 .....	18
	Total credits .....	154

### Second Year Core Courses

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

### Elective Core Courses

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

Number	Course	Credits
BUS2010F/S	Marketing I .....	18
BUS3039F/S	People Management .....	18
CML2005F	Labour Law .....	18
ECO2003F	Microeconomics II .....	18
ECO2004S	Macroeconomics II .....	18
STA2020F/S	Business Statistics .....	18

### Third Year Core Courses

Number	Course	Credits
CML2010S	Business Law II .....	18
CON1019F	Professional Communication Studies .....	16
CON3034F	Property Studies III A .....	16
CON3035S	Property Studies III B .....	16
CON3036W	Property and Contract Law .....	16
CON3040W	Cost Engineering I T .....	16
CON3041F	Property Studies III C .....	16
	Total credits .....	114

**Elective Core Courses**

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

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

**Postgraduate Programmes**

Please note that the offering of all postgraduate programmes is subject to a minimum student enrolment.

A subminimum of 40% applies to the examination and coursework components of all Honours level courses with a CON course code.

A subminimum of 50% applies to the examination and coursework components of all Postgraduate Diploma and Masters level courses with a CON course code.

**Bachelor of Science (Honours) in Construction Management [EH007]****Associate Professor and Programme Convener:**

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)

PhD(Construction Management) *Bath* MRICS FCIOB PrCPM

The curriculum of the BSc(Hons) in Construction Management programme equips graduates to: identify, analyse and solve problems in the field of construction assembly and management of the process; perform a number of managerial roles within a constructor organisation, after an appropriate period of practical experience; work effectively in teams; and undertake research and produce reports. The aims of the degree 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).

A candidate shall complete approved courses of a value required to bring the total to a minimum of 160 credits and shall comply with all the prescribed curriculum requirements.

**Core Courses**

Number	Course	Credits
ACC2022S	Management Accounting I .....	18
CON4030F	Property Studies II .....	16
CON4033W	Applied Contract Law II .....	16
CON4038F	Advanced Construction Management .....	16
CON4039S	Integrated Management Project .....	16
CON4047W	Research Report .....	32
CON4049S	Construction Innovation .....	16

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<b>STA1000F</b>	Statistics 1000.....	18
	Total credits.....	148
<b>CON4035X</b>	Practical Training	

### Elective Core Courses

Courses totalling a minimum of 12 credits must be chosen from the following:

Number	Course	Credits
<b>CON3044S</b>	Globalisation & the Built Environment .....	18
<b>CON4032F</b>	Measurement & Design Appraisal III .....	12
<b>CON4034W</b>	Professional Practice.....	20
<b>CON4037S</b>	Civil Engineering Measurement .....	16
<b>CON4045F</b>	Housing Development & Management I T .....	16
	Approved elective.....	16

## Bachelor of Science (Honours) In Quantity Surveying [EH007]

### Associate Professor and Programme Convener:

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)  
PhD(Construction Management) *Bath* MRICS FCIQB PrCPM

The curriculum of the BSc(Hons) in Quantity Surveying programme equips graduates to: undertake financial planning and control of new and existing facilities; undertake property development and property portfolio management; value property; apply appropriate quantity surveying techniques to building and civil engineering projects; perform appropriate professional quantity surveying management functions; work effectively in teams; and undertake research and produce reports. The aims of the degree are to provide employable professional graduates to the Quantity Surveying Profession; 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 Quantity Surveying Profession (SACQSP); and the Royal Institution of Chartered Surveyors (RICS).

A candidate shall complete approved courses of a value required to bring the total to a minimum of 164 credits and shall comply with all the prescribed curriculum requirements.

### Core Courses

Number	Course	Credits
<b>ACC2022S</b>	Management Accounting I.....	18
<b>CON4030F</b>	Property Studies II .....	16
<b>CON4032F</b>	Measurement & Design Appraisal III .....	12
<b>CON4033W</b>	Applied Contract Law II .....	16
<b>CON4034W</b>	Professional Practice .....	20
<b>CON4047W</b>	Research Report .....	32
<b>CON4037S</b>	Civil Engineering Measurement .....	16
<b>STA1000F</b>	Statistics 1000 .....	18
	Total credits .....	148
<b>CON4035X</b>	Practical Training	

### Elective Courses

Courses totalling a minimum of 16 credits must be chosen from the following:

Number	Course	Credits
<b>CON3044S</b>	Globalisation & the Built Environment .....	18
<b>CON4038F</b>	Advanced Construction Management .....	16
<b>CON4039S</b>	Integrated Management Project .....	16

CON4045F	Housing Development & Management I T .....	16
CON4049S	Construction Innovation .....	16
	Approved Elective .....	16

## **Bachelor of Science (Honours) in Property Studies [EH007]**

### **Associate Professor and Programme Convener:**

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)

PhD(Construction Management) *Bath* MRICS FCIQB PrCPM

The curriculum of the BSc(Hons) in Property Studies programme equips graduates to: apply advanced methods of valuation and value special properties; manage property and buildings; plan, control and report costs associated with property management; know and apply legislation and case law relevant to the valuation of fixed property; define a research problem, undertake empirical research, analyse data and report research findings; and apply skills in an elective area of speciality in statistics, management, economics or law.

The aim of the degree is to fully satisfy the criteria for accreditation in terms of the requirements of the South African Council for the Property Valuers Profession (SACPVP) A candidate shall complete approved courses of a value required to bring the total to a minimum of 144 credits and shall comply with all the prescribed curriculum requirements.

### **Core Courses**

Number	Course	Credits
CON4041S	Advanced Property Studies A .....	16
CON4042F	Advanced Property Studies B .....	16
CON4043S	Applied Property Law .....	16
CON4045F	Housing Development & Management I T .....	16
CON4047W	Research Report .....	32
CON4048S	Advanced Property Studies C .....	16
	Total credits .....	112

### **Elective Courses**

Courses totalling a minimum of 32 credits must be chosen from the following:

Number	Course	Credits
ACC1012S	Business Accounting .....	18
ACC2022F/S	Management Accounting I .....	18
BUS2010F	Marketing I .....	18
CML2001F	Company Law .....	18
CML2005F	Labour Law .....	18
CON3030S	Construction Costing .....	16
CON3039S	Construction Management I T .....	16
CON3044S	Globalisation & the Built Environment .....	18
ECO2003F	Microeconomics II .....	18
ECO2004S	Macroeconomics II .....	18
STA2020F/S	Business Statistics .....	18
STA3022F	Research and Survey Statistics .....	18
	Approved elective .....	18

## **Postgraduate Diploma / Master of Science in Property Studies [EG007/EM013]**

The primary aim of the Postgraduate Diploma and MSc in Property Studies programmes is to

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produce graduates with the necessary skills to enter the field of property at a professional managerial level. Students are exposed to the full spectrum of property related disciplines and issues, including: urban land economics; property law; property finance; property development; property valuation; property portfolio management; and facilities management. In addressing each of these areas, a strong emphasis is placed on the development of decision-making skills. The purpose of the research report, only undertaken by candidates for the MSc in Property Studies programme, is to develop advanced research skills.

### Associate Professor and Programme Convener:

D Root, BSc(Hons)(Building Surveying) *Salford* MSc(Construction Management)  
PhD(Construction Management) *Bath* MRICS FCIQB PrCPM

A candidate for the Postgraduate Diploma in Property Studies shall complete approved courses of a value required to bring the total to a minimum of 120 credits and shall comply with the prescribed curriculum requirements. A candidate for the MSc in Property Studies shall complete approved courses of a value required to bring the total to a minimum of 200 credits and shall comply with all the prescribed curriculum requirements.

### Core Courses

Number	Course	Credits
CON5006Z	Property Development .....	20
CON5007Z	Property Law .....	20
CON5008Z	Urban Land Economics .....	20
CON5009Z	Property Finance .....	20
CON5010Z	Minor Dissertation (MSc Candidates only) .....	60
CON5021Z	Property Portfolio Management.....	20
CON5036Z	Introduction to Research.....	4
CON5037Z	Research Methodology .....	6
CON5041Z	Basic Applied Statistics .....	4
CON5042Z	Further Applied Statistics .....	6
CON5043Z	Property Valuation Theory & Practice.....	20
	Sub-total credits .....	200

### Elective Core Courses

To achieve registration with SACPVP (South African Council for Property Valuers Professionals) a student, in addition to the core courses, will have to complete the following core elective.

Number	Course	Credits
CON5044Z	Advanced Property Valuation.....	20

To qualify as a specialist Corporate Real Estate Manager a student, in addition to the core courses, will have to complete the following core elective.

Number	Course	Credits
CON5045Z	Corporate Real Estate Portfolio Management.....	20

## Postgraduate Diploma In Project Management [EG008]

## Master of Science In Project Management [EM014]

The primary aim of the Postgraduate Diploma and MSc in Project Management programme is to produce graduates with the necessary skills to enter the field of project management, the form of management considered most appropriate for the handling of multi-disciplinary projects in a rapidly changing business environment.

**Senior Lecturer and Programme Convener:**CI Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA*

A candidate for the Postgraduate Diploma in Project Management programme shall complete approved courses of a value required to bring the total to a minimum of 120 credits and shall comply with the prescribed curriculum requirements. A candidate for the MSc in Project Management programme shall complete approved courses of a value required to bring the total to a minimum of 200 credits and shall comply with all the prescribed curriculum requirements.

**Core Courses**

Number	Course	Credits
<b>CON5014Z</b>	Project Management & Systems Theory .....	20
<b>CON5016Z</b>	Project Planning & Implementation .....	20
<b>CON5018Z</b>	Human Resource Management and Interpersonal Communication .....	20
<b>CON5022Z</b>	Total Quality Management in a Project Environment .....	20
<b>CON5010Z</b>	Minor Dissertation (MSc candidates only) .....	60
<b>CON5029Z</b>	Project Risk Management.....	20
<b>CON5036Z</b>	Introduction to Research.....	4
<b>CON5037Z</b>	Research Methodology .....	6
<b>CON5041Z</b>	Basic Applied Statistics.....	4
<b>CON5042Z</b>	Further Applied Statistics .....	6
	Sub-total credits .....	160

**Elective Courses**

Students must select any two approved Masters level 20-credit courses, or combination of courses totalling 40 credits, offered by the University.

**Elective Courses**

Number	Course	Credits
<b>CON5030Z</b>	Project Finance & Procurement.....	20
	Approved elective.....	20

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

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## ELECTRICAL ENGINEERING

The Department offers the following Degree programmes:

### **Bachelor of Science in Engineering Degree Programme in**

Electrical Engineering

Electrical and Computer Engineering

Mechatronics

### **Postgraduate specialisations in**

Control Engineering

Image Processing and Vision Systems

Instrumentation

Power Electronics

Power Engineering

Remote Sensing and Radar

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

Website: [www.ee.uct.ac.za](http://www.ee.uct.ac.za)

Email address: [eleceng@uct.ac.za](mailto:eleceng@uct.ac.za)

## Staff

### **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

JC Tapsen, BSc(Physics) BSc(Eng) PhD *Cape Town* MIEEE FSAAE

### **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

### **Emeritus Associate Professor:**

JR Greene, MSc(Eng) *Cape Town* MIEEE

### **Part-time Professors:**

HA Chan, BSc *HKU* PhD *Maryland* SMIEEE

P Pillay, CEng BSEng *UDW* MSc(Eng) *Natal* PhD *Virginia Tech* FIET FIEEE

### **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

AJ Wilkinson, BSc(Eng) *Cape Town* PhD *London*

**Adjunct Professor:**

JH Potgieter, PrEng MSc(Eng) *Cape Town*

**Visiting Professors:**

CJ Baker, BSc(Hons) PhD *Hull*

HD Griffiths, BA *Oxon* PhD DSc *London*

T Magedanz, PhD *Berlin*

**Senior Lecturers:**

P Barendse, MSc(Eng) PhD *Cape Town*

AWD Jongens, MSc(Eng) *Cape Town* MSAAI NAG MSAIEE

MA Khan, MSc(Eng) PhD *Cape Town* MIEEEE MSAEE

A Murgu MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD (Appl Math) *Jyväskylä* MIEEEE

F Nicolls, MSc(Eng) PhD *Cape Town*

**Part-time Senior Lecturer:**

M Malengret, BSc(Eng) *Natal* MSc(Eng) PhD *Cape Town* M(SA)IEE

**Lecturers:**

K Awodele, REng BSc(Eng) *Ife* MSc(Eng) *Abu* PGDM MNSE MIEEEE

OE Falowo, BEng, MEng *Akure* PhD *Cape Town* MIEEEE

I Khan, MSc(Eng) *Cape Town* MIEEEE

SI Ginsberg, MSc(Eng) *Cape Town* MSAIEE

Y Paichard, BSc(Eng) *Rennes* MSc(Eng) PhD(Physics) *Paris*

MS Tsoeu, BEng *Lesotho* MSc(Eng) *Cape Town*

RA Verrinder, MSc(Eng) *Cape Town*

S Winberg, BSc(Hons) *Cape Town* MSc *UTK*

**Academic Development Lecturer:**

R Smit, MSc(ScEd) *Witwatersrand*

**Senior Research Officers:**

S Chowdhury, BEE(Hons) PhD(Engg) *Kolkata* MIET MIEEEE MIE

R Herman, BSc(Eng) *Cape Town* MSc(Eng) PhD(Eng) *Stell*

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

**Honorary Research Associates:**

J Collins, MSc *Oxon*

BT Farrimond, BA *Oxon* MSc(Computer Science) *Manchester*

A Langman, PhD *Cape Town*

N Morrison, MSc(Eng) *Akron* PhD *Case WRU*

K Woodbridge, BSc(Hons) *Sussex* DPhil

**Principal Technical Officers:**

Mr S Schrire

Mr AC Wozniak BSc(Eng) *Cape Town*

**Senior Technical Officers:**

Mr P Daniels

Vacant

**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 A Martin

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 Acoustics, 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) [EB009]**

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	Credits
CAS1001S*	Culture, Identity & Globalization in Africa .....	8
EEE1003W <sup>+</sup>	Computing for Electrical Engineers.....	16
EEE1004W	Engineering I .....	32

<b>MAM1017F</b>	Engineering Mathematics A .....	16
<b>MAM1018S</b>	Engineering Mathematics B.....	16
<b>MAM1045S<sup>9</sup></b>	Modelling for Electrical Engineers .....	16
<b>MEC1003F</b>	Engineering Drawing .....	8
<b>PHY1012F</b>	Engineering Physics A .....	16
<b>PHY1013S</b>	Engineering Physics B.....	16
	Total Credits .....	144
<b>EEE1000X</b>	Practical Training	

\* **CAS1001S** may be replaced with an equivalent complementary studies course with approval of the Head of Department.

+ **CSC1015F** is a more advanced 18 credit course that allows for conditional transfer to the Electrical and Computer Engineering programme. It can be taken as equivalent to EEE1003W.

<sup>9</sup> **CSC1016S** is a more advanced 18 credit course that allows for conditional transfer to the Electrical and Computer Engineering programme. It can be taken as equivalent to MAM1045S.

### Second Year Core Courses (EE)

Number	Course	Credits
<b>EEE2035F</b>	Signals & Systems I.....	12
<b>EEE2036S</b>	Probability & Statistical Design in Engineering .....	12
<b>EEE2038W</b>	Fundamentals of Electrical Engineering .....	24
<b>EEE2039W</b>	Fundamentals of Electronic Engineering .....	36
<b>MAM2083F</b>	Vector Calculus for Engineers A .....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B .....	16
<b>MEC2043F</b>	Electrical & Mechanical Materials .....	12
<b>PHY2010S</b>	Electromagnetism for Engineers .....	16
	Total credits .....	144

### Third Year Core Courses (EE)

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

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

### Third Year Optional Courses (EE)

Number	Course	Credits
<b>EEE3064W</b>	Digital Electronics & Microprocessors .....	16
<b>EEE3085S</b>	Communication System & Network Design II .....	12

### Fourth Year Core Courses (EE)

Number	Course	Credits
<b>EEE4006F</b>	Professional Communication Studies .....	8
<b>EEE4022S/F</b>	Thesis Project .....	40
<b>EEE4036C/A</b>	Electrical Engineering Design .....	8
<b>EEE4051F</b>	New Venture Planning .....	8

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<b>MEC4054Z</b>	Quality, Reliability & Maintenance Management .....	12
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### Fourth Year Elective Core Courses (EE)

Choose three courses (60 credits) from the following:

Number	Course	Credits
<b>EEE4001F</b>	Digital Signal Processing.....	20
<b>EEE4084F</b>	Digital Systems .....	20
<b>EEE4087F</b>	Mobile Broadband Networks.....	20
<b>EEE4088F</b>	Wireless Communication Systems Design.....	20
<b>EEE4089F</b>	Power Distribution & Transmission Networks .....	20
<b>EEE4090F</b>	Power Systems Analysis Operation and Control .....	20
<b>EEE4093F</b>	Process Control & Instrumentation .....	20
<b>EEE4099F</b>	Electrical Machines & Power Electronics.....	20
<b>EEE4101F</b>	Nuclear Power Engineering .....	20
	Total Credits .....	136

### 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	Credits
<b>EEE4080C</b>	Electrical Machines & Drives .....	8
<b>EEE4096S</b>	Neural Fuzzy & Evolving Systems .....	8
<b>EEE4098F</b>	Acoustics: Noise Control Engineering .....	12
<b>EEE4100X</b>	Practical Training.....	0
<b>HUB4045F</b>	Introduction to Medical Imaging & Image Processing .....	12

## Programme for Technikon/University of Technology Transferees to Bachelor of Science In Engineering In Electrical Engineering (EE) [EB009]

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 288 credits and are required to complete specific courses amounting to a value not less than 288 credits in 2 years. Technology graduates who do not satisfy the required entry criteria for the 2-year programme may follow a 3 year programme prescribed by the Department.

## Conversion Programme for Bachelor of Science graduates to Bachelor of Science In Engineering In Electrical Engineering (EE) [EB009]

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) [EB022]

### Professor and Programme Convener:

JC Tapson, BSc(Physics) BSc(Eng) PhD *Cape Town* MIEEE FSAAE

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	Credits
<b>CAS1001S*</b>	Culture, Identity & Globalization in Africa .....	8
<b>CSC1015F</b>	Computer Science IA .....	18
<b>CSC1016S</b>	Computer Science IB .....	18
<b>EEE1004W</b>	Engineering I .....	32
<b>MAM1017F</b>	Engineering Mathematics A .....	16
<b>MAM1018S</b>	Engineering Mathematics B .....	16
<b>MEC1003F</b>	Engineering Drawing .....	8
<b>PHY1012F</b>	Engineering Physics A .....	16
<b>PHY1013S</b>	Engineering Physics B .....	16
	Total credits .....	148
<b>EEE1000X</b>	Practical Training	

\* **CAS1001S** may be replaced with an equivalent complementary studies course with approval of the Head of Department.

#### Second Year Core Courses (EC)

Number	Course	Credits
<b>CSC2001F</b>	Computer Science 2A .....	24
<b>CSC2002S</b>	Computer Science 2B .....	24
<b>EEE2026S*</b>	Electrical Engineering Part 2 .....	20
<b>EEE2035F</b>	Signals and Systems I .....	12
<b>EEE2036S</b>	Probability and Statistical Design in Engineering .....	12
<b>EEE2040F*</b>	Basics of Electronic Engineering .....	24
<b>MAM2083F</b>	Vector Calculus for Engineers A .....	16
<b>MAM2084S</b>	Vector Calculus for Engineers B .....	16
	Total credits .....	148

\* Instead of **EEE2040F** and **EEE2026S**, students may take **EEE2038W** and **EEE2039W**.

## 130 PROGRAMMES OF STUDY

### Third Year Core Courses (EC)

Number	Course	Credits
CSC3021Z	Operating Systems I.....	18
EEE3044S*	Energy Conversion & Utilization.....	8
EEE3064W	Digital Electronics & Microprocessors .....	16
EEE3073S	Professional Communication Studies.....	12
EEE3074W	Embedded Systems.....	20
EEE3081F	Control Engineering A.....	10
EEE3084W	Communication System & Network Design.....	24
EEE3086F	Signals & Systems II .....	12
MEC2026S	Project Management .....	8
	Total credits.....	128
EEE3000X	Practical Training	

\* EEE3044S Students who have passed EEE2038W may be exempted (no credits), and may take EEE3057S as an option.

### Third Year Elective Core Courses (EC)

Select at least one of the following. (Note: These are pre-requisites for Fourth Year Elective Core Courses. Other courses are required to make up the normal load, 144 credits.)

Number	Course	Credits
EEE3063F	Transmission Lines.....	10
EEE3082S	Control Engineering .....	10

### Fourth Year Core Courses (EC)

Number	Course	Credits
EEE4006F	Professional Communication Studies.....	8
EEE4022S/F	Thesis Project .....	40
EEE4036A/C	Electrical Engineering Design .....	8
EEE4051F	New Venture Planning .....	8
EEE4084F	Digital Systems .....	20
MEC4054Z	Quality, Reliability & Maintenance Management.....	12
	Total credits.....	96

### Fourth Year Elective Core Courses (EC)

Choose two courses from the following:

Number	Course	Credits
EEE4001F	Digital Signal Processing.....	20
EEE4087F	Mobile Broadband Networks.....	20
EEE4088F	Wireless Communication Systems Design.....	20
EEE4093F	Process Control & Instrumentation .....	20
	Total credits.....	132

### Fourth Year Optional Courses (EC)

Number	Course	Credits
EEE4098F	Acoustics: Noise Control Engineering.....	12
EEE4100X	Practical Training.....	0
HUB4045F	Introduction to Medical Imaging & Image Processing .....	12

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

## Bachelor of Science In Engineering In Mechatronics (ME) [EB011]

**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	Credits
<b>CAS1001S*</b>	Culture, Identity & Globalization in Africa .....	8
<b>EEE1003W<sup>+</sup></b>	Computing for Electrical Engineers.....	16
<b>EEE1004W</b>	Engineering I .....	32
<b>MAM1017F</b>	Engineering Mathematics A .....	16
<b>MAM1018S</b>	Engineering Mathematics B.....	16
<b>MAM1042S</b>	Engineering Statics .....	16
<b>MEC1003F</b>	Engineering Drawing .....	8
<b>PHY1012F</b>	Engineering Physics A .....	16
<b>PHY1013S</b>	Engineering Physics B.....	16
	Total credits.....	144
<b>EEE1000X</b>	Practical Training	

\* **CAS1001S** may be replaced with an equivalent complementary studies course with approval of the Head of Department.

<sup>+</sup> **CSC1015F** is a more advanced 18 credit course that allows for conditional transfer to the Electrical and Computer Engineering programme. It can be taken as equivalent to EEE1003W.

**Second Year Core Courses (ME)**

Number	Course	Credits
<b>EEE2035F</b>	Signals & Systems I.....	12

## 132 PROGRAMMES OF STUDY

EEE2036S	Probability & Statistical Design in Engineering .....	12
EEE2038W	Fundamentals of Electrical Engineering .....	24
EEE2039W	Fundamentals of Electronic Engineering .....	36
MAM2083F	Vector Calculus for Engineers A .....	16
MAM2084S	Vector Calculus for Engineers B.....	16
MEC2022S	Thermofluids I .....	16
MEC2043F	Electrical & Mechanical Materials .....	12
	Total credits .....	144

### Third Year Core Courses (ME)

Number	Course	Credits
EEE3017W	Digital Electronics .....	16
EEE3031S	Energy Utilisation .....	10
EEE3061W	Mechatronics Design I .....	12
EEE3068F	Electronic Circuits .....	12
EEE3069W	Control Engineering .....	20
EEE3073S	Professional Communication Studies.....	12
MEC2023F	Dynamics I .....	16
MEC2025F	Mechanics of Solids .....	12
MEC2026S	Project Management .....	8
MEC3031S	Dynamics II .....	16
MEC3035S	Computer Integrated Manufacture & Robotics .....	8
	Total credits .....	140
EEE3000X	Practical Training	

### Third Year Optional Course (ME)

Number	Course	Credits
EEE3083F	Communication System & Network Design I.....	12
EEE3086F	Signals and Systems II.....	12

### Fourth Year Core Courses (ME)

Number	Course	Credits
EEE4006F	Professional Communication Studies.....	8
EEE4022S/F	Thesis Project .....	40
EEE4036C/A	Electrical Engineering Design .....	8
EEE4051F	New Venture Planning .....	8
EEE4093F	Process Control & Instrumentation .....	20
EEE4099F	Electrical Machines & Power Electronics.....	20
MEC4054Z	Quality, Reliability & Maintenance Management .....	12
	Total credits .....	116

### Fourth Year Optional Courses (ME)

Number	Course	Credits
EEE4001F	Digital Signal Processing.....	20
EEE4098F	Acoustics: Noise Control Engineering .....	12
HUB2005F	Introduction to Medical Imaging and Image Processing .....	12
MEC3023F	Mechanics of Solids .....	12
MEC3068C	Functional Materials.....	8
EEE4100X	Practical Training	

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

## **Master of Science In Engineering In Electrical Engineering [EM023/EM024] Doctor of Philosophy [ED001]**

The Department prepares candidates for the Master of Science in Engineering in Electrical Engineering and for the Doctor of Philosophy. The Doctor of Philosophy is a research degree. The Master of Science can be either by dissertation only [EM023] or by coursework and dissertation [EM024]. The Department offers a number of special postgraduate courses each year some of which are scheduled to facilitate attendance by practising engineers from industry. The majority of courses are full-time and cover a variety of topics.

Control Engineering	Professor M Braae	M.Braae@uct.ac.za
Electronics	A/Professor A Wilkinson	Andrew.Wilkinson@uct.ac.za
Image Processing and Vision Systems	Dr F C Nicolls	Fred.Nicolls@uct.ac.za
Instrumentation	Professor J Tapson	Jonathan.Tapson@uct.ac.za
Power Electronics	Dr M A Khan	Azeem.Khan@uct.ac.za
Power Engineering	Professor CT Gaunt	CT.Gaunt@uct.ac.za
Radar and Remote Sensing Large systems	Professor MR Inggs	Michael.Inggs@uct.ac.za
Telecommunications Systems	A/Professor M Dlodlo	Mqhele.Dlodlo@uct.ac.za
Telecommunications Networks	Dr O Falowo	Olabisi.Falowo@uct.ac.za

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

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## MECHANICAL ENGINEERING

The Department offers the following Degree Programmes:

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

**Postgraduate Programme**

Research projects and courses are offered through which suitably qualified graduates may qualify for the degrees of BSc Honours in Materials Science, MSc(Eng), MPhil(Eng), MEng and PhD. These areas of specialisation include:

Computational Mechanics  
Electro-Mechanical Engineering  
Energy and Development Studies Engineering Management  
Materials Engineering  
Mechanical Engineering  
Sustainable Energy Engineering

**Research Entities:**

Blast Impact and Survivability Research Unit (BISRU)  
Centre for Materials Engineering  
Centre for Research in Computational and Applied Mechanics (CERECAM)  
Energy Research Centre (ERC)  
Engineering Management  
Sasol Advanced Fuels Laboratory

The Department of Mechanical Engineering is situated in the Electrical & Mechanical Engineering, McMillan and Menzies Buildings 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:**

RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* M(SA)IMEchE

**Professor and Deputy Head of Department:**

KF Bennett, PrEng BSc(Eng) *Cape Town* MSc CNA A PhD *Cape Town* F(SA)IMEchE

**Professors:**

RD Knutsen, BSc PhD *Cape Town* MSAIMM M(SA)IMEchE  
CI Lang, BSc PhD *Cape Town*  
GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* F(SA) IMechE MASME FSAAE  
C Redelinghuys, BEng(Hons) *Stell* MS *Stanford* PhD *Stell*

**Emeritus Professor:**

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

**Adjunct Professor:**

A DB Yates, BSc(Eng) MSc(Eng) PhD *Cape Town* *Cape Town* M(SA)IMEchE

**Honorary Professor:**

D Karagiozova, PhD *Ukrainian Academy of Science*

**Associate Professors:**

BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* M(SA)IMechE SAARMSTE ASEE

FJ Kahlen, Dipl-Ing *RWTH, Aachen* MSc *Tennessee* PhD *Central Florida* SMAIAA

GS Langdon, BEng PhD *Liverpool* AMIMechE

K Ramesh, BEng(Hons) MTech PhD *Singapore* SMSME

AT Sayers, PrEng Eurlng BSc(Mech Eng) *City Univ Lond* MSc *Birmingham* PhD *Cape Town*

MIMechE CEng M(SA)IMechE

CJ von Klemperer, BSc(Eng) MSc(Eng) PhD *Natal*

**Senior Lecturers:**

TJ Cloete, MIng *Stell*

D Findeis, MSc(Eng) *Cape Town* M(SA)IMechE

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:**

EB Ismail, BSc(Eng) *Cape Town*

R Wood, Dip. Ed. *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 J Coulter BSc(Eng) *Cape Town*

Mr J D'Arcy-Evans, PrEng BSc(Eng) *London* MIMechE, SAIRAC

Mr H Nieuwmeyer, PrEng BSc(Eng) *Cape Town*

Mr M Shelley

**Principal Technical Officers:**

Mr J Mayer Higher Nat. Tech. Dipl. MechEng

Mr G Newins

**Chief Technical Officers:**

Mr H Emrich

Mr CJ Nicholas

Mr G McPhillips, BSc MSc(Eng) *Cape Town*

Mr H Tomlinson

**Laboratory Attendants:**

Mr G Dooling

Mr D Jacobs

Mr P Jacobs

Mr S Johannes

Mr W Slaverse

**Administrative Assistants:**

Mrs CA Bloomer BA HDE *Cape Town*  
Ms T Dlakiya, BAdmin *UWC*

**Senior Secretary:**

Mrs S Batho

**Undergraduate Programmes****Bachelor of Science in Engineering in Electro-Mechanical Engineering [EB010]****Bachelor of Science in Engineering in Mechanical Engineering [EB005]**

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	Credits
CEM1008F	Chemistry for Engineers .....	16
MAM1017F	Engineering Mathematics A .....	16
MAM1018S	Engineering Mathematics B.....	16
MAM1042S	Engineering Statics .....	16
MEC1002W	Engineering Drawing .....	16
MEC1004W	Engineering I .....	32
PHY1012F	Engineering Physics A.....	16
PHY1013S	Engineering Physics B.....	16
	Total credits .....	144
MEC1000X	Practical Training	

**Common Second Year Core Courses**

Number	Course	Credits
EEE2030F	Electrical Engineering I .....	12
EEE2031S	Electrical Engineering II .....	12
MAM2083F	Vector Calculus for Engineers A .....	16
MAM2084S	Vector Calculus for Engineers B.....	16
MEC2020W	Design I .....	32
MEC2022S	Thermofluids I .....	16
MEC2023S	Dynamics I .....	16
MEC2025F	Mechanics of Solids .....	12
MEC2042F	Materials Science in Engineering .....	12
	Total credits .....	144
MEC2000X	Practical Training	

**Bachelor of Science in Engineering in Electro-Mechanical Engineering [EB010]**

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.

**Associate Professor and Programme Convener:**

BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* M(SA)IMEchE SAARMSTE ASEE

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

**Fourth Year Core Engineering Courses**

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

**Fourth Year Core Complementary Studies Course**

Number	Course	Credits
MEC4063C	Industrial Ecology.....	8

**Fourth Year Elective Complementary Studies Courses**

Number	Course	Credits
MEC4022Z	Industrial Law .....	8
MEC4042Z	Industrial Management .....	8
MEC4051F	New Venture Planning .....	8
MEC4054Z	Quality Reliability & Maintenance Management.....	12

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

## 138 PROGRAMMES OF STUDY

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 [EB005]

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

### Elective Core Courses:

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

Number	Course	Credits
MAM3080F	Numerical Methods .....	12
MEC3060F	Materials Under Stress .....	8
MEC3069S	Production Processes .....	8

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

Number	Course	Credits
MEC4055Z	Design III .....	16
MEC4061F/Z	Individual Lab/Research Project .....	48
MEC4063C	Industrial Ecology.....	8
	Total credits .....	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 perspective 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	Credits
EEE4013F	Control Systems .....	8
EEE4098F	Noise Control Engineering .....	12
EEE4103F	Nuclear Power Sources.....	12
MEC4035F	Fracture Mechanics .....	8
MEC4036C	Power Plant .....	8
MEC4045F	Numerical Methods in Heat and Fluid Flow .....	12
MEC4047F	Mechanical Vibrations .....	12
MEC4048F	Advanced Heat Transfer .....	12
MEC4049F	Turbomachines .....	8
MEC4062Z	Air Conditioning & Refrigeration .....	12
MEC4065F	Finite Elements in Mechanical Design.....	16
MEC4087Z	Failure Analysis .....	8
MEC4088Z	Manufacturing with Materials .....	12
MEC4092F	Internal Combustion Engines .....	12
MEC4094F	Applied Operations Engineering.....	20
MEC4095Z	Lean Operations.....	8
MEC4101C	Advanced Manufacturing & Nano Technology .....	8
MEC4102C	Hydraulics & Pneumatics .....	8

#### Elective Complementary Studies Courses:

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

## Postgraduate Programme

The Department prepares candidates for the degrees listed below. The Doctor of Philosophy is a research degree. The Master of Science can be either by dissertation only or by coursework and dissertation in any of its research areas. The Master of Philosophy is by coursework and dissertation.

- Postgraduate Diploma in Engineering Management [EG003]
- Bachelor of Science (Honours) in Materials Science [EH007]
- Master of Science in Engineering by dissertation [EM023]
- Master of Science in Engineering by coursework and dissertation [EM024]
- Master of Philosophy by coursework and dissertation [EM026]
- Doctor of Philosophy [ED001]

## Master of Philosophy In Computational Mechanics [EM026]

The Department offers the following courses in Computational Mechanics. This area of study is truly interdisciplinary and is available to all postgraduate students in the Faculty.

### Professor and Convener:

BD Reddy, OMB, BSc(Eng) Cape Town PhD *Cantab* FRSSAf SARChI

Number	Course	Credits
MEC5063Z	An Introduction to Finite Elements .....	12
MEC5064Z	Finite Element Analysis .....	12
MEC5065Z	Programming for Scientists & Engineers.....	12
MEC5066Z	Continuum Mechanics .....	12
MEC5067Z	Non-linear Material Behaviour .....	12
MEC5068Z	Topics in Computational & Applied Mechanics .....	12
MEC5069Z	Computational Fluid Dynamics: A First Course .....	12

## Postgraduate Diploma In Engineering Management [EG003]

The Department offers structured coursework in Engineering Management leading to the award of a Postgraduate Diploma.

**Convener:** CB Shaw, BSc, MPhil(EngMan) *Cape Town*

Candidates whose programmes include coursework are required to complete courses from the list of elective-core courses listed below, to be selected in consultation with the Programme Convener.

Number	Course	Credits
MEC5035Z	Project Management .....	20
MEC5036Z	Managing for Performance Improvement .....	20
MEC5037Z	Operations Management Project .....	20
MEC5038Z	Engineering Management Technical Report .....	40
MEC5046Z	Systems Engineering Practice .....	40
MEC5054Z	Introduction to Business Administration .....	40
MEC5080Z	Managing New Venture Projects .....	20

## Bachelor of Science (Honours) In Materials Science [EH007]

The Department offers a BSc(Hons) in Materials Science to **graduates with a three-year Bachelor of Science degree**. The aim is to provide one year of intensive training in Materials Science and Technology. The broad-based instructional approach prepares graduates for careers in a wide range of industrial settings, from small manufacturing companies to large corporations producing bulk commodity products, and R&D laboratories. In addition the BSc(Hons) in Materials Science programme prepares students for registration for research degrees in Materials Engineering at the Masters and ultimately Doctoral levels.

The programme runs over one year, with students taking a structured programme of **144 credits** of coursework, including a project, as follows.

**Professor and Programme Convener:**

CI Lang, BSc PhD Cape Town

**Core Courses**

Number	Course	Credits
<b>MEC4091S</b>	Research Report.....	48
<b>MEC4096Z</b>	Manufacture & Properties of Composites.....	12
<b>MEC4097F</b>	Manufacture & Properties of Ceramics.....	8
<b>MEC4098Z</b>	Properties & Manufacture of Metallic Materials.....	16
<b>MEC4100F</b>	Manufacture & Properties of Polymers.....	12

**Elective Core Courses**

Select 48 credits from the following courses:

Number	Course	Credits
<b>END5044F</b>	Professional Communication Studies .....	16
<b>MEC3060F</b>	Materials under Stress.....	8
<b>MEC3068C</b>	Functional Materials.....	8
<b>MEC4085F</b>	Fracture Mechanics.....	8
<b>MEC4087Z</b>	Failure Analysis.....	8
<b>MEC4088Z</b>	Manufacturing with Materials.....	12
<b>MEC4099Z</b>	Phase Transformations in Materials.....	8

**Master of Science in Engineering In Sustainable Energy Engineering [EM024]**

The Energy Research Centre offers a structured Masters Programme in Sustainable Energy Engineering. Students are required to complete 80 credits of course work, the courses being chosen from the list below. To qualify for the degree in MSc(Eng), candidates are required to complete a supervised dissertation, equivalent to a further 120 credits, the topic of which requires the approval of the Director of the ERC.

**Professor and Convener:**

KF Bennett, PrEng BSc(Eng) *Cape Town* MSc CNAA PhD *Cape Town* F(SA)IMechE

**Compulsory Course**

Number	Course	Credits
<b>MEC5061Z</b>	Masters Dissertation: Sustainable Energy.....	120
<b>MEC5091Z</b>	Introduction to Energy Policy & Sustainable Energy Engineering .....	20

**Elective Courses** (60 credits must be selected from the following list)

Number	Course	Credits
<b>MEC5049S</b>	Advanced Refrigeration .....	12
<b>MEC5056Z</b>	Energy Efficient & Demand Side Management .....	20
<b>MEC5059Z</b>	Energy Modelling .....	20
<b>MEC5062Z</b>	Power Production Systems .....	20
<b>MEC5075Z</b>	New & Renewable Energy Technologies .....	20
<b>MEC5089Z</b>	Energy Project .....	20
<b>MEC5094Z</b>	Cleaner Fuels & Cleaner Engines.....	16

## Master of Science In Engineering In Energy & Development Studies [EM024]

The Energy Research Centre offers a structured Masters Programme in Energy and Development Studies. Students are required to complete 80 credits of course work, the courses being chosen from the list below. To qualify for the degree in MSc(Eng), candidates are required to complete a supervised dissertation, equivalent to a further 120 credits, the topic of which requires the approval of the Director of the ERC.

### Professor and Convener:

KF Bennett, PrEng BSc(Eng) *Cape Town* MSc CNA A PhD *Cape Town* F(SA)IMechE

### Compulsory Course

Number	Course	Credits
<b>MEC5091Z</b>	Introduction to Energy Policy & Sustainable Energy Engineering .....	20
<b>MEC5092Z</b>	Masters Dissertation: Energy & Development Studies .....	120

### Elective Courses (60 credits must be selected from the following list)

Number	Course	Credits
<b>END5097Z</b>	Dissertation Preparation	
<b>MEC5059Z</b>	Energy Modelling .....	20
<b>MEC5075Z</b>	New & Renewable Energy Technologies .....	20
<b>MEC5087Z</b>	Energy Markets & Governance.....	20
<b>MEC5088Z</b>	Energy Poverty & Development .....	20
<b>MEC5089Z</b>	Energy Project .....	20
<b>MEC5090Z</b>	Energy & Climate Change .....	20

Postgraduate students not registered for either of the above programmes may register for the above courses with the permission of the Director of the Energy Research Centre.

## Research Entities

### Blast Impact & Survivability Research Unit (BISRU)

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

### Centre for Materials Engineering

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

### Centre for Research In Computational & Applied Mechanics (CERECAM)

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

### Engineering Management

This unit engages in multidisciplinary research which includes the fields of Management education, Operations and Project management, Strategic management, Organisational practice, Systemic organisational design and development, Quality and productivity management, Management of knowledge and technology, Decision support and policy formulation.

Research is focussed with a view to broadening and deepening the thinking and understanding of issues such as the emerging global and digital economy which coupled to the democratisation of society and our institutions affect the nature of work. The aim is to develop innovative and appropriate approaches, which will be more relevant to the context in which we find individuals in society. Research is conducted in the following areas: Systemic organisational design and development; Operations and project management; Quality and productivity management; Management of knowledge and technology; Strategic management; and Decision support and policy formulation.

**Associated Academic Staff:**

CB Shaw, MPhil *Cape Town*

**Energy Research Centre (ERC)**

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

**Sasol Advanced Fuels Laboratory**

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

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

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## ACADEMIC DEVELOPMENT IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

**ASPECT Co-ordinator:**

HT Pearce, BSc(Eng) *Cape Town* PhD *Illinois*

**Lecturers:**

TS Craig PhD *Cape Town*

P le Roux, BSc(Eng) PGDipEd(HES) *Cape Town*

K Nathoo, BSc(Eng) MEngMan *Cape Town*

**Academic Development Lecturer:**

D Mogashana BSc(Eng) MPhil *Cape Town*

**Part Time Lecturer:**

E Vicatos, BA(Hons) *Natal*

**Administrative Staff:**

Mrs L Nkomo

### The ASPECT Programme [EB008]

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 provides 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 three full 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 is taught 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, one major second year course, namely the Mathematics course for engineers, 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	Credits
<b>END1008Z</b>	Introduction to Communication .....	8

**Elective Courses**

Number	Course	Credits
<b>END0007F</b>	Foundation of Engineering Mathematics .....	16
<i>and</i>		
<b>END1017S</b>	Mathematics 1017.....	16
<i>or</i>		
<b>END1017F</b>	Mathematics 1017.....	16
<i>and</i>		
<b>END1018S</b>	Mathematics 1018.....	16
<b>PHY0011F</b>	Engineering Physics Foundations .....	16
<i>and</i>		
<b>PHY1012S</b>	Engineering Physics A.....	16
<i>or</i>		
<b>PHY1012F</b>	Engineering Physics A.....	16
<i>and</i>		
<b>PHY1013S</b>	Engineering Physics B.....	16
<i>or</i>		
<b>CEM1000W</b>	Chemistry 1000 .....	36
<b>CHE1004W</b>	Engineering I (Chemical).....	32
<i>or</i>		
<b>CIV1004W</b>	Engineering I (Civil) .....	32
<i>or</i>		
<b>EEE1004W</b>	Engineering I (Electrical) .....	32
<i>or</i>		
<b>MEC1004W</b>	Engineering I (Mechanical) .....	32

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

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

## CENTRES AND OTHER ENTITIES ESTABLISHED IN THE FACULTY

### Centres and Units Accredited by the University Research Committee

#### African Centre for Cities

The African Centre for Cities (ACC) was established in 2007 to serve as a platform for interdisciplinary research on urban issues - both theoretical and applied - across the University of Cape Town. The primary focus is on applied research to address complex, intractable urban problems and challenges. This is undertaken in a manner that advances novel ways of thinking about and understanding urbanism across the global South, yet is rooted in the realities of African urban spaces. Applied research is primarily done in the CityLab initiative, in which multi-year research on the advancement of sustainable human settlement is conducted. The current research focus is on flooding and the determinants of healthy cities. The inner city district of Cape Town and Phillipi are the focus of site-specific research from multi-disciplinary perspectives. The CityLab incorporates the Cape Urban Observatory, which support empirically grounded policy- and decision-making by providing robust spatially and temporally referenced data at multiple scales. The Observatory provides a platform for identifying, accessing, sharing, analysing, and disseminating data from public sources on a range of themes, spanning the social and natural sciences. The ACC drives a national research programme on the space economy of South Africa aimed at developing an empirical base to inform public policy decision-making on targeting infrastructure expenditure and poverty reduction programmes. The ACC supports a Master programme in Urban Infrastructure and Design, which seeks to equip a new generation of built environment professionals with the knowledge to conduct sustainable urban development in a fast changing world. Finally, the ACC convenes public forums for engagement on critical urban related public policy issues.

#### Professor and Director:

E Pieterse BA(Hons) *UWC* MA Development Studies *ISS* PhD *LSE* SARChI

#### Associated Academic Staff:

Associate Professor NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE Mem IAHR Mem IAHS Mem IWA

Professor O Crankshaw, BSc(Hons) BA (Hons) MA PhD *Witwatersrand*

Associate Professor R Del Mistro PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP *Cape Town* PhD *Pretoria*

K Evans, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS

R Hamann, *MSc Cape Town* PhD *East Anglia*

I Low, BArch *Cape Town* MArch(Urban Design)*Penn* PrArch MIA Arch CIA

S Oldfield, BA(Hons) *Syracuse* MA(Geography) PhD *Minnesota*

Professor S Parnell, BA(Hons) HDE MA PhD *Witwatersrand*

E Salo, MA(International Development) *Clark* PhD *Emory*

JL Smit, BSc(Surv) PhD *Cape Town*

Associate Professor HB von Blotnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTH Aachen* MSAICHe MESSA

Professor V Watson, BA(Hons) *Natal* MCRP *Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

#### Administrative Officer:

Ms M Armstrong

## Centre for Bioprocess Engineering Research (CeBER)

CeBER was formally constituted as a Unit in 2001 cementing a long history of research in this field at UCT. In 2008, it was upgraded to a Centre. It aims to underpin the growth and exploitation of the biotechnology sector in South Africa through a national centre of expertise in bioprocess engineering. As such, the Centre has the following objectives:

- the education of engineers and scientists at the postgraduate level with key expertise to excel in careers in the bioprocess arena, both in research and in the industry,
- the provision of research expertise in key aspects of bioprocess engineering relevant to South Africa through contract research,
- the contribution to fundamental insights in bioprocess engineering and related processes, and
- the transfer and application of knowledge across disciplines in which bioprocesses play a role.

The CeBER maintains a productive balance between research centred on the application of biological principles through process development, on the fundamental understanding of biological processes at the mechanistic level and on the interaction of these processes with their environment. Our key foci include biohydrometallurgy for the extraction of metals in tank and heap bioleaching processes, AMD prevention and remediation of metal rich effluents, algal biotechnology for bioenergy products, commodities and fine chemicals, biotransformation and biocatalysis for value addition, product liberation and recovery, bioprocess integration and optimisation through modelling, design and development of bioprocesses for environmental sustainability. In addressing these research areas, the Centre brings together key skills in chemical engineering science, mathematical modelling, hydrometallurgy, environmental engineering, biochemistry, micro- and molecular biology. CeBER hosts the SDT/NRF SARChI Research Chair in Bioprocess Engineering.

### Professor and Director:

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHE SASM FSAAE ASSAf SARChI

### Associated Academic and Research Staff:

Emeritus Professor GS Hansford, BSc(Eng)Chem MSc *Cape Town* MSE PhD *Pennsylvania* CEng MICHE FSAICHE FSAIMM

SH Minnaar, BSc(Hons) PhD MBA *Free State*

J Petersen, BSc(Eng)Chem *Witwatersrand* PhD *Cape Town* MSAIMM

R Rawatlal, BSc(Hons) PhD *KwaZulu-Natal* MSAICHE

RP van Hille, BSc(Hons), PhD *Rhodes* SASM

### Technical Staff:

E Ngoma, BTEch Biotechnology *Tshwane University of Technology*

FH Pocock, Dip. Med. Technology (Clinical Pathology) *Durban Institute of Technology*

N van Wyk, BSc(Hons) MSc *Stell*

### Postdoctoral Researchers:

C Bryan, BSc(Hons) *Nottingham* PhD *Bangor*

C Garcin, BSc(Eng) PhD *Cape Town*

OO Oyekola, BSc(Hons) *Ibadan* MSc *Rhodes* PhD *Cape Town*

J Stenson, BSc *Warwick* MSc PhD *Birmingham*

O Tupikina, BSc *Lomonsov Moscow* PhD *Russian Academy of Sciences*

C Vengadajellum, BSc(Hons) *Rhodes* PhD *Cape Town*

### Administrative Staff:

B Bailey

SH Jobson, BA *Rhodes* HDE *Cape Town*

### Centre for Catalysis Research

Industrial catalysis research was initiated in the Department of Chemical Engineering in 1980 and was formally recognised as a Research Unit (1990) and subsequently as a Research Centre (2005) by the University. Funding comes from a variety of sources including the University, the National Research Foundation (NRF), Technology & Human Resources for Industry Programme (THRIP), and several industrial sponsors. Industrial contract research from both domestic and international companies contributes substantially to the Centre's financial base.

The Centre concerns itself with both fundamental and industrial research and development in the general field of heterogeneous catalysis, encompassing all of catalyst synthesis, physico-chemical characterisation and performance testing for industrially interesting chemical conversions. Although engaged in topics of international interest, the Centre has a strong commitment to addressing issues of direct importance to the South African Chemical Process Industry.

The main fields of investigation within the Centre cover Fischer-Tropsch synthesis, zeolites and molecular sieves, catalysis by gold, hydrocracking and phenolics conversion. The Centre offers a MSc(Eng) degree involving coursework, and research degrees at PhD level.

#### Professor and Director:

JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE

#### Associated Academic Staff:

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

Honorary Professor ME Dry, MSc *Rhodes*, PhD *Bristol*

Professor E van Steen, MSc(Eng) *Eindhoven*, PhD *Karlsruhe*

Professor M Claeys, Dipl.Ing (Chem Eng), DIng *Karlsruhe*

W Böhringer, Dipl.Chem *Karlsruhe*

S Roberts, BSc(Eng)Chem MSc(Eng)Chem *Cape Town*

### Centre for Research in Computational & Applied Mechanics (CERECAM)

The Centre for Research in Computational and Applied Mechanics (CERECAM) is a multi-departmental and multi-disciplinary research grouping which is housed in the Department of Mechanical Engineering and concerns itself with basic and applied research and postgraduate education in computational and applied mechanics. Its members are drawn from chemical, civil, and mechanical engineering, and applied mathematics. Research in the area of solid and structural mechanics focuses on modelling and simulation of inelastic material behaviour and of various structural systems, fracture mechanics and fatigue, while work in computational fluid and particulate dynamics includes activities in industrial aerodynamics, simulations of flotation and precipitation processes, milling and comminution processes, and various aspects of non-Newtonian flows. Work in biomechanics straddles the two broad areas of solid and fluid mechanics.

#### Professor and Director:

BD Reddy, OMB, BSc(Eng) Cape Town PhD *Cantab* FRSSAf SARChI

#### Members:

T Chinyoka, MSc*Zimbabwe* PhD *Virginia Tech*

Associate Professor DA Deglon BSc (Eng) *Witwatersrand* MBA PhD *Cape Town* MSAIMM

F Ebobisse Bille, PhD *Pisa*

I Govender, BSc *UDWHDE UNISA* BSc(Hons) PhD *Cape Town*

S Skatulla, Dipl Ing *Karlsruhe* PhD*Adelaide*

#### Associated Academic Staff:

Professor AE Lewis, PrEng BSc(Eng)Chem MSc (Eng) PhD *Cape Town* MSAIChE  
 Professor GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* F(SA)IMechE MASME FSAAE  
 Professor RB Tait, BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE  
 Professor A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng  
 FIStructE FZweIE MASSAf MIAABSE FSAAE  
 Associate Professor P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle upon Tyne* PhD *Nanyang*  
 Associate Professor AT Sayers, PrEng Eurlng BSc(Mech Eng) *City Univ Lond* MSc *Birmingham*  
 PhD *Cape Town* MIMechE CEng M(SA)IMechE  
 TJ Cloete, MIng *Stell*

**Research Officer:**

AT McBride, MSc(Eng) PhD *Cape Town*

**Administrative Assistant:**

Ms OJ Goodhind

Website: [www.cerecam.uct.ac.za](http://www.cerecam.uct.ac.za)

**Centre for Materials Engineering**

The Centre has the objectives of educating and training students in the techniques and fundamentals in the broad field of Materials Engineering. We are concerned with the physical, chemical, electrical and mechanical properties of ceramic, polymeric, metallic and composite materials. The Centre is supported by the NRF and materials processing, producing, manufacturing and user industries and undertakes extensive research programmes, which prepare candidates for the degrees of MSc(Eng) in Materials Engineering and PhD. Of particular significance is the BSc(Hons) in Materials Science that is specifically designed for graduates with degrees in Physics, Chemistry or Geology. We promote quality research by maintaining international liaisons and publication in reputable journals. The Centre also aims to support and assist both large and developing industries through research projects, practical solutions and human resource development.

**Professor and Director:**

RD Knutsen, BSc PhD *Cape Town*

**Associated Academic Staff:**

Professor RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* M(SA)IMechE  
 Professor CI Lang, BSc PhD *Cape Town*  
 M Topic, BSc *Belgrade* PhD *Cape Town*  
 C Woolard, BSc(Hons) PhD *Cape Town*

**Visiting Lecturer:**

Professor I Sigalas, Element Six Professor of Ceramic Science *Witwatersrand*

**Scientific Officer:**

P Park-Ross

**Secretary:**

Mrs B Glass

**Centre for Minerals Research**

The Centre for Minerals Research at the University of Cape Town is a multi-disciplinary, inter-departmental research centre based in the Department of Chemical Engineering with close associate activities in Mechanical and Electrical Engineering; geology and physics. The main focus of research is on the processes of froth flotation and comminution, arguably two of the most important unit operations in mineral beneficiation. Research is conducted through industrial, laboratory and

computational studies. The Centre enjoys extensive support from local and international mining companies as well as statutory funding agencies. The Centre has an excellent reputation in its field and has strong links with a number of international research institutes. The Centre is a research partner in a highly successful collaborative venture with the Julius Kruttschnitt Mineral Research Centre, University of Queensland.

**Professor and Director:**

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

**Associated Academic Staff:**

J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM SARChI  
Honorary Professor PJ Harris, BSc(Hons) PhD *Witwatersrand*  
Adjunct Professor S Lambert, BSc(Eng) BSc(Hons) *Strathclyde*  
Associate Professor DA Deglon BSc (Eng) *Witwatersrand* MBA PhD *Cape Town* MSAIMM  
Honorary Associate Professor DJ Bradshaw, BSc(Eng) PhD *Cape Town*  
Honorary Associate Professor M Powell, BSc PhD *Cape Town*  
I Govender, BSc *UDW* HDE *UNISA* BSc(Hons) PhD *Cape Town*  
MC Harris, MSc(Eng) *Cape Town*  
A Mainza, BSc(Eng)Chem *UNZA* PhD *Cape Town*  
CJ Meyer, MIng PhD *Stell*  
J Sweet BSc(Eng) MSc *Cape Town* MSAIMM  
A van der Westhuizen, BIng *Stell* MSc(Eng) *Cape Town* MSAIMM

**Research Staff:**

L Bbosa, MSc *Cape Town*  
M Becker, MSc *Cape Town* PhD *Pretoria*  
P Bepswa, BSc(Eng) *Cape Town*  
K Corin, MSc PhD *Cape Town*  
B McFadzean, MSc PhD *Nelson Mandela Metropolitan*  
LAS Parolis, BPharm, PhD *Rhodes*  
J Waters, BTech *Cape Technikon*  
JG Wiese

**Administrative Staff:**

Mrs B Andersen  
Ms H Sundström  
Ms N Davies  
Ms J Le Cash

**Centre for Research in Engineering Education (CREE)**

CREE was founded in 1996 with the aim of establishing and promoting engineering education as a viable research field at UCT and in the broader academic community. In the thirteen years since then, considerable progress has been made towards meeting this objective and the research area is now well established at UCT, as evidenced in peer-reviewed research output, as well as the number of CREE researchers who are working towards postgraduate qualifications in this area. CREE also has a strong national profile which is sustained through its own publications and involvement in co-hosting national conferences on engineering education. A key development over this time has been the growth of CREE to incorporate what is now a sizable proportion of researchers working in the science disciplines. This has been a very natural and logical progression, and has emerged from shared concerns, contextual features and research methodologies. The 'home' of CREE remains in the Faculty of Engineering and the Built Environment, and half of the members of the management team are located in this faculty.

**Associate Professor and Director:**

BI Collier-Reed, MSc(Eng) PhD *Cape Town* M(SA)IMechE SAARMSTE ASEE

**Administrative Staff:**

Ms Z Geyer, BA *Cape Town*

**Associated Academic Staff:**

Associate Professor JM Case, BSc(Hons) *Stell HDE Cape Town* MED *Leeds* PhD *Monash*

Professor DMcK Fraser, BSc(Eng)Chem PhD *Cape Town* MSAIChE

K le Roux, BA(Hons) *Natal* MPhil *Cape Town*

P le Roux, BSc(Eng) PGDipEd(HES) *Cape Town*

**DST - NRF Centre of Excellence in Catalysis**

The DST-NRF Centre of Excellence in Catalysis (c\*change), established in 2004 and hosted by the Centre for Catalysis Research in the Department of Chemical Engineering, has as its focus in the field of catalysis and catalytic processing, and is to be seen as a large yet focused virtual research programme of a national scope and significance, with multi-disciplinary participants from nine higher education institutions. It is fundamentally about directed research themes conducted by national teams to support the nation's international competitiveness. In South Africa, the principal application of catalysts is within the chemical and petrochemical industries, where catalysis lies at the heart of 90% of all chemical transformation processes. With the manufacturing sector being the largest contributor to national GDP and with chemical manufacturing being the largest single contributor to the South African manufacturing sector, chemical processing and catalysis are recognized as a distinct field for targeted initiatives as emphasized in the National Research and Development Strategy.

**Professor and Director:**

M Claeys, DIng (Chem Eng) *Karlsruhe*

**DST Hydrogen Catalysis Competence Centre**

The Centre for Catalysis Research, together with Mintek, hosts the Department of Science and Technology's (DST) Hydrogen Catalysis Competence Centre. This virtual centre, established in 2007, is one of three Competence Centres that will develop hydrogen-based technologies as part of the National Flagship Project in Hydrogen and Fuel Cell Technologies. Platinum-group metals are key catalytic materials in hydrogen fuel cells and South Africa has the unique driver in that it possesses 75% of the world's platinum reserves. The strategic goal is for South Africa to supply 25% of the future global fuel-cell market with novel, locally developed and fabricated platinum-group metal catalysts by 2020, thereby diversifying the applications of the nation's platinum group metal resources and promoting socio-economic benefits through value addition of its key natural resources.

**Professor and Director:**

JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE

**Energy Research Centre (ERC)**

The Energy Research Centre was formed by amalgamating two existing energy research groups housed within the Faculty, namely the Energy Development Research Centre (EDRC) and the Energy Research Institute (ERI) and is currently situated in the Department of Mechanical Engineering.

The ERC is a multi-disciplinary Centre that conducts high quality, targeted and relevant research as well as offering postgraduate opportunities at the Masters and PhD levels. Two Masters programmes are convened by the Centre, an MSc in Sustainable Energy Engineering and an MSc in Energy and

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Development Studies with a focus on policy. The energy policy stream accepts students from a wide range of graduate programmes, while the energy technology stream focuses more on engineering graduates. These two streams comprise a coursework component and a dissertation component.

Students also have the option of registering for a masters by dissertation only. This route opens opportunities for students who are unable to relocate to Cape Town to attend the structured courses, but who have a good energy background.

### **Professor and Director:**

KF Bennett, PrEng BSc(Eng) *Cape Town* MSc CNA A PhD *Cape Town* F(SA)IMechE

### **Energy & Climate Change Group Leader**

Associate Professor H Winkler, MSc *Berkeley* MA PhD *Cape Town*

### **Energy, Poverty and Development Group Leader**

G Prasad, PhD *Sorbonne Univ of Paris*

### **Energy Efficiency Group Leader:**

G McKuur, MSc(Eng) *Cape Town*

### **Energy Modelling Group Leader:**

AG Hughes, BEng *Stell* MSc(Eng) *Cape Town*

### **Research Staff:**

M Moorlach, MSc *Eindhoven*

WD Cowan, MA *Oxon* MPhil *Cape Town*

S Davis, MSc(Operations Research) *Witwatersrand* MSc *Cape Town*

M Edkins, MSc(Environmental Change & Management) *Oxon*

A Hibberd, MSc(Energy Studies) *Cape Town*

M Jooste, MSocSc(Economics) *Cape Town*

T Letete, MSc(Eng) *Cape Town*

MB Magwaca, Nat Dipl *Pentech*

J Manley, MSc(Eng) *Cape Town*

A Marquard, BA *Cape Town* BA(Hons) MA *Rhodes* PhD *Cape Town*

P Monamodi, BTech *CPUT*

M Solomon, MSc(Eng) *Cape Town*

D Sparks, MSc PhD *Cape Town*

A Trikam, BSc(Eng) *Cape Town*

### **Operations Manager:**

Ms K Muller

### **Administrative and Support Staff:**

Ms A Steiner

### **Senior Secretary:**

Ms B Matubatuba

### **Publications & Media Staff:**

R Drummond, BSocSc MRCP *Cape Town* AAA DipCEA MSAPI MIEA

T James, BA *Witwatersrand* BA(Hons) *Cape Town* MA *Essex* PhD *Cape Town*

## **Blast Impact & Survivability Research Unit (BISRU)**

There is an ever-increasing potential for injuries and fatalities from blast events, transportation

accidents and subsequent equipment failures. The objective of the research work during the past 25 years has been, and continues to be, to strive to reduce the risks of life-changing injuries and save lives by using the fundamental principles of science and engineering. This involves using experimental, analytical and computational tools and techniques to understand the mechanics and dynamics of blast and impact loading and structural response. BISRU is located within the Department of Mechanical Engineering and has developed collaborative links with industry and academia at both national and international levels. The research work, though interlinked, is categorised into the following areas:-

- Blast Characterisation
- Material Characterisation
- Novel Materials
- Structural Response & Scaling
- Underwater Blast Response
- Energy Absorbers
- Human Response
- Sporting Equipment

**Professor and Director:**

GN Nurick, PrEng MSc(Eng) Natal PhD Cape Town HonF(SA) IMechE MASME FSAAE

**Honorary Professor:**

D Karagiozova, PhD *Ukrainian Academy of Science*

**Associated Academic Staff:**

TJ Cloete, MIng *Stell*

Associate Professor GS Langdon, BEng *Liverpool* PhD *Liverpool* AMIMEchE

**Researchers:**

K Balchin, PrEng Reg Cert Eng BSc(Eng) MIndAdmin *Cape Town*

VH Balden, MSc(Eng) *Cape Town*

S Chung Kim Yuen PhD D Karagiozova, PhD *Cape Town*

**Administrative Assistant:**

S Hellaby BA HDE *Cape Town*

**Website:** [www.bisru.uct.ac.za](http://www.bisru.uct.ac.za)

## **Crystallisation and Precipitation Research Unit**

Although industrial applications of precipitation have a long history and precipitation has been studied scientifically since the 1930's, understanding of this operation is still very limited. Industrially, precipitation reactions are generally carried out in very simple reactor systems. Probably over 90% of industrial precipitation processes are carried out in ordinary stirred tank reactors operated either batch-wise or continuously. Major problems, however, often occur in control of precipitation processes, specifically in understanding the effect of processing conditions on reactor performance and product characteristics such as precipitate morphology, purity and particle size distribution. Consequently, there is a need to further the scientific understanding of precipitation processes that are currently based on empirical knowledge. The specific objective of furthering this scientific understanding is in order to be able to optimise and control precipitation processes in the extractive metallurgical processes as well as in treatment of effluent streams.

The Crystallization and Precipitation Research Unit has national recognition as the only facility in the country for concerted research in the area of precipitation and crystallisation. In addition, the particular research thrust is unique internationally. Industrial support for the programme is ongoing, as seen by active funding for and interest in research projects. Presentation of Continuing

Professional Development courses to industry; such as the Industrial Crystallization course (in collaboration with Prof GM van Rosmalen of TU Delft) and specific courses given to industrial partners are an ongoing activity.

The research programme is underpinned by a focus on the development of a fundamental understanding of precipitation processes in the chemical and mineral processing context. Current research areas include Eutectic Freeze Crystallization for brine treatment, Selenium precipitation using replication, removal of scaling compounds from process streams, solubility measurements and modelling as well as an investigation into spherulitic crystal growth.

**Professor and Director:**

AE Lewis, PrEng BSc(Eng)Chem MSc (Eng) PhD *Cape Town* MSAIChe

**Associated Academic Staff:**

J Nathoo MSc(Eng) *Cape Town*

### **Engineering Management**

This unit engages in multidisciplinary research which includes the fields of Management education, Operations and Project management, Strategic management, Organisational practice, Systemic organisational design and development, Quality and productivity management, Management of knowledge and technology, Decision support and policy formulation.

Research is focussed with a view to broadening and deepening the thinking and understanding of issues such as the emerging global and digital economy which coupled to the democratisation of society and our institutions affect the nature of work. The aim is to develop innovative and appropriate approaches, which will be more relevant to the context in which we find individuals in society. Research is conducted in the following areas: Systemic organisational design and development; Operations and project management; Quality and productivity management; Management of knowledge and technology; Strategic management; and Decision support and policy formulation.

**Associated Academic Staff:**

CB Shaw, MPhil *Cape Town*

### **Sasol Advanced Fuels Laboratory**

Sasol's Fuels Research group at Sasolburg is world renowned for leading the local and international understanding of both High and Low Temperature Fischer-Tropsch (HTFT, LTFT) fuels in the different applications which include, amongst others, the automotive and aviation environments. The Sasol Advanced Fuels Laboratory within the Mechanical Engineering Department at the University of Cape Town was set up with the following objectives:

- To actualise the future-oriented research initiatives that have been identified and classified as being of a high priority for the Sasol Fuels Research group.
- To derive a deeper understanding of the science and engineering of internal combustion engines and fuels so as to stimulate their application and to disseminate such knowledge to the mutual benefit of Sasol and the University.
- To develop human-resource capacity to meet the future needs of the Sasol Fuels Research group as well as providing for the fuel technology needs of South Africa as a whole.
- To elevate the group's international stature through technical publications and selected collaborations.

**Director and Projects Coordinator:**

Adjunct Professor ADB Yates, BSc(Eng) MSc(Eng) PhD *Cape Town* M(SA)IMechE

**Project Leaders:**

G Floweday, MSc(Eng) *Cape Town*

P Schaberg, MSc(Eng) *Cape Town*

**Other Entities****Continuing Professional Development****Co-ordinator:**

Ms H Tait BHE *Stell*

**Administrator:**

Ms S Jemaar

The CPD programme offers short courses, workshops and conferences. These provide a means for the ongoing education of engineers and other technical staff, outside of the formal academic courses offered at UCT for degree purposes. Engineering education is considered to include all subjects which will benefit engineers and technical staff in their professional and vocational activities, and this covers a wide field. Generally there are no formal academic qualification entrance requirements to CPD courses. In some cases, some prerequisite knowledge may be required. A certificate of attendance or of successful completion (where an examination is passed) is normally issued. Some courses may be undertaken outside of working hours, while others may require attendance for a number of days on a full time basis. Courses may also be run on an in-house basis for companies, if requested.

In terms of the agreements between the Engineering Council of South Africa (ECSA) and other international engineering bodies, South African registered professionals are obliged to keep abreast of developments and knowledge in their fields of expertise in order to maintain and demonstrate their competence. All ECSA registered persons are required to undertake and record CPD activities as a prerequisite to renewal of their professional registration. Most of the courses offered by the CPD Programme are registered with ECSA for CPD points.

The CPD web address is [www.cpd.uct.ac.za](http://www.cpd.uct.ac.za).

**Geographical Information Systems Unit****Administrators:**

Mr N Lindenberg, BSc(Hons) *Cape Town*

Mr T Slingsby, MSc(Eng) *Cape Town*

The UCT GIS Laboratory acts as a consulting & resource centre for Geographic Information Systems researchers and postgraduate students. We administer the ESRI site license for Campus, act as a central data warehouse, offer support for GIS-related queries and provide a consulting service for project planning, course design and lecturing. The Lab also offers a small computing facility with PC's equipped with the latest ESRI software, an A0 digitizer, and a number of hand-held GPS receivers for field data collection.

## **Professional Communication Studies**

**Senior Lecturer/Convener:**

J English, BA MPhil *Cape Town* PhD *Glasgow Caledonian*

**Administrative Staff:**

Mrs AJ Rumbelow, Diagnostic and Therapeutic Rad Dip *Cape Town*

Professional Communication Studies (PCS) courses aim to equip students with essential theory and skills in the areas of oral, written and interpersonal communication, as recommended by professional bodies such as ECSA, (SA)IMechE and IEEE.

Outcomes of the courses are knowledge and ability in:

- research methods using libraries, academic sources, Internet;
- referencing and citation;
- professional ethics;
- reports;
- executive summaries to company and public readership;
- business proposals;
- letters of application and detailed CVs;
- posters;
- presentation skills;
- visual literacy and graphics.

**Website:** [www.pcs.uct.ac.za](http://www.pcs.uct.ac.za)

## **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, BBusSc MCom *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 Harry Oppenheimer 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.

## 158 CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

### 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.

#### Public Law

##### Associate Professor and Head of Department:

DM Chirwa, LLB *Malawi* LLM *Pretoria* PhD *Western Cape* Practitioner of the High Court of Malawi

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 PBL.

### Department Established in the Faculty of Health Sciences

#### Human Biology

##### Professor and Head of Department:

SH Kidson, BSc(Hons) MSc PhD *Witwatersrand* HDE (*JCE*)

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 *Basle* 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:**

AL Rodgers, MSc PhD *Cape Town*

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**

### **Professor and Head of Department:**

KJ MacGregor BSc *Strathclyde*, MSc *Glasgow*

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**

### **Associate 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 has a LEO S440 scanning electron microscope equipped with an extensive range of accessories including an x-ray analyser, cathodoluminescence spectrometer and cryopreparative facility. The unit also has a LEO 912 EFTEM with in column energy filter and 2kX2k CCD camera to support tomographic applications in structural biology. Other microscopes in the Unit include the FEI F20 and JEOL 1200 EX II CRYO transmission electron microscopes and the Cambridge S200 scanning electron microscope. Associated preparative, darkroom, light microscopy and library facilities are also provided. Enquiries regarding the use of these facilities are welcome.

As digital imaging is used extensively in modern microscopy the Unit has established an Imaging Centre equipped with facilities for digitizing images on transparent media, image processing and analysis software and printing.

Courses in 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. Details of these courses, which are held throughout the year, may be obtained from the Unit. 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**

### **Professor and Head of Department:**

## 160 CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

C Harris, MA DPhil *Oxon*

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

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

## 162 COURSES OFFERED

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 cover both undergraduate and postgraduate courses. All are listed 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 Masters degree.

### **Credit System**

The Faculty has adopted the National Qualifications Framework (NQF) course credit system with

effect from 2004. The Faculty's course credit ratings which were in effect prior to 2004 have been converted to NQF course credits. This conversion involves multiplying the pre-2004 credit values by four. The NQF 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.

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### ACC1006F/S FINANCIAL ACCOUNTING

18 NQF credits, 4 lectures per week, 1 double tutorial per week.

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

**Course outline:** The objective of business; various business decisions; the income statement and balance sheet; GAAP and the IFRS Framework; the accounting system; the flow of documentation in a business; recording business transactions (particularly inventory, VAT and receivables); year-end accounting adjustments; reporting financial information.

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

**Lectures:** 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%.

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### ACC1012S BUSINESS ACCOUNTING

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

18 NQF credits, 4 lectures per week, 1 double tutorial per week.

**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 management accounting, taxation and systems control.

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

**Lectures:** Monday to Thursday: 6th.

**DP requirements:** A weighted average of 40% for class tests AND satisfactory performance on assignments AND attendance at and submission of a minimum of 75% of tutorial assignments.

**Assessment:** Test(s)/assignment(s)/other 40%, final 3 hour examination 60%.

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### ACC2022F MANAGEMENT ACCOUNTING I

18 NQF credits, 4 lectures per week, 1 double period tutorial per week.

**Course co-ordinator(s):** 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-volume-profit relationships, relevant costing and cost benefit analyses; budgeting systems; standard costing and flexible budgeting; financial performance measurement in business segments.

**DP requirements:** A minimum weighted average of 40% for course work (class tests, projects and tutorial work) and a minimum of 75% attendance and participation in the designated tutorials.

## 164 COURSES OFFERED

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

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### APG1003W TECHNOLOGY I

24 NQF credits, 40 lectures, site visits, tutorials.

**Co-requisites:** APG1019W, APG1013W, APG1014S, 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.

**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.

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### APG1004F HISTORY & THEORY OF ARCHITECTURE I

12 NQF credits, 20 lectures, 16 tutorials.

**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 20th Century. This chronology is occasionally interrupted and reframed by thematic content based on contemporary theoretical issues and architecture.

**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.

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### APG1005S HISTORY & THEORY OF ARCHITECTURE II

12 NQF credits, 20 lectures, 16 tutorials.

**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.

**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.

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### APG1009S THEORY OF STRUCTURES II

4 credits, 12 lectures.

**Course outline:** Understand the development and process of empirical structural design loading on structures, strip and pad foundations and the basics of soils mechanics, the difference and performance of the principle building materials, the forces of elements and the theory of simply supported beams. Arches and thrust lines are introduced.

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

**Assessment:** By written class test and tutorials.

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### APG1014S REPRESENTATION II

4 credits.

**Co-requisites:** APG1019W, APG1003W, APG1020W, APG1021W.

**Course outline:** The course introduces the use of computers in technical drawing and presentation, aiming to develop a working knowledge of basic operating procedures and graphic techniques.

**DP requirements:** 80% attendance and participation and 100% completion of all tutorials and

assignments.

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

### **APG1015S PROGRAMMING FOR GEOMATICS**

18 NQF credits, 12 lectures, 12 practical/tutorial assignments.

**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.

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

**Assessment:** Tests, practical assignments.

### **APG1016F GEOMATICS I**

18 NQF credits, 60 lectures, 12 practical/tutorial assignments.

**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.

**DP requirements:** Class tests must be written and all practicals/assignments attended and submitted.

**Assessment:** Tests (subminimum 35%), practical assignments, examination 3 hours (sub minimum 40%).

### **APG1017F ACADEMIC DEVELOPMENT CLASS**

First Semester, DP course.

**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.

### **APG1018S ACADEMIC DEVELOPMENT CLASS**

June vacation, DP course.

**Co-requisites:** APG1003W, APG1020W or APG2022W, 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.

### **APG1019W ENVIRONMENT & SERVICES I**

8 credits, 20 lectures.

**Co-requisites:** APG1003W, APG1013W, APG1014S, APG1020W.

**Course outline:** The course introduces global, regional and local environmental sustainability aiming to establish an understanding of the links between renewable resource utilisation and built environment design issues. The study of building services is introduced, in the context of circular systems.

## 166 COURSES OFFERED

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

**Assessment:** By examination of projects and assignments.

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### APG1020W DESIGN & THEORY STUDIO I

72 NQF credits, 1 theory and 1 design lecture and studio - 12 hours per week.

**Co-requisites:** APG1019W, APG1003W, APG1013W, APG1014S.

**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.

**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.

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### APG1021W REPRESENTATION I

24 NQF credits, 80 lectures/tutorials.

**Co-requisites:** APG1019W, APG1003W, APG1013W, APG1014S, 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 elements 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.

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

**Assessment:** By examination of portfolio of all projects and assignments.

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### APG2000F HISTORY & THEORY OF ARCHITECTURE III

8 NQF credits, 20 lectures, 10 tutorials.

**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.

**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.

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### APG2003S HISTORY & THEORY OF ARCHITECTURE IV

8 NQF credits, 20 lectures, 10 tutorials.

**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.

**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 NQF credits, 10 lectures.

**Course outline:** Understand and be able to produce various structural concepts of all horizontal spanning elements pertaining to buildings of residential scale. The concepts must show how the structure carries the loads (in all three directions), how it connects to the vertical structure and the most appropriate material choice. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements include roofs, suspended floors (including prestressed and precast systems) and cantilevers and beams and their various evolutions. Fixed and pinned connections are introduced. Arches are developed into vaults and domes. There is some cross over with vertical structure.

**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 NQF credits, 10 lectures.

**Prerequisites:** APG2009F.

**Course outline:** Understand and be able to produce various structural concepts of all vertical spanning elements pertaining to buildings of residential scale. The concepts must show how the structure (and appropriate material choices) and its connections 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, reservoirs, walls, columns, small towers as vertical cantilevers and frames. There is some crossover with horizontal structure.

**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 NQF credits, 60 lectures, 8 practical/tutorial assignments.

**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.

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

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

### **APG2015F** GEOGRAPHIC INFORMATION SYSTEMS I

24 NQF credits, 60 lectures; 8 practical sessions.

**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, Map Projections and their application in GIS, GIS data structures

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and their analysis, Spatial databases, GIS data input with special emphasis on Remote Sensing, GIS analysis and its application.

**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, practical assignments, 3 hour examination (sub minimum 40%).

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### APG2016W SURVEYING I

24 NQF credits, 50 lectures; 8 practical assignments; 5 tutorial assignments.

**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, triangulation, error figures, eccentric reduction and reverse polars, levelling calculations, distance measurement, and tacheometry and topographic mapping and surface fitting. In addition, the course builds competency in the solution of integrated survey calculation problems.

**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, practical assignments, 3 hour examination in June.  
Second semester: tutorial assignments.

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### APG2017X BASIC SURVEY CAMP

4 NQF credits, 1 Week practical project.

**Prerequisites:** 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.

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

**Assessment:** Project 100%.

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### APG2018X GEOGRAPHIC INFORMATION SYSTEMS CAMP

4 NQF credits, 1 Week practical project.

**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.

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

**Assessment:** Project 100%.

### **APG2019X PRACTICAL TRAINING I**

Practical training.

**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.

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

**Assessment:** Report 100%.

### **APG2021W TECHNOLOGY II**

24 NQF credits, 40 lectures, site visits, tutorials.

**Prerequisites:** APG1003W.

**Co-requisites:** APG2022W, APG2025W, APG2028W.

**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.

**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.

### **APG2022W DESIGN & THEORY STUDIO II**

72 NQF credits, 1 theory and 1 design lecture and studio - 12 hours per week.

**Prerequisites:** APG1020W.

**Co-requisites:** APG2021W, APG2025W, APG2028W.

**Course outline:** The course reiterates in more sophisticated form the issues explored in the first year studio in order to gain familiarity with them. They are addressed within an exploration of the architecture of place, conceived as having four keystones: 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 contexts. The format of the course consists of short experimental exercises, longer projects and *en loqe* tests.

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

**Assessment:** Theory of Design assignments and reports, *en-loqe* design test and examination of

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portfolio of all projects.

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### APG2023F MANAGEMENT PRACTICE LAW I

4 credits, 10 lectures.

**Course outline:** An introductory course which provides a broad understanding of social and organisational principles which influence the production of the built environment. Economic and legal principles are introduced in global and national contexts.

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

**Assessment:** By examination of essays and assignments.

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### APG2024S MANAGEMENT PRACTICE LAW II

4 credits, 10 lectures.

**Course outline:** The course extends the general organisational principles introduced in APG2023F into the local context of the built environment, focusing on two themes: production of the built environment (including financial, sectoral, professional and ethnic issues) and regulation of the built environment (providing an overview of multiple legislative frameworks).

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

**Assessment:** By examination of essays and assignments.

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### APG2025W REPRESENTATION III

12 NQF credits, 20 lectures and tutorial sessions.

**Co-requisites:** APG2021W, APG2022W, APG2028W.

**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.

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

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

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### APG2026F ELEMENTARY SURVEYING

16 NQF credits, 48 lectures, 9 practical/tutorial assignments.

**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.

**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%).

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**APG2027X WORK EXPERIENCE**

**Co-requisites:** APG2021W, APG2022W, APG2025W.

**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.

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**APG2028W ENVIRONMENT & SERVICES II**

12 NQF credits, 20 lectures, 16 tutorials.

**Co-requisites:** APG2021W, APG2022W, APG2025W.

**Course outline:** Consolidation of the understanding of broad environmental impacts on the design of buildings and the spaces around buildings, developed in relation to human comfort standards, climatic performance, and servicing systems applicable to low rise buildings.

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

**Assessment:** By examination of all projects & assignments.

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**APG3000F HISTORY & THEORY OF ARCHITECTURE V**

8 NQF credits, 20 lectures, 5 tutorials.

**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.

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

**Assessment:** By examination of essays and assignments.

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**APG3001S HISTORY & THEORY OF ARCHITECTURE VI**

8 NQF credits, 20 lectures, 5 tutorials.

**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.

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

**Assessment:** By examination of essays and assignments.

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**APG3008F THEORY OF STRUCTURES V**

4 NQF credits, 10 lectures.

**Prerequisites:** APG2009F and APG2011S.

**Course outline:** Understand and be able to produce various structural concepts of all horizontal spanning elements pertaining to buildings beyond the residential scale. The concepts must show how the structure carries the loads (in all three directions), how it connects to the vertical structure 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, portal frames, planar space frames, shells, girders etc. Form active structures are explored in this section.

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

**Assessment:** By written class test and tutorials.

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### APG3010S THEORY OF STRUCTURES VI

4 NQF credits, 10 lectures.

**Prerequisites:** APG1009S, APG2009F, APG2011S and APG3008F.

**Course outline:** Understand and be able to produce various structural concepts of all vertical spanning elements pertaining to buildings beyond residential scale. The concepts must show how the structure carries the loads (in all three directions), how it connects to the ground and other horizontal structures and appropriate material choice. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements include advanced retaining systems, dams, towers, tall buildings, multi-story and other evolutions. At this stage the buildings are fully integrated with the horizontal elements. Additionally, the entire course is brought together with the total study of large low-rise buildings like airports, factories etc.

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

**Assessment:** By written class test and tutorials.

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### APG3011S GEOGRAPHIC INFORMATION SYSTEMS II

24 NQF credits, 60 lectures; 12 practicals/tutorials.

**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.

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

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

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### APG3012S GEOMATICS III

24 NQF credits, 60 lectures; 12 practicals/tutorials.

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

**Course outline:** Course Aims: To provide the fundamental knowledge and skills in photogrammetry. To teach problem solving skills in relation to practical spatial data acquisition. To equip the student with group work skills.

**Course Content:** Basic mathematics of photogrammetry, stereo photogrammetry, orientation techniques, relative orientation, absolute orientation, co linearity, co planarity, bundle adjustment, DLT, camera calibration, image measurement and co-ordinate refinement, introduction to digital photogrammetry. Aero triangulation and close range network design. DTM production, rectification, ortho-rectification, mosaicing and automation in digital photogrammetry. Laser scanning.

**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%).

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### APG3013F NUMERICAL METHODS IN GEOMATICS

16 NQF credits, 48 lectures; 8 practicals/tutorials.

**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.

**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%).

### APG3014X CONTROL SURVEY CAMP

4 NQF credits, 1 Week practical project.

**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.

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

**Assessment:** Project 100%.

### APG3015X PRACTICAL TRAINING II

Practical training.

**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.

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

**Assessment:** Report.

### APG3016C SURVEYING II

12 NQF credits, 30 lectures; 1 essay; 2 practicals; 1 seminar.

**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 prerequisite 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 satellite systems is covered in detail and consists of 80% of the course.

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

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**Assessment:** Tests, practical assignments/seminars, Examination 1½ hours (sub minimum 40%).

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### APG3017D SURVEYING III

12 NQF credits, 30 lectures; 6 practical/tutorial assignments.

**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.

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

**Assessment:** Tests, practical assignments/seminars, examination 1½ hours (sub minimum 40%).

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### APG3020X SPATIAL DATA ANALYSIS PROJECT

4 NQF credits, 1 week practical project.

**Prerequisites:** APG2015F or equivalent.

**Co-requisites:** APG3011S or equivalent.

**Course outline:** Course Aims: To provide practical experience in processing, management, analysis and representation of spatial data. Course Content: This will vary from project to project.

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

**Assessment:** Project 100%.

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### APG3023W TECHNOLOGY III

24 NQF credits, 40 lectures, site visits and tutorials.

**Prerequisites:** APG2021W.

**Co-requisites:** APG3024W, APG3029W.

**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.

**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.

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### APG3024W DESIGN & THEORY STUDIO III

84 NQF credits, 1 theory and 1 design lecture and studio - 12 hours per week.

**Prerequisites:** APG2022W.

**Co-requisites:** APG3023W, APG3029W.

**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, and competition briefs are used to hone the clarity of design ideas. 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. Professional Communication Studies gives a module in this course for a percentage of the final mark.

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

**Assessment:** Theory of Design assignments and reports, *en loge* design test and examination of portfolio of all projects.

### **APG3026F** MANAGEMENT PRACTICE LAW III

4 NQF credits, 10 lectures.

**Course outline:** An introduction to entrepreneurship and small business development in the context of design consultancies. Documentation methods and exercises are used as the platform for introducing aspects of business and financial planning, roles, responsibilities, information and risk management in relation to project cycles.

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

**Assessment:** By examination of projects, drawings and assignments.

### **APG3027Z** CADASTRAL SURVEY & REGISTRATION PROJECTS

24 NQF credits, 2 projects, assignments, and 1 week camp.

**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. For Geoinformatics Stream: Simulated land registration system using GIS and database software. This course includes 2 major projects, tutorials and a one-week camp project, which takes place during a vacation, away from the UCT campus.

**DP requirements:** Completion of all projects and assignments.

**Assessment:** 100% projects and assignments.

### **APG3028X** INDEPENDENT RESEARCH

**Co-requisites:** APG3024W.

**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.

### **APG3029W** ENVIRONMENT & SERVICES III

8 NQF credits, 20 lectures.

**Co-requisites:** APG3023W, APG3024W.

**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 the students own design work.

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

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

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**APG3033W LAND & CADASTRAL SURVEY LAW**

16 NQF credits, 23 lectures.

**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.

**DP requirements:** 50% minimum average for assignments; 40% minimum average for tests.

**Assessment:** Tests and assignments.

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**APG4001S GEODESY**

24 NQF credits, 60 lectures, 12 practicals.

**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.

**DP requirements:** Completion of practical assignments to the satisfaction of the course convener.

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

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**APG4002Z LAND USE PLANNING & TOWNSHIP DESIGN**

16 NQF credits, 48 lectures, 8 practicals.

**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.

**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%).

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**APG4003Z RESEARCH REPORT**

40 NQF credits, 10 - 12 contact sessions, mid-year seminar.

**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.

**Assessment:** Project report, poster; final oral presentation.

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**APG4004F REMOTE SENSING**

24 NQF credits, 30 lectures, 6 practical assignments.

**Prerequisites:** APG1016F, APG2015F or equivalent.

**Course outline:** Course Aims: To broaden the knowledge of remotely sensed data and its use in spatial information systems. This is to include satellite and airborne remote sensing and airborne laser scanning. Course Content: The nature and concept of satellite and airborne remote sensing; the nature of remote sensing, optical radiation models, sensor models, spectral transforms, spatial transforms, image correction and calibration, image registration and fusion, and thematic classification. An introduction to airborne laser scanning (ALS); sensor systems, data acquisition, data processing, data modelling and data fusion.

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

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

### **APG4005F ENGINEERING SURVEYING & ADJUSTMENT**

18 NQF credits, 30 lectures, 6 practical assignments.

**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.

**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 1½ hours (sub minimum 40%).

### **APG4006S GEOMATICS PRACTICE & LAND MANAGEMENT**

12 NQF credits, 24 lectures, 6 practical assignments.

**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.

**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 INTRODUCTORY GIS**

24 NQF credits, 60 lectures; 12 practical sessions, 2 Projects.

**Co-requisites:** APG4003Z, APG4004F, APG4008F, APG4009F.

**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 contents:** 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

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display and presentation, theory of map projections.

**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%).

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### APG4008S ADVANCED GIS

24 NQF credits, 60 lectures; 12 practical/tutorials.

**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.

**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%).

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### APG4009F COMPUTING FOR GIS

18 NQF credits, 12 lectures; 12 practical/tutorial assignments.

**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.

**DP requirements:** Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more).

**Assessment:** Tests, practical assignments.

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### APG4020F PLANNING THEORY & PRACTICE

8 NQF credits.

**Course outline:** Evolution of the planning discipline; and changing values, concerns, methods, outcomes and plan forms over the last century.

**Assessment:** Based on the submission of a term paper.

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### APG4021F URBAN SYSTEMS

Elective for students in BAS(Hons). 12 NQF credits.

**Course outline:** Processes of settlement formation and growth; settlement patterns in regional space; forces affecting the internal distribution of urban activities; the urban land market; elements of public structure; private sector responses.

**Assessment:** Based on a paper.

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### APG4022F PLANNING PROJECT A

32 NQF credits.

**Course outline:** Focuses on urban planning at the local scale and involves the development of descriptive, explanatory, evaluative and interventive skills. An introduction to visual and verbal communication techniques forms part of the course. Fieldwork is an integral requirement of the

course.

**Assessment:** Based upon Project work.

#### **APG4023S URBAN DEVELOPMENT PROCESSES**

12 NQF credits.

**Course outline:** The dynamics of contemporary urban development processes. Land development models, land/property economics, the social/political/economic context of urban development.

**Assessment:** Based on a paper.

#### **APG4024S PLANNING & GOVERNMENTAL SYSTEMS**

12 NQF credits.

**Course outline:** The political and institutional context of planning; systems of representation and administration; local government financing and budgeting; integrated development planning; negotiation and public participation; "package of plans" approaches; public-private partnerships; plan monitoring and evaluation.

**Assessment:** Based on a paper.

#### **APG4025S REGULATORY & LEGAL FRAMEWORK**

12 NQF credits.

**Course outline:** Planning law; Introduction to South African law; administrative law; environmental law; current legislative framework for planning; development control; options for a new planning framework.

**Assessment:** By examination.

#### **APG4026S PLANNING PROJECT B**

32 NQF credits.

**Prerequisites:** APG4022F

**Course outline:** The project focuses on planning within the large metropolitan context and on plan implementation.

**Assessment:** Based on Project work.

#### **APG4028F ASPECTS OF CITY DESIGN**

Elective for students in BAS(Hons).

12 NQF credits.

**Course outline:** The course focuses on historically conceptualised concepts of urban structure and performance at the local area scale. It includes: Introduction to city planning; conceptual framework; role of the planner; issues of planning; approach of the programme. Aspects of city design: the need for design and a design approach to planning ; the process of design; exploration of fundamental ideas. Historical case studies: framework of evaluation; overseas case studies; local case studies.

**Assessment:** Based on a paper.

#### **APG4029F NATURAL SYSTEMS**

Elective for students BAS(Hons).

12 NQF credits.

**Course outline:** The course focuses on the relationship between nature and settlement. It deals with central issues, methods of environmental analysis and evaluation, and substantive knowledge relating to: land systems, water systems, air systems, life systems, and the related design and planning implications.

**Assessment:** Based on a paper.

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### APG4030F HISTORY & THEORY OF LANDSCAPE ARCHITECTURE A

Elective for students in BAS(Hons).

12 NQF credits.

**Course outline:** Covers the great traditions and developments in landscape architecture of both the East and the West, and explores the influence of these on contemporary landscape works.

**Assessment:** Assignments.

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### APG4031F LANDSCAPE TECHNIQUES I

12 NQF credits, lectures/tutorials.

**Course outline:** Landscape graphics; map reading; air-photo interpretation and introduction to GIS.

**Assessment:** Assignments.

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### APG4032S LANDSCAPE DESIGN

12 NQF credits.

**Course outline:** Values, principles and informants for site planning and the design of urban spaces, streetscapes and open spaces including paving, street furniture, lighting, signage and water elements.

**Assessment:** Assignments, workbook.

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### APG4033S LANDSCAPE TECHNIQUES II

8 NQF credits.

**Prerequisites:** APG4031F or permission of course convener.

**Course outline:** The tools and routines in computer applications related to landscape planning work, including CAD and image manipulation programmes.

**Assessment:** Assignments.

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### APG4034S TERRAIN ANALYSIS

12 NQF credits.

**Prerequisites:** APG4029F or permission of course convener.

**Course outline:** Terrain analysis methodology covering geological, hydrological, coastal, climatic, biotic and visual assessments, and the implications of these for planning and design. Includes mandatory ecology camp/s.

**Assessment:** Projects.

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### APG4035F PLANNING TECHNIQUES I

12 NQF credits.

**Course outline:** Map work and cartographic/aerial photography interpretation; techniques of graphic presentation and communication, introduction to Geographical Information Systems, report writing.

**Assessment:** Assignments.

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### APG4036F LOCAL AREA LANDSCAPE ARCHITECTURE PROJECT

32 NQF credits.

**Course outline:** analysis of landscape and urban structure and performance at the local scale (diagnostic and evaluative skills); concept design/s for a 'greenfield' site within a local area (development of design and plan-making skills); elaboration of implementational implications.

**Assessment:** Project work.

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### APG4037S METRO LANDSCAPE PROJECT

36 NQF credits.

**Prerequisites:** APG4036F.

**Co-requisites:** APG4034S or permission of course convener.

**Course outline:** Urban context and natural processes; site planning and concept design for a 'brownfield' site, including implementation strategies.

**Assessment:** Project work.

### APG4038S PLANNING TECHNIQUES II

12 NQF credits.

**Course outline:** Identifying key information needs for planning; assembling relevant data; generating and analysing demographic and socio-economic data. Scales of measurement, descriptive statistical methods, data summaries, introduction to statistical inference, tests of association, measures of correlation, simple linear regression.

**Assessment:** Assignment and examination.

### APG4039F ADVANCED HISTORY & THEORY OF ARCHITECTURE

12 NQF credits.

**Course outline:** A survey of ideological and aesthetic terms of architectural theory and criticism by way of locating a close reading of contemporary texts within a broader social and cultural context. The course offers an advanced theoretical examination of the cultural and social role of design to enable evaluation and articulation of the interaction between theory and practice, and assessment of strategies for the making of architecture.

**DP requirements:** 80% attendance; 100% of all hand-ins and participation in discussion.

**Assessment:** Research paper, seminar presentation and participation. Examination counts 90%, year mark 10%.

### APG4040F ARCHITECTURAL RESEARCH METHODS

12 NQF credits.

**Course outline:** An investigation of practices and strategies that inform an analysis, synthesis and representation of ideas in architectural design research. The course offers a theoretical and practical introduction to research as an aspect of design by investigating activities that support and enhance architectural design, such as mapping. It prepares students to undertake academic and design research in a critical and structured manner.

**DP requirements:** 80% attendance; 100% of all hand-ins and participation.

**Assessment:** Research paper, seminar presentation.

### APG4041S ADVANCED BUILDING TECHNOLOGY

12 NQF credits.

**Course outline:** An investigation of how the interaction of systems of structure, enclosure, environment, materials, and detailing informs spatial and formal expression in architecture. The course focuses on contemporary building and environmental technologies in relation to programmatic requirements and innovation. It aims to prepare students to understand the structural, constructional and material consequences and constraints on design decision-making.

**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Research paper/seminar participation and presentation.

### APG4042F ARCHITECTURAL DESIGN STUDIO I

48 NQF credits.

**Course outline:** A range of complex design problems involving issues of the public and private nature of the urban and suburban context that calls for appropriate analysis and creative invention in the making of architecture. The topic, focus, requirements and duration of projects will be determined by the studio convener.

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**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Oral presentation of architectural design project/s.

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### APG4043S ARCHITECTURAL DESIGN STUDIO II

48 NQF credits.

**Prerequisites:** APG4042F.

**Course outline:** A range of complex design problems involving issues of the public and private nature of the urban and suburban context that calls for appropriate analysis and creative invention in the making of architecture. The topic, focus, requirements and duration of projects will be determined by the studio convenor.

**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Oral presentation of architectural design project/s.

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### APG4044S PROFESSIONAL PRACTICE

12 NQF credits.

**Course outline:** An introduction to the knowledge and skills required to procure, administer and manage an architectural project. The course offers an opportunity to explore the essential elements of professional practice related to the role and function of the architect, differing modes of practice in the public and private sectors, the client-architect relationship, critical legislation influencing the role and conduct of architects, building procurement systems and conflict resolution. The course will also investigate the challenges facing the architectural profession, the meaning of professionalism and ethical and social problems within current architectural practice.

**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Written examination.

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### APG4045S ARCHITECTURAL RESEARCH PROJECT

12 NQF credits.

**Prerequisites:** APG4040F.

**Course outline:** This course is intended to further develop and consolidate research skills acquired in APG4040F. Students will be exposed to a select range of investigative methods, archival sources and representation techniques that are suitable for investigating spatial condition and will be required to apply these through the compilation of research and documentation in reporting on an urban phenomenon in Cape Town. Successful completion of APG4040F and APG4045S should prepare students to engage independent research in support of the MArch (Prof) dissertation.

**DP requirements:** 80% attendance; 100% participation in seminars and discussions.

**Assessment:** Year mark.

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### APG4046S STATISTICAL METHODS FOR PLANNERS

8 NQF credits.

**Course outline:** Scales of measurement; descriptive statistical methods, data summaries, introduction to statistical inference, tests of association, measures of correlation, simple linear regression.

**DP requirements:** Class attendance and submission of all assignments.

**Assessment:** Year mark.

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### APG5000W MASTERS DISSERTATION : GEOMATICS

180 NQF credits.

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### APG5001Z MASTERS DISSERTATION: GEOMATICS

120 NQF credits.

**Prerequisites:** APG5061Z.

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**APG5014F INTRODUCTION TO URBAN DESIGN THEORY**

Elective for BAS(Hons).

12 NQF credits.

**Course outline:** Core theories in urban design: "urban design pioneers" and their ideas; selected theorists and practitioners; review of the state of the art.

**Assessment:** by one paper.

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**APG5020F REGIONAL PLANNING PROJECT**

32 NQF credits.

**Prerequisites:** APG4026S

**Course outline:** The course focuses on regional planning issues at a number of scales and involves the development of descriptive, explanatory, evaluative and interventive skills.

**Assessment:** Based on project work.

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**APG5023F REGIONAL PLANNING THEORY**

20 NQF credits.

**Course outline:** The Natural Landscape Framework of Regional Planning: conceptual exploration of landscape processes and patterns; methods of regional landscape analysis and synthesis; landscape management frameworks.

The Regional Economic Development Framework: models of regional economic development; issues and debates; SA national and regional economic development policies.

The Settlement and Services Framework of Regional Planning: processes of settlement formation; resultant settlement patterns (size and spatial); major issues and debates relating to service provision.

**Assessment:** By term papers.

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**APG5024S PLANNING TECHNIQUES III**

8 NQF credits.

**Course outline:** The aim of this course is to provide students with experience in evaluating the environmental consequences of policies, programmes, plans and projects. Contents includes: the need and desirability for evaluating the environmental consequences of policies, plans and programmes, current and future environmental assessment tools, environmental impact assessment (EIA), strategic environmental assessment, sustainability assessment, public participation in environmental governance, biodiversity in impact assessment, social impact assessment, environmental management plans.

**Assessment:** Based on a paper and a practical groupwork assignment.

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**APG5025F HISTORY & THEORY OF LANDSCAPE ARCHITECTURE B**

Elective for students in BAS(Hons).

12 NQF credits.

**Course outline:** Contemporary landscape architecture, spanning the 20th Century, to the present day, exploring a range of issues and themes, relating to landscape theory and practice.

**Assessment:** Assignments.

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**APG5026F LANDSCAPE CONSTRUCTION & PRACTICE**

Elective for students in BAS(Hons).

12 NQF credits.

**Course outline:** Principles of grading, drainage, stormwater management, vehicular and pedestrian circulation, and road alignment design, client-architect relationship, contract documentation and

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administration, procurement systems, and legislation guiding professional conduct of landscape architects (CBE and SACLAP).

**Assessment:** Assignments and workbook.

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### **APG5029F** LANDSCAPE ARCHITECTURE PROJECT

36 NQF credits.

**Prerequisites:** APG4032S, APG4037S or permission of course convener.

**Co-requisites:** APG5026F, APG5053F or permission of course convener.

**Course outline:** The structure and functioning of landscapes at the large scale, and the precinct scale, suitability evaluations; settlement and resource management, urban landscape design and detailing.

**Assessment:** Project work.

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### **APG5030W** GEOGRAPHICAL INFORMATION SYSTEMS PROJECT

40 NQF credits, lectures, contact sessions.

**Prerequisites:** APG5031F, APG5043F.

**Course outline:** On the recommendations of the supervisor and the agreement of the Head of Department, a student may be permitted to enter into a programme of individual study guided by the supervisor. The program will involve the student in about 360 hours of work and a written report must be submitted.

**Assessment:** Project report(s).

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### **APG5031F** DATA ACQUISITION & CONCEPTS OF GIS

28 NQF credits, 12 four hour lectures, 40 hours on GIS software.

**Course outline:** Definition of GIS; GIS application areas, raster and Vector structures, maps and map analysis; review of co-ordinate systems and reference surfaces; map projections; introduction to Global Positioning System (GPS); spatial data sources-digitising and data formatting, spatial analysis, remote sensing and image processing, stereo and rectified images.

**Assessment:** June examination 3 hours.

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### **APG5032S** TECHNICAL ISSUES IN GIS

28 NQF credits, 40 hours on GIS software, 12 four hour lectures and related technologies.

**Course outline:** Map projections, co-ordinate systems and transformations; vector and raster data structures and algorithms; digital elevations models, TIN and general digital terrain applications in environmental and temporal studies; database concepts of GIS; error modelling and data uncertainty; design and presentation of spatial data.

Research design and methodology.

**Assessment:** November examination 4½ hours.

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### **APG5033Z** MANAGEMENT ISSUES IN GIS

28 NQF credits, 12 lectures 3½ hours.

**Course outline:** GIS application areas; land information systems and cadastral data bases; decision support systems; artificial intelligence; system planning, design and implementation; national and international data exchange standards.

**Assessment:** June examination 3 hours.

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### **APG5034Z** SURVEYING FOR RESEARCH PURPOSES

12 NQF credits, 2 week block course including lectures, practical assignments, and technical reports.

**Prerequisites:** None.

**Course outline:** The aim is to provide a basic understanding of graphical and spatial concepts and

skills of plane surveying, to teach problem solving skills in relation to practical surveying problems; to equip the student with group work skills; to equip the student with simple technical report writing skills. Content includes use and testing of levelling instruments, levelling calculation using the rise and fall method. Steel tapes: corrections for temperature, tension, catenary. EDM: principal of electronic distance measurement, corrections for refraction. Reduction of distances: slope, sea level, scale enlargement. Angular measure; the mapping/projection plane; the SA co-ordinate system; joins and polars, orientation, traverses. Setting up theodolites, observing procedures. Planning and execution of a tacheometric survey using electronic instrumentation. Fundamentals of mapping and cartography. Horizontal setting out: offsets, reference-grid, right angles, staking out. Vertical alignment: longitudinal sections, cross sections and volume calculations, sight rails, profiles, batter boards. GPS field data collection. Types and Sources of errors. Course outcomes: After completing this module the student should be able to: demonstrate understanding of graphical and spatial concepts, carry out basic site work from collecting spatial data to presentation of the results; set out works and perform area and volume calculations; use the Global Positioning System for basic data collection purposes; work in a team; produce technical reports and comment on accuracies achieved.

**DP requirements:** Completion of practical assignments to the satisfaction of the course convener.

**Assessment:** Practical Assignments 70%, Examination 3 hours 30%.

### **APG5040Z LAND, TENURE & LAW**

20 NQF credits, one week block lectures

**Course outline:** Land and tenure within the context of overarching city problems. Different approaches internationally to land and tenure issues. Current legal framework in SA in relation to tenure. Land markets - formal: investment cycles, sources of land, decision-making drivers; informal: invasions, informal sales, illegal tenure, occupation. Housing markets: shelter strategies, delivery systems, secondary markets, subsidy access modes. Land, tenure and social dynamics: migration, household structures, household economies / livelihoods, gender and youth, economic participation, HIV/AIDS. Political dynamics and power relations: leadership structures and modes, participation, patronage, clientelism. Fiscal/financial aspects.

**Assessment:** Three hour exam 40%; assignment 60%.

### **APG5043F DATABASE MODELLING & GEO-STATISTICS**

28 NQF credits, 40 hours on GIS software, 12 four hour lectures and related technologies.

**Course outline:** Relational, Object-relational and Object oriented database concepts; knowledge based systems; general digital terrain models; applications in environmental and temporal studies; advanced Interpolation techniques; error modelling and data uncertainty.

**Assessment:** 3 hour examination (55%) and assignments and tests (45%).

### **APG5044F WEB GIS**

18 NQF credits, 48 lectures and 20 hours on GIS software and application development.

**Course outline:** Computer networks: Principles of computer networks, hardware/software, client/server computing and distributed systems Internet concepts: Overview of Internet concepts & features: Internet protocol, Domain Name System, Internet services, WWW, Web servers, Web clients. Web application development: Web page design principles, HTML, XML, data formats, helper applications, Java, databases and the Web. Internet GIS: Application of Internet services to GIS, Internet GIS software.

**Assessment:** 3 hour examination (55%) and assignments and tests (45%).

### **APG5045S GIS FOR URBAN & REGIONAL PLANNING**

18 NQF credits, 40 hours of directed reading and research.

**Course outline:** The course is spread over three main areas:

- GIS in Property and Land Valuations: Property modelling using GIS. Spatial Urban Management Systems. Spatial Multi-criteria systems in evaluation.

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- Urban Infrastructure Management: Dynamic segmentation modelling of linear features, The GIS-T model, Linear databases. 3-D Linear modelling systems. Route modelling and management of networks.
- Land Use and Cadastral systems: Land Information Systems. Decision support systems for Land Use Planning. GIS and the Cadastre.

**Assessment:** Seminar(s) (40%), term paper (60%).

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### APG5046S ENVIRONMENTAL MANAGEMENT

18 NQF credits, 40 hours of directed reading and research.

**Course outline:** Spatial Decision Support systems for Natural Resources Management, GIS and Remote Sensing in Environmental Impact Assessment and Multi-criteria Evaluation analysis, Geological modelling, mathematical modelling for Geography, 3-D visualization, 3-D data structures for environmental data modelling. Environmental data acquisition techniques.

**Assessment:** Seminar(s) (40%), term paper (60%).

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### APG5047S GEO-INFORMATICS

18 NQF credits, 40 hours of directed reading and research.

**Course outline:** Advanced Database Systems, Spatial indexing, Hierarchical structures, 3-D modelling Systems and Virtual Reality, Advanced Systems Development, Advanced GIS application Development.

**Assessment:** Seminar(s) (40%), term paper (60%).

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### APG5050Z MCPUD DISSERTATION

120 NQF credits.

**Prerequisites:** APG5055F.

**Course outline:** The course consists of a project on an approved subject usually chosen by the student. Fieldwork is an integral requirement of the course.

**Assessment:** Based upon project work.

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### APG5051Z MCRP DISSERTATION

120 NQF credits.

**Prerequisites:** APG5020F.

**Course outline:** This course consist of a project on an approved subject usually chosen by the student. Fieldwork is an integral requirement of the course.

**Assessment:** Based on project work.

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### APG5052S MLA DISSERTATION

120 NQF credits.

**Prerequisites:** APG5029F.

**Course outline:** Major landscape architecture design project of student's choice undertaken under staff guidance.

**Assessment:** Project work.

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### APG5053F PLANTS & DESIGN

12 NQF credits.

**Course outline:** Vegetation types of Southern Africa, and limiting factors. Identification and utilization of plant material, principles of permaculture and horticulture. Planting plans, schedules and specifications.

**Assessment:** Assignments and workbook.

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**APG5055F URBAN DESIGN PROJECT**

35 NQF credits.

**Prerequisites:** APG4026S

**Course outline:** This course consists of urban design projects through which descriptive, explanatory, evaluative and interventive design skills are developed. Fieldwork is an integral requirement of the course.

**Assessment:** Based upon Project work and a comprehensive Studiowork Examination. Project marks count 80% of final result Studiowork Examination counts 20% of final result.

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**APG5056F URBAN DESIGN THEORY**

25 NQF credits.

**Course outline:** Theories in urban design: urban design pioneers and their ideas; selected theorists and practitioners; review of the state of the art. Urban design policy: antecedents of urban design as government activity, urban design control frameworks, economics of urban design, contemporary urban design controls and techniques, policy arenas of urban design.

**Assessment:** By three papers.

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**APG5057F ADVANCED TECHNOLOGY RESEARCH**

30 NQF credits.

**Course outline:** Self-initiated, self-motivated research project on technology of architecture, produced under supervision.

**Assessment:** Research paper.

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**APG5058S DESIGN RESEARCH PROJECT**

30 NQF credits.

**Course outline:** Supervision of an individual design research inquiry grounded in a sound methodological base that supports the production of a research document as a basis for informal design discussion in the major design project.

**Assessment:** Research document submitted as part of Design Dissertation.

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**APG5059F ADVANCED THEORY RESEARCH**

30 NQF credits.

**Course outline:** Self-initiated, self-motivated research project on architectural theory, produced under supervision.

**Assessment:** Research paper.

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**APG5060W MAJOR DESIGN PROJECT**

90 NQF credits.

**Course outline:** Design component of Design Dissertation. Self-initiated, self-motivated architectural Design Project produced under supervision.

**Assessment:** Oral presentation of Design Project, submitted as part of Design Dissertation.

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**APG5061Z DISSERTATION PREPARATION**

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the Masters Dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show

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evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

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### APG5063F HISTORY OF CONSERVATION

10 NQF credits.

**Course outline:** The course reviews the origins from the earliest times and the development of the ideas and practices of conservation and restoration of architecture, of towns, of the cultural landscape, of archaeology.

**DP requirements:** 80% attendance of lectures and participation in seminars; and 100% completion of assignments.

**Assessment:** By examination and examination of an assignment.

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### APG5064F LAW OF CONSERVATION & DEVELOPMENT

10 NQF credits.

**Course outline:** Introduction to South African Law; administrative law; heritage resources law; current legislative framework for planning and development control.

**DP requirements:** 80% attendance of lectures and participation in seminars; and 100% completion of assignments.

**Assessment:** By examination and by assignment.

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### APG5065F CONSERVATION DISCIPLINES & PRACTICES

10 NQF credits.

**Course outline:** The course introduces the several disciplines engaged in the conservation of the built environment, most specifically the current practice of pre-colonial and historical archaeology, architectural restoration and conservation, historical archaeology, architectural restoration and conservation, historical town and urban conservation, conservation of the cultural landscape.

**DP requirements:** 80% attendance of lectures and participation in seminars; and 100% completion of assignments.

**Assessment:** By examination and by assignment.

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### APG5066F SURVEYING, MEASURING & RECORDING HERITAGE RESOURCES

10 NQF credits.

**Course outline:** This course demonstrates the several methods of surveying, measuring and recording heritage resources, including photogrammetry, the measuring of archaeological sites, historical buildings, towns and environments.

**DP requirements:** 80% attendance of lectures and 100% completion of assignments.

**Assessment:** By assignment.

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### APG5067S RESEARCHING & ASSESSING HERITAGE RESOURCES

12 NQF credits.

**Course outline:** This course introduces the methods adopted researching the history of the built environment, including archival material, the records of statutory authorities and other institutions, oral history, social surveys and interviewing. The course also introduces the measures required by the legislation to assess the cultural significance of heritage resources.

**DP requirements:** 80% attendance of lectures and 100% completion of assignments.

**Assessment:** By examination and assignment.

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### APG5068S CONSERVATION, DEVELOPMENT & IMPACT ASSESSMENT I

8 NQF credits.

**Course outline:** This studiowork course integrates and develops the knowledge gained through the courses in the earlier part of the programme; focuses on the historical process leading to the current composition of the environment and assessments of heritage resources; develops the student's ability to assess the impacts of development and its significance; and it is intended to give experience in working with other professional disciplines.

**DP requirements:** 90% attendance of lectures and studiowork time and 100% completion of assignments.

**Assessment:** By examination (25% of mark), by assessment of groupwork conducted in the studio (25%) and of an assignment done individually (50%).

### **APG5069F CONSERVATION, DEVELOPMENT & IMPACT ASSESSMENT II**

20 NQF credits.

**Course outline:** This studiowork course, following the Part I course, further integrates and develops the knowledge gained through the courses in the earlier part of the programme; focuses on the historical process leading to the current composition of the environment and assessments of heritage resources; develops the student's ability to assess the impacts of development and its significance; and it is intended to give experience in working with other professional disciplines. This more advanced Part II course aims to prepare the student for the mini-thesis.

**DP requirements:** 90% attendance of lectures and studiowork time and 100% completion of assignments.

**Assessment:** By assessment of groupwork conducted in the studio (25%) and of an assignment done individually (75%).

### **APG5070F RESEARCH METHODOLOGIES**

20 NQF credits.

**Course outline:** This course consolidates the material of the earlier courses and requires the student to develop a research proposal for a thesis to be written during the second semester. This research proposal will include a problem statement, the design of the research, the methodologies to be adopted, the sources to be consulted, people to be interviewed, a bibliography and the relation of the proposed thesis to current issues in conservation and heritage resource management.

**DP requirements:** 90% attendance of lectures and seminar; and 100% completion of assignments.

**Assessment:** By assessment of the assignment.

### **APG5071S RESEARCH PROJECT**

60 NQF credits.

**Course outline:** Candidates will undertake a thesis in which he/she will design, develop or review a conservation-related topic/subject. The thesis must include primary research into the history of the building, place or environment and its composition or current state. The thesis will require approximately 600 hours of work; and the thesis may need to be defended orally at an examination.

**DP requirements:** Satisfactory completion of all coursework.

**Assessment:** By examination of the thesis.

### **APG6000W PHD THESIS: GEOMATICS**

### **APG6002S STUDIOWORK (ARCH6)**

Available to repeat BArch students only.

76 NQF credits.

**Course outline:** The course is a self elected Major Design under the guidance of tutors, and is aimed to demonstrate the student's all-round architectural ability from the development of a programme to conceptual design, to developed detail design.

**Assessment:** Oral examination (And Thesis design).

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### APG7000W MASTERS DISSERTATION: ARCHITECTURE & PLANNING

180 NQF credits.

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### APG7001Z MASTERS DISSERTATION: ARCHITECTURE & PLANNING

120 NQF credits.

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### APG7002Z ARCHITECTURAL PROJECT

32 NQF credits.

**Course outline:** On the recommendation of the supervisor and with the agreement of the head of department, a student registered for an MArch or an MPhil (Arch) may be permitted to enter into a programme of individual study on an approved topic. A statement of objectives must be agreed upon, and the course of study will be guided by the supervisor. The programme will involve the student in about 280 hours of work, and a written report must be submitted. The work will be examined and an oral examination may be held at the discretion of the supervisor.

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### APG7005Z RESEARCH METHODS IN ARCHITECTURE & THE BUILT ENVIRONMENT A

12 NQF credits.

**Course outline:** The course introduces basic methods and theories to be used in the study of the history of architecture and the built environment. It includes introduction to the use of archival materials, public documents, manuscripts, oral history, interviews, site analyses and documentation for each type of research. Course work will be focused on Cape Town and its region, and will consist of readings and short research exercises from a variety of sources.

**Assessment:** Examination and year mark.

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### APG7006Z RESEARCH METHODS IN ARCHITECTURE & THE BUILT ENVIRONMENT B

12 NQF credits.

**Course outline:** Students will prepare a research proposal for a thesis to be written during the second semester. The proposal will include development of problem statement, design of research, methodology to be followed, sources to be consulted, bibliography, relation of this research to current research issues.

**Assessment:** Examination and year mark.

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### APG7007Z RESEARCH PROJECT IN ARCHITECTURE & THE BUILT ENVIRONMENT

32 NQF credits.

**Course outline:** This course engages students in research projects in archives, libraries and sites in Cape Town and its region. All of the research projects will be components of a larger project, so each student will be researching a different aspect of one topic. Each student will conduct research, document the results of research, prepare a bibliography of sources utilized, and write a report of the research conducted.

**Assessment:** Research paper and year mark.

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### APG7008Z THEORIES OF ARCHITECTURE & THE BUILT ENVIRONMENT

12 NQF credits.

**Course outline:** This course introduces students to contemporary theories of architecture and the built environment, with particular reference to Cape Town and its region. Included are readings on Cape Town as well as theoretical issues to be considered in the conduct of the research projects,

including issues relating to culture and identity in the built environment, such as those based on gender, class, race and ethnicity; heritage assessment and evaluation in the built environment; construction of memory in places; globalisation and local culture; tradition and modernisation.

**Assessment:** Assignments and year mark.

## APG8000W PHD THESIS: ARCHITECTURE & PLANNING

### AST1000F INTRODUCTION TO ASTRONOMY

18 NQF credits, 5 lectures per week, 6 practicals.

**Course outline:** Our place in the Universe. Early beliefs and historical development of astronomical knowledge. 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.

**Assessment:** Class record: 50%, June examination 2 hours: 50%.

**DP requirements:** Regular attendance at lectures and tutorials; class mark of at least 35%.

**Sub-minimum:** 40% for final examination.

### AST2002S ASTROPHYSICS

24 NQF credits, 5 lectures per week, 1 practical per week, 1 field-trip to Sutherland.

**Course co-ordinator(s):** Dr PA Woudt.

**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-Å. 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.

**DP requirements:** Regular 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.

### BUS1007S INTRODUCTION TO ORGANISATIONAL PSYCHOLOGY

18 NQF credits, 3 lectures per week, 1 two hour tutorial every second week.

*Entry to this course is restricted to BBusSc students in the special field of Organisational Psychology and students from other faculties who may go on to complete senior courses in Organisational Psychology as well as students registered for the PGDipMngt(Entrepreneurship).*

**Course co-ordinator(s):** Dr A Schlechter.

**Prerequisites:** None.

**Course outline:** This course typically will introduce students to the field of Organisational Psychology, using three organising principles, namely Organisations, People and Human Resource Processes.

**DP requirements:** Completion of all tests and tutorial assignments. Minimum of 35% for coursework. Attendance is compulsory for all tutorials.

**Examination requirements:** Coursework (tutorials assignments and tests) 60%, October/November examination 40%.

### BUS1036F/S EVIDENCE-BASED MANAGEMENT

18 NQF credits, 3 lectures per week, 1 one hour tutorial per week.

**Course co-ordinator(s):** Mr J Rosseau.

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**Lecturer:** Mr J Rosseau.

**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.

**DP requirements:** 40% required (on average) for all coursework; submission of all tutorials and essays; attendance at a minimum of 75% tutorials.

**Examination requirements:** Essays and tutorial assignments 50%, 2 hour June/October examination 60%. A subminimum of 40% must be achieved in the exam.

**Website:** <http://www.commerce.uct.ac.za/managementstudies/undergrad/>

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### BUS2010F/S MARKETING I

18 NQF credits, 3 lectures per week, 1 one hour tutorial per week.

**Course co-ordinator(s):** Ms C O'Neill.

**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.

**DP requirements:** 40% class mark and the completion of all required assignments, attendance at 100% of tutorials.

**Examination requirements:** Essays, case studies, project and test 50%, 2 hour June examination 50%.

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### BUS2020F BUSINESS FINANCE

18 NQF credits, 3 lectures per week, 1 one 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.*

**Course co-ordinator(s):** Mr D Moore

**Prerequisites:** BUS1036F/S, STA1001F/S/H, MAM1000W or MAM1002W.

**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 entrepreneurial focus, equipping the prospective entrepreneur with some of the quantitative decision making tools required for a successful business venture.

**DP requirements:** 40% for classwork, completion of all required assignments and tests, attendance at 80% of the tutorials.

**Examination requirements:** Classwork 40%, final examination 60%.

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**CAS1001S AFRICA: CULTURE, IDENTITY & GLOBALISATION**

8 NQF credits, 12 lectures, 11 tutorials.

**Course co-ordinator(s):** Associate Professor N Shepherd.

**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.

**Assessment:** Two assignments counting 15% each; one group project counting 20%; and one examination counting 50%.

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**CAS4005Z RACE, CULTURE & IDENTITY IN AFRICA**

16 NQF credits, 12 double-period seminars.

**Course co-ordinator(s):** Associate Professor Nick Shepherd.

**Course outline:** The course is designed specifically with students, who are non African Studies specialists in mind, such as international students, or students from Faculties, such as Engineering and the Built Environment, Health Sciences, Science or Commerce. The mix of students, local and international as well as from a variety of disciplines, makes the interaction on the course an enriching experience.

The course will address some of the major contemporary issues facing South Africa and the continent and will confront some of the stereotypes and misrepresentations of the culture and history of Africa. Taught with the aim of empowering aspirant professionals as they embark on careers, students will be provided with reading especially chosen for non-specialists. The course is taught using exciting multimedia resources; web-based material; film, books and journal articles, fiction and commentary; poetry, political writing; and site visits.

This course is of interest to students in faculties such as Engineering & the Built Environment who wish to gain knowledge of the African context in order to start understanding some of the challenges they might meet in practice once qualified. In addition, many professional institutes are now making courses such as this a requirement for professional accreditation as part of a programme of *Complementary Studies*.

**Assessment:** Coursework 50%, final examination 50%.

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**CAS5009S CRITICAL ISSUES IN HERITAGE**

36 NQF credits.

**Course co-ordinator(s):** Associate Professor Nick Shepherd.

**Course outline:** In this course we examine a set of critical issues in the field of heritage studies, as they are currently unfolding. We take a case study approach to look at currently breaking issues in heritage theory, policy and practice. In particular, we are interested in those points at which heritage forms a cutting edge in broader contestations around culture, identity and history. In addition, as a way of making sense of heritage management discourses, we examine some of the intellectual histories and genealogies of formulations of heritage in South Africa.

**NOTE:** Attendance at seminars is compulsory, failing which students' papers may not be marked.

**Assessment:** Coursework 50%, final examination 50%.

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### CEM1000W CHEMISTRY 1000

36 NQF credits, 4 lectures per week, 1 practical per week, 1 tutorial per week.

**Course outline:** Microscopic and macroscopic concepts, atomic structure, chemical bonding and molecular structure, chemistry of the elements and inorganic chemistry, chemical equilibrium and 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.

**Assessment:** November examination 3 hours.

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### CEM1008F CHEMISTRY FOR ENGINEERS

16 NQF credits, 4 lectures per week, 1 practical and/or tutorial per week.

**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.

**Assessment:** June examination 2 hours.

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### CEM1009H CHEMISTRY 109

18 NQF credits, 3 lectures per week, 2 tutorials per week, 1 practical per week.

**Note:** This course, together with CEM1010F, is equivalent to CEM1000W.

**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.

**Assessment:** November examination 2 hours.

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### CEM1010F CHEMISTRY 110

18 NQF credits, 5 lectures per week, 1 tutorial per week, 1 practical per week.

**Note:** This course, together with CEM1009H is equivalent to CEM1000W.

**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.

**Assessment:** June examination 2 hours.

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### CEM2007F PHYSICAL CHEMISTRY & SPECTROSCOPY

24 NQF credits, 5 lectures per week, 1 practical per week, 1 tutorial per week.

**Prerequisites:** CEM1000W or equivalent, first-year full course in Physics, first-year full or semester course in Mathematics. Concurrent registration for MAM2052F (Quantitative Skills for Scientists) 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.

**Assessment:** June examination 2 hours.

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### CEM2008S ORGANIC & INORGANIC CHEMISTRY

24 NQF credits, 5 lectures per week, 1 practical per week, 1 tutorial per week.

**Prerequisites:** CEM1000W or equivalent, first-year full course in Physics, first-year full or

semester course in Mathematics. Completion of CEM2007F is strongly recommended.

**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.

**Assessment:** November examination 2 hours.

### CEM3005W CHEMISTRY 305

48 NQF credits, 5 lectures per week, 2 practicals per week.

**Prerequisites:** CEM2007F and CEM2008S, first-year full course in Mathematics; completion of or concurrent registration for MAM2052F 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.

**Assessment:** November examination two 3 hour papers.

### CHE1000Z INTRODUCTION TO CHEMICAL ENGINEERING

For students transferring into Chemical Engineering.

16 NQF credits, 48 lectures, 18 tutorials/practicals.

**Course outline:** Unit conversions; introduction to processes and design; chemical engineering calculations; graphical analysis; MATLAB and modelling; design project.

**DP requirements:** Satisfactory performance in tutorials.

**Assessment:** February examination, two 2.5 hour papers.

### CHE1004W ENGINEERING I

32 NQF credits, 96 lectures, 14 tutorials, 2 plant visits, 1 practical.

**Course outline:** Studying and working in chemical engineering; unit conversions; introduction to processes and design; chemical engineering calculations; graphical analysis; modelling using spreadsheets and MATLAB; design project.

**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 MATERIAL & ENERGY BALANCES

20 NQF credits, 60 lectures, 12 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials and journal tasks; minimum of 40% for class mark.

**Assessment:** Class tests; project; June examination 3 hours.

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**CHE2032Z DESIGN OF CHEMICAL PROCESSES**

8 NQF credits, 24 lectures, 12 tutorials, 1 week field-trip.

**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.

**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.

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**CHE2033W CHEMICAL ENGINEERING LABORATORY I**

4 NQF credits, 7 practicals.

**Co-requisites:** CHE2031F.

**Course outline:** Steady state mass and energy balancing, fluid flow measurements, pump characteristics, heat exchange, transport phenomena.

**DP requirements:** Satisfactory performance in all reports and presentations.

**Assessment:** Class test; reports; presentations.

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**CHE2035S THERMODYNAMICS I**

12 NQF credits, 36 lectures, 10 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials; minimum of 40% for class mark.

**Assessment:** Class tests; November examination 3 hours.

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**CHE2040S DESIGN OF FLUID FLOW & HEAT TRANSFER SYSTEMS**

20 NQF credits, 60 lectures, 24 tutorials.

**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. Open-ended problem solving.

**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.

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**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, either in the form of a log book as well as either a technical report to the satisfaction of the programme convener, or a letter of confirmation from a practising engineer, shall be submitted on the day of registration.

**DP requirements:** None.

**Assessment:** Final report.

### **CHE3035S BIOPROCESS ENGINEERING I**

8 NQF credits, 24 lectures, 2 tutorials, 2 practicals, 2 Plant visits.

**Prerequisites:** All second year core courses.

**Course outline:** An introduction to microbiology and biochemistry; the requirements of microbial processes; bioreactor design; bioprocess kinetics; sterilisation; selected case studies, visits to local bioprocess industries.

**DP requirements:** None.

**Assessment:** Assignments; November examination 2 hours.

### **CHE3039S CHEMISTRY & CHEMICAL ENGINEERING OF CATALYTIC PROCESSES**

8 NQF credits, 24 lectures.

**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.

**DP requirements:** None.

**Assessment:** November examination 2 hours.

### **CHE3040S SOLID-FLUID OPERATIONS**

12 NQF credits, 36 lectures, 12 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials; minimum of 40% for class mark.

**Assessment:** Class tests; November examination 3 hours.

### **CHE3044F REACTOR DESIGN I**

12 NQF credits, 36 lectures, 12 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials; minimum of 40% for class mark.

**Assessment:** Class tests; June examination 3 hours.

### **CHE3046F THERMODYNAMICS II**

12 NQF credits, 36 lectures, 11 tutorials.

**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

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phase and chemical equilibrium; applications of computational methods to solve thermodynamic problems.

**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.

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### CHE3049W CHEMICAL ENGINEERING LABORATORY II

16 NQF credits, 8 lectures, 5 practicals.

**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.

**DP requirements:** Satisfactory performance in all reports and presentations.

**Assessment:** Class tests, reports, presentations.

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### CHE3050S CHEMICAL PROCESS UNIT DESIGN

6 NQF credits, 24 lectures.

**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.

**Assessment:** Project.

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### CHE3053S SEPARATION PROCESSES

13 NQF credits, 36 lectures, 10 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials; minimum of 40% for class mark.

**Assessment:** Class tests; November examination 3 hours.

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### CHE3054S REACTOR DESIGN II

13 NQF credits, 36 lectures, 10 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorials; minimum of 40% for class mark.

**Assessment:** Class tests; November examination 3 hours.

### **CHE3062S** PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering and Geomatics students.

12 NQF credits, 24 lectures.

**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. **Second-year students may not register for CHE3062S.**

**DP requirements:** Satisfactory attendance at all sessions; minimum of 50% for class mark.

**Assessment:** Class test; report; essay; exercises; presentation; November examination 2 hours.

### **CHE3063F** MASS TRANSFER

16 NQF credits, 48 lectures, 10 tutorials.

**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.

**DP requirements:** Satisfactory performance in tutorial and project, class mark of 40%.

**Assessment:** Class tests; project; computer examination; June examination 3 hours.

### **CHE3064S** MINERAL & METALLURGICAL PROCESSING I

8 NQF credits, 4 lectures, 5 practicals.

**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 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 the above unit operations using a spreadsheet-based simulator (LIMN).

**DP requirements:** None.

**Assessment:** Projects; reports.

### **CHE3065S** NUMERICAL SIMULATION FOR CHEMICAL ENGINEERS

8 NQF credits, 24 lectures.

**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 least 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 least squares estimation of model parameters with variance; formulate objective functions and minimisation/maximisation of process operating models; embedded systems.

**DP requirements:** None.

**Assessment:** Projects; assignments.

### **CHE3066S** CRYSTALLISATION & PRECIPITATION

8 NQF credits, 24 lectures.

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**Prerequisites:** All second year core courses.

**Course outline:** Overview, Crystallisation methods, Product characterisation, Fundamental mechanisms, Mass, heat and population balances, Design of crystallizers and precipitators, Crystallisation and precipitation equipment, Applications of industrial crystallisation, Measurement techniques, Precipitation: Basic Principles, Chemistry Particle processes in precipitation, Mixing and Hydrodynamics, Scale up. Case studies.

**DP requirements:** Satisfactory performance in all assignments.

**Assessment:** Assignments.

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### **CHE4024F** INTRODUCTION TO ENVIRONMENTAL PROCESS ENGINEERING

8 NQF credits, 24 lectures, 5 tutorials. 1 afternoon field-trip.

**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.

**DP requirements:** Satisfactory performance in project.

**Assessment:** Project; June examination 2 hours.

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### **CHE4029Z** PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering students.

8 NQF credits, 24 lectures.

**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.

**DP requirements:** Satisfactory attendance at all sessions.

**Assessment:** Oral examination, projects, presentations.

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### **CHE4036Z** CHEMICAL ENGINEERING DESIGN

28 NQF credits.

**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.

**DP requirements:** None.

**Assessment:** Individual and group submissions.

### **CHE4042F** PROCESS DYNAMICS & CONTROL

16 NQF credits, 48 lectures, 10 tutorials.

**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, Ziegler-Nichols tuning. Feedforward and cascade control. Multi-input-multi-output systems: stability, interaction, relative gain array, decoupling.

**DP requirements:** Satisfactory performance in tutorials, projects, laboratory, individual learning reflections.

**Assessment:** Projects; June examination, one 3 hour and one 1.5 hour paper.

### **CHE4045Z** CHEMICAL ENGINEERING PROJECT

32 NQF credits.

**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.

**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.

### **CHE4048F** BUSINESS, SOCIETY & ENVIRONMENT

20 NQF credits, 48 lectures, 12 tutorial sessions.

**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.

**DP requirements:** Satisfactory performance in tutorials, project, class mark of 40%.

**Assessment:** Class test; projects; June examination 3 hours.

### **CHE4049F** PROCESS SYNTHESIS & EQUIPMENT DESIGN

20 NQF credits, 48 lectures, studio sessions, 8 tutorials.

**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:

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Process Flowsheeting Conventions; Process Flowsheet Development using Process Synthesis Theory and Heuristics; Chemical Engineering Flowsheeting Packages; Equipment Design Heuristics; Process Control Philosophy; Health, Safety and Environmental (HSE) Reviews; Plant Layout.

**DP requirements:** Satisfactory performance in competency test; projects, satisfactory attendance at HSE review session.

**Assessment:** Competency test; projects; June examination 3 hours.

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### CHE4050F MINERAL & METALLURGICAL PROCESSING II

8 NQF credits, 16 lectures, 4 projects, 2 tutorial sessions.

**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 items and circuits. Introduction to mineralogy and liberation analysis methods are discussed. The course then presents selected theories/models used for the design, modelling and simulation of industrial milling and flotation process items and circuits. The course concludes with an overview of the use of two milling and flotation simulators (JKSimMet and JKSimFlot). An introduction to hydrometallurgy containing the basic concepts and calculations encountered in this field. Students are required to demonstrate their understanding of the course material through four projects.

**DP requirements:** None.

**Assessment:** Projects.

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### CHE4051W PROCESS INDUSTRIES

8 NQF credits.

**Prerequisites:** 3 year BSc Degree.

**Course outline: Fieldwork:** The students will undertake a selection of 3 field studies selected from local industries relevant to their chosen specialisation. The students will plan these visits, collect relevant information prior to the visit, compile a programme for each visit and report on their findings. In each of these, they will be expected to compile the process flow sheet for the manufacture of a specific product and to gather detailed knowledge on 3 unit operations used in the process. The assignments will be compiled in the open-ended format, requiring the student to investigate the theory underpinning the process, to plan and conduct the visit, collect and process information, and to present their findings as a technical report and seminar in each case.

**Assignment:** In addition to the plant visits, the students will undertake the review of a potential new product in their discipline, considering routes to production, market, product specification etc.

**DP requirements:** None.

**Assessment:** Assignments; reports; seminars.

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### CHE4052W PROCESS TECHNOLOGY LABORATORY FOR SCIENTISTS

8 NQF credits.

**Prerequisites:** 3 year BSc Degree.

**Course outline: Lectures:** Students will attend a set of 8 lectures (shared with the courses CHE3049W or CHE2033W) in which they will be taught the elements of safety in the laboratory, experimental design and statistics for experimental analysis.

**Practicals:** The students will conduct a selection of 4 practical experiments selected from those available within the chemical engineering curriculum. These experiments will be conducted in the open-ended format, requiring the student to investigate the theory of the experiment, to plan an experimental approach, to conduct the experiment, collect data, analyse the data both qualitatively and quantitatively, and to present their research findings as a technical report in each case. Practical will be drawn from the following: filtration, fluid flow, crystallisation and precipitation, protein

production and recovery, fermentation, residence time distribution, milling, fluidisation, flooding and loading, analysis of chemical kinetics, process control.

**Assessment:** Assignments.

**CHE5000W** MASTERS DISSERTATION: CHEMICAL ENGINEERING

180 NQF credits.

**Co-requisites:** CHE5055Z.

**CHE5002Z** MASTERS DISSERTATION: CHEMICAL ENGINEERING

120 NQF credits.

**Prerequisites:** CHE5055Z, DP in CHE5082Z.

**CHE5022Z** INTRODUCTION TO CATALYSIS

16 NQF credits.

**Course outline:** Basic principles in heterogeneous catalysis; diffusion and adsorption; catalyst testing (reactions, product analysis); catalyst preparation (zeolites; metal-based catalysts); acid catalysed reactions; metal catalysed reactions; bi-functional catalysis; oxidation catalysis.

**Assessment:** Class tests; project; examination 3 hours.

**CHE5027Z** ADVANCED REACTION KINETICS IN HETEROGENEOUS SYSTEMS

8 NQF credits.

**Course outline:** Collision theory, adsorption, micro-kinetic analysis of heterogeneous catalysed reactions. Kinetics of specific systems; microbial enzyme kinetics, kinetics of polymerisation; oxidation reactions, mineral leaching.

**Assessment:** Examination 2 hours and assignments.

**CHE5030Z** ADVANCED ENGINEERING STATISTICS I

8 NQF credits.

**Course outline:** Conducting a physical experiment, random variables and variation, making inference on random variables, normal distribution, confidence intervals. Design and analysis of experiments : sequential design, factorial designs, fractional factorial designs, response surface designs, mixture designs, optimal design. Nonlinear model fitting, nonlinear optimal design, application to laboratory and industrial data.

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

**CHE5033Z** APPLIED MATHEMATICS & MODELLING II

8 NQF credits.

**Course outline:** Non-linear multivariable parameter estimation, formulation of objective functions, optimisation (NLP), single variable, multivariable, BFGS, Nelder and Mead, Levenberg-Marquardt, sequential quadratic programming (QP&SQP), mix-integer non-linear optimisation (MINLP), unconstrained, constrained, inequalities, Lagrange multipliers, sensitivity analysis, examples.

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

**CHE5040Z** FUELS & CHEMICALS FROM OIL

12 NQF credits, 36 lectures, 10 tutorials.

**Prerequisites:** CHE5045Z (DP).

**Course outline:** The purpose of the course is to impart a basic understanding of the underlying principles of industrial chemical production processes and to develop an intuitive understanding of how things are done and why they are done the way they are done in the fuel/chemical industry

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including basic economic and environmental considerations. The course back bone is a crude oil refinery. The major individual processes and how they are integrated are the examples or carriers for the above understanding; comprising crude distillation, solvent deasphalting, thermal cracking processes, catalytic cracking, all of hydroprocessing ranging from hydrofining to deep hydrocracking, sweetening, reforming, alkylation, isomerisation, sulphur management, octane and cetane numbers and steamcracking.

**Assessment:** Class test and final examination 3 hours.

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### CHE5041Z INSTRUMENTAL ANALYSIS I

4 NQF credits.

**Course outline:** Introduction to instrumental measurements; amplification of signals; noise; temperature measurement; pressure measurement; evaluation of analytical data.

**Assessment:** Examination and project.

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### CHE5042Z INSTRUMENTAL ANALYSIS II

4 NQF credits.

**Course outline:** Chromatographic methods; chromatographic separation; peak broadening; column efficiency; instrumentation for GC; instrumentation for HPLC; detectors; quantitative analyses.

**Assessment:** Examination 1 hour.

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### CHE5043Z INSTRUMENTAL ANALYSIS III

4 NQF credits.

**Course outline:** Spectroscopic methods; electromagnetic radiation; optical instrumentation; quantitative absorption measurements. Categorised into three broad classes, viz. elemental analysis (AAS, AES, XRF), structural determination (XRD, IR, LEED) and surface characterisation (AES, UPS, XPS).

**Assessment:** Examination 2 hours.

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### CHE5045Z FUELS & CHEMICALS FROM COAL & SYNGAS

12 NQF credits, 36 lectures, 10 tutorials.

**Course outline:** The purpose of the course is to impart a basic understanding of the underlying principles of industrial chemical production processes and to develop an intuitive understanding of how things are done and why they are done the way they are done in the fuel/chemical industry including basic economic and environmental considerations and features of R&D in the chemical industry. The course is structured around South Africa's coal liquefaction to fuels and chemicals process as the back bone. The major individual processes and how they are integrated are the examples or carriers for the above understanding; comprising coal gasification, syngas gas clean-up and coal gasification by-products, chemistry of phenolics, Fischer-Tropsch synthesis, Fischer-Tropsch product separation and purification as well as other syngas based processes, e.g. methanol synthesis and hydroformylation and manufacture of hydrogen.

**DP requirements:** 30% class mark.

**Assessment:** Class test and final examination 3 hours.

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### CHE5047Z INTRODUCTION TO MOLECULAR MODELLING

8 NQF credits.

**Course outline:** Molecular modelling of solids and fluid-phase components of interest to catalysis and other fields. Course provides background theoretical understanding of molecular modelling as well as subject specific experience with the use of the leading commercial modelling software. Including the building of molecular structures ab initio, the use of data libraries as well as the use of various force-field energy minimisation techniques.

**Assessment:** Examination 2 hours.

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**CHE5048Z CRYSTALLISATION & PRECIPITATION**

12 NQF credits, 26 lectures, 6 tutorials.

**Course outline:** Crystallisation and precipitation are considered as separation processes, where a solid phase is created from a liquid phase. The course covers crystallisation methods and supersaturation, particle size distribution (PSD), crystal morphology, mother liquor inclusions, uptake of impurities, primary nucleation, growth mechanisms and growth rate expressions, the population balance equation, agglomeration and special considerations for precipitation.

**Assessment:** Project(s).

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**CHE5049Z CHEMICAL ENGINEERING TOPICS FOR SCIENTISTS**

Not offered to Chemical Engineering graduates

16 NQF credits, 48 lectures, 12 tutorials.

**Course outline:** Material and energy balances; reactor configuration; reaction kinetics; fluid flow in pipe reactors and particulate systems. Solid-liquid separations. Basic mass transfer.

**Assessment:** Examination 3 hours, assignments.

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**CHE5051Z MICROBIAL PHYSIOLOGY & DYNAMICS**

8 NQF credits, 24 lectures.

**Prerequisites:** BSc(Eng) or equivalent four year BSc(Hons) degree.

**Course outline:** Fundamentals of microbiology, macromolecules and metabolism; metabolic engineering; microbial media and culture maintenance; gene expression and control.

**Assessment:** Examination 3 hours, assignments.

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**CHE5052Z MOLECULAR BIOLOGY & BIOCATALYSIS**

8 NQF credits, 24 lectures, 3 assignments.

**Course outline:** Gene cloning and expression; genetically engineered organisms in processes: process constraints; regulatory constraints and GMO's; Microbial species identification using molecular biology; definition of biocatalysis; enzymes as biocatalysts; enzyme kinetics; enzyme applications in biocatalysis; biotransformations using whole cell systems.

**DP requirements:** Attendance at 75% of lectures, submission of all assignments.

**Assessment:** Examination and year mark.

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**CHE5054Z BIOTECHNOLOGY LABORATORY**

8 NQF credits

**Course outline:** Basic microbiology, fermentation technology, brewing, protein extraction and electrophoresis, DNA extraction, PCR, Fluorescence microscopy, enzyme kinetics, biotransformations.

**Assessment:** Assignments and practical examination.

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**CHE5055Z RESEARCH COMMUNICATION & METHODOLOGY**

16 NQF credits, 20 lectures or seminar sessions, 4 assignments and 1 final report.

**Course outline:** The aim of the course is to provide postgraduate students with the competency to execute meaningful research in a structured way, to critically analyse the results of this research and to communicate these results effectively. The course topics include: Research philosophy, research planning, hypothesis development and research methodology; literature review skills; research ethics; research communication and related technical skills; experimental practice; structuring, writing and presentation of scientific outputs. The assignments include: oral presentation of seminars, scientific and technical writing tasks, experimental design tasks and literature review. The final examination comprises the compilation and presentation of the final report which is a complete

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research proposal.

**DP requirements:** Completion of all assignments and the final report.

**Assessment:** Assignments and final report.

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### **CHE5056Z** BIOLEACHING OF SULPHIDE MINERALS

8 NQF credits, 20 lectures, 4 tutorials.

**Course outline:** Scope of bioleaching and its historical developments; industrial applications: dump, heap and tank leaching and the use of thermophiles; microorganisms: microbial ecology of bioleach systems; mechanism and kinetics: chemical reaction mechanisms; kinetics and rate equations; modelling: chemical process modelling; future developments: current research activities and developmental challenges.

**Assessment:** Examination.

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### **CHE5057Z** FUNDAMENTALS OF HYDROMETALLURGY

12 NQF credits, 24 lectures, 4 tutorials.

**Course outline:** Aqueous thermodynamics; kinetics of heterogeneous reactions; material and energy balances in hydrometallurgy.

**Assessment:** Examination 50% and year mark 50%.

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### **CHE5058Z** LEACHING HYDROMETALLURGY

12 NQF credits, 24 lectures, 4 tutorials.

**Course outline:** Advanced Topics in leaching: theory and applications to leaching practice.

**Assessment:** Examination 50% and year mark 50%.

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### **CHE5059Z** HYDROMETALLURGICAL SEPARATION PROCESSES

12 NQF credits, 24 lectures, 4 tutorials.

**Course outline:** Introduction to principles and applications of solvent extraction, precipitation, electrowinning adsorption and solid-liquid separation as pertinent to hydrometallurgical processes.

**Assessment:** Examination 50% and year mark 50%.

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### **CHE5060Z** SOLVENT EXTRACTION

8 NQF credits, 20 lectures, 4 tutorials.

**Course outline:** Solvent Extraction: practice; engineering; modelling.

**Assessment:** Examination and year mark.

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### **CHE5061Z** ADVANCED TOPICS IN REDUCTION

8 NQF credits, 20 lectures, 4 tutorials.

**Course outline:** Metal reduction: theory - chemical reaction kinetics and thermodynamics; engineering - chemical process design and engineering; modelling - chemical process modelling.

**Assessment:** Examination and year mark.

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### **CHE5062Z** ELECTROWINNING/REFINING: PRACTICE, MODELLING & CONTROL

8 NQF credits, 20 lectures, 4 tutorials.

**Course outline:** Electrowinning and -refining: chemical process design, engineering and operation; chemical process modelling; process control.

**Assessment:** Examination 50% and year mark 50%.

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**CHE5063Z ADVANCED TOPICS IN ADSORPTION & ION EXCHANGE**

8 NQF credits, 20 lectures, 4 tutorials.

**Course outline:** Introduction: scope of adsorption and ion exchange and their historical development; theory: adsorption and ion exchange process systems engineering; industrial applications: modelling and control.

**Assessment:** Examination 50% and year mark 50%.

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**CHE5064Z SUSTAINABILITY IN CHEMICAL ENGINEERING**

8 NQF credits

**Prerequisites:** BSc(Eng) or equivalent four year BSc(Hons) degree. Students of excellent academic standing may be given concession to register for this course in the final year of their BSc(Eng) degree.

**Course outline:** Sustainability is fast becoming a major factor in decision making in most industries employing chemical engineering graduates. Since the IChemE and its sister associations signed the London Communiqué in 1997, sustainability has become understood as a key design and operation criterion for chemical engineers to consider. This course seeks to provide graduate students with an awareness of the issues surrounding a sustainable process industry and an appreciation for its importance. The course will examine the central role of chemical engineering in achieving balance amongst economic, environmental, and social benefits and impacts for projects conducted by companies operating in the oil, chemicals, minerals and energy sectors, and will address related challenges of intensive agriculture and provision of water. It seeks to go further to provide a framework and a set of tools which will assist the process engineer in providing rational input in terms of sustainability into decision making, with quantification wherever possible.

**Assessment:** Examination and assignments.

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**CHE5066Z COMPUTING FOR ENGINEERS**

8 NQF credits, 24 lectures.

**Prerequisites:** BSc(Eng).

**Course outline:** Delphi IDE and VCL, introduction to Object-Oriented Programming (OOP), inheritance and polymorphism, interfaces, modelling in Delphi, numerical routines, reaction kinetics, CAPE-Open wizard, Aspen blocks.

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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**CHE5069Z ADVANCED THERMODYNAMICS & SEPARATION PROCESSES**

8 NQF credits, 24 lectures.

**Prerequisites:** BSc(Eng).

**Course outline:** Multiphase equilibria : equations of state, activity coefficient models, gas-solid and liquid-solid systems, Gibbs free energy minimisation. Separations technology : azeotropes, residue curve/distillation curve analysis, complex separations, membranes, adsorption, reactive separations. Multi-component mass transfer: application of Maxwell-Stefan theory to separation systems.

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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**CHE5070Z ADVANCED BIOPROCESS ENGINEERING**

This course cannot be taken with CHE5038Z and CHE5053Z.

16 NQF credits, 36 lectures, 12 tutorials.

**Prerequisites:** BSc(Eng) or equivalent four year BSc(Hons) degree.

**Course outline:** Introduction to bioprocess design. Stoichiometry of microbial growth and product formation. Mixing and oxygen transfer. Bioreactor design and scale up. Sterilisation. Material and energy balances for microbial systems. Biokinetic analysis of batch, fed-batch and continuous systems. Mixed cultures and mixed culture kinetics. Downstream processing. Bioprocess analysis.

**DP requirements:** Satisfactory completion of all projects and assignments.

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**Assessment:** Examination 3 hours, projects and assignments.

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### CHE5072Z FUNDAMENTALS OF PROCESS MODELLING

4 NQF credits.

**Course outline:** Micro-, meso-, macro-scale modelling; Population balance modelling; Dynamics and stability of chemical systems.

**DP requirements:** Attendance 70%.

**Assessment:** Project and/or examination.

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### CHE5073Z ESSENTIAL TECHNICAL TOOLS

16 NQF credits.

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** Problem solving, risk assessment, sampling theory and practice, comparative statistics for minerals engineers, mass balancing and data reconciliation using Microsoft Excel, Project Management and Microsoft Project.

**DP requirements:** Attain no less than 50% for the year mark.

**Assessment:** Examination and year mark.

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### CHE5074Z ADVANCED COMMINATION I

16 NQF credits.

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** Comminution principles (equipment and operating characteristics such as power draw, classification principles, etc). Survey and measurement of comminution process circuits.

**DP requirements:** 50% for the year mark.

**Assessment:** Examination and year mark.

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### CHE5075Z ADVANCED COMMINATION II

16 NQF credits.

**Prerequisites:** At least 65% in CHE5074Z. BSc(Eng) or equivalent.

**Course outline:** Comminution theory (rock breakage, ore characterisation, etc). Steady state models of unit operations (crushers, screens, cyclones, mills). The use of recycle streams. Circuit optimisation using relevant tools such as simulation.

**DP requirements:** 50% for the year mark.

**Assessment:** Examination and year mark.

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### CHE5076Z CONCEPTUAL FRAMEWORK OF MINERALS BENEFICIATION

8 NQF credits.

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** The economics of mined commodities, with examples taken from the relevant mining sub-industry (e.g. from the Platinum or Gold industries). Mining, Smelting and Refining theory and practice for engineers not practising in these fields. Introduction to project analysis (issues such as viability and sensitivity).

**DP requirements:** Completion of all assignments.

**Assessment:** Examination and year mark.

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### CHE5077Z INTRODUCTION TO HYDROMETALLURGY

8 NQF credits, 24 lectures, 4 tutorials.

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** Fundamentals of equilibrium and redox chemistry and thermodynamics in aqueous solution; introduction to pH-Eh diagrams, leach kinetics and electro-kinetics; unit operations in

hydrometallurgical processes: leaching, precipitation, solvent extraction and electrowinning; flow sheets of typical processes: Cu, Ni, Au, PGMs; mass balancing in hydrometallurgical circuits; hydrometallurgy in the environment and various engineering disciplines.

**Assessment:** Examination 40%, assignment 60%.

### **CHE5078Z** ADVANCED NUMERICAL METHODS FOR ENGINEERS

16 NQF credits, 24 lectures.

**Prerequisites:** BSc(Eng), BSc(Hons) with applied mathematics major.

**Course outline:** Computer arithmetic, linear equations (transformations, SVD), non-linear equations (quasi-newtons methods, continuation), ODE's (explicit, implicit, BDF, implicit Runge-Kutta), BVPs (collocation, finite differences, shooting method, finite elements), DAEs (index, implicit solvers), PDE's (collocation, finite differences, finite elements, iterative methods), model regression (least squares, variance, bootstrap, parameter estimation), parametric sensitivity analysis (transient, steady state).

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

### **CHE5079Z** INTEGRATED ANALYSIS OF MINERAL BENEFICIATION SYSTEMS

16 NQF credits, 8 lectures, 9 tutorials.

**Prerequisites:** CHE5075Z and CHE5081Z.

**Course outline:** The course is in the form of a classical engineering design project, including individual and group exercises. The main exercise is grounded in an expansion-type project, where the data are collected from an existing operation and used to calibrate unit process models. An optimisation study is then performed on the existing operation. The work is carried out in a studio environment.

**Assessment:** Year mark.

### **CHE5080Z** ADVANCED FLOTATION I

16 NQF credits, 36 lectures, 2 tutorials.

**Prerequisites:** Chemical or Metallurgical Engineering Degree or Diploma.

**Course outline:** Flotation principles (sub-processes, floatability, entrainability, flotation chemistry); steady-state models of batch and continuous flotation cells, and their limitations; introduction to analytical procedures (analysis of minerals, reagents, sulphur, etc); introduction to flotation cell characterisation (gas dispersion, residence time distribution); introduction to flotation circuit characterisation (plant surveys, nodal analysis).

**DP requirements:** 50% for the year mark.

**Assessment:** Examination 50%, year mark 50%.

### **CHE5081Z** ADVANCED FLOTATION II

16 NQF credits, 36 lectures, 9 tutorials, 2 practicals.

**Prerequisites:** CHE5073Z, CHE5074Z, CHE5076Z, at least 65% in CHE5080Z.

**Course outline:** Modelling and simulation of flotation cells and circuits; optimisation of flotation circuit performance.

**DP requirements:** 50% for the year mark.

**Assessment:** Examination 50%, year mark 50%.

### **CHE5082Z** DISSERTATION PREPARATION

DP requirement for entry to CHE5002Z.

**Co-requisites:** CHE5055Z.

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the

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CHE5002Z Masters Dissertation. Work required may include ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place, setting up of models, collection of data. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

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### CHE5083Z TRANSLATING TECHNOLOGY FROM THE LABORATORY TO THE MARKETPLACE

8 NQF credits.

**Course outline:** Topics covered include technology commercialisation; intellectual property; start-up companies (structure, resourcing); entrepreneurial resources; introduction to entrepreneurial finance and funding; business models specific to biotechnology; understanding the components of a business plan; market research.

**DP requirements:** Satisfactory completion of 80% assignments.

**Assessment:** Year mark.

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### CHE5084Z MINOR DISSERTATION (MINERALS BENEFICIATION)

*For Masters Candidates only*

60 NQF credits.

**Course outline:** Candidates will undertake a project of a developmental, review or practical nature on a research topic/problem selected in consultation with the Programme Convener. The work will involve the preparation of a research project/proposal, a literature review, data collection (possibly including empirical research), analysis of findings, drawing conclusions, making recommendations and the preparation of a minor dissertation.

**Assessment:** Research project report.

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### CHE6000W PHD THESIS: CHEMICAL ENGINEERING

**Co-requisites:** CHE5055Z.

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### CIV1004W ENGINEERING I

32 NQF credits.

**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.

**Assessment:** Continuous assessment by projects, assignments and tests.

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### CIV1006S BUILDING SCIENCE I

16 NQF credits, 4 lectures per week.

**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.

**Assessment:** November examination 2 hours.

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**CIV2011F MECHANICS OF MATERIALS**

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**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.

**Assessment:** June examination 3 hours.

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**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.

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**CIV2031S STRUCTURAL ENGINEERING I**

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**Prerequisites:** CIV2011F.

**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.

**Assessment:** November examination 3 hours.

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**CIV2034S SPATIAL DATA ACQUISITION & MANAGEMENT**

16 NQF credits, 48 lectures, 12 practicals.

**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.

**Assessment:** Group projects, class tests and practical work.

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**CIV2035X CIVIL ENGINEERING CAMP**

4 NQF credits, 2 weeks.

**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, metadata design. Spatial Query and Analysis.

**Assessment:** Group project and practical work.

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### CIV2037F EXPERIMENTAL METHODS & STATISTICS

16 NQF credits, 36 lectures, 24 practicals.

**Prerequisites:** CIV1004W.

**Co-requisites:** CIV2011F.

**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 flow, temperature, and pH, 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.

**Assessment:** Continuous assessment by projects, assignments and tests.

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### CIV2039S GEOTECHNICAL ENGINEERING I

16 NQF credits, 48 lectures, 6 practicals, 9 tutorials.

**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.

**Assessment:** November examination 3 hours.

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### CIV2040S FLUID MECHANICS

8 NQF credits, 25 lectures, 4 tutorials, 1 practical.

**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.

**Assessment:** November examination 2 hours.

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### CIV3031F STRUCTURAL ENGINEERING II

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**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.

**Assessment:** June examination 3 hours.

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### CIV3035S STRUCTURAL ENGINEERING III

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**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.

**Assessment:** November examination 3 hours.

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### CIV3042F GEOTECHNICAL ENGINEERING II

16 NQF credits, 48 lectures, 12 tutorials.

**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. Geotechnical design.

**Assessment:** June examination 3 hours.

### **CIV3043F HYDRAULIC ENGINEERING**

16 NQF credits, 48 lectures, 7 tutorials.

**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.

**Assessment:** June examination 3 hours.

### **CIV3044F ENGINEERING HYDROLOGY**

8 NQF credits, 22 lectures, 5 tutorials.

**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.

**Assessment:** June examination 2 hours.

### **CIV3045F TRANSPORTATION PLANNING**

16 NQF credits, 52 lectures, 13 tutorials.

**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).

**Assessment:** June examination 3 hours 50%, class mark 50%.

### **CIV3046S WATER TREATMENT**

12 NQF credits, 36 lectures, 12 tutorials.

**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.

**Assessment:** November examination 3 hours.

### **CIV3047S URBAN WATER SERVICES**

12 NQF credits, 36 lectures.

**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.

**Assessment:** Three design projects (60%) November examination 2 hours (40%).

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### CIV4031F STRUCTURAL ENGINEERING IV

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**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.

**Assessment:** June examination 4 hours.

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### CIV4034F GEOTECHNICAL ENGINEERING II

16 NQF credits, 48 lectures, 12 tutorials/practicals.

**Prerequisites:** CIV3034S (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 walls and sheet pile wall design, anchorages, sliding block stability. Dewatering control systems, filter criteria, theory of wells. Geotechnical design.

**Assessment:** June examination 4 hours.

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### CIV4035C DESIGN PROJECT

24 NQF credits, 5 weeks full time duration.

**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.

**Assessment:** Assessment by prescribed submissions and contributions.

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### CIV4041F PROFESSIONAL PRACTICE

16 NQF credits; 50 lectures; 1 tutorial.

**Prerequisites:**

**Co-requisites:** CIV4035C and CIV4044F/S.

**Course outline:** Benefit:Cost analysis, the project life cycle, contract law, project management, Health & Safety, Ethics and Codes of Conduct, Sustainability & the future of civil engineering, the profession, professional communication, the world of work.

**Assessment:** Continuous assessment by class tests, essays, project and presentation.

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### CIV4042F WASTEWATER TREATMENT

12 NQF credits; 36 lectures; 10 tutorials.

**Prerequisites:** CEM1008F.

**Co-requisites:**

**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 nonbiodegradable 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.

**Assessment:** June examination 3 hours.

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**CIV4043F** URBAN DESIGN & MANAGEMENT

16 NQF credits; 48 lectures; 12 tutorials.

**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. Project evaluation and prioritisation.**Assessment:** Class mark (50%) June examination 50%.

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**CIV4044S/F** THESIS

48 NQF credits.

**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.**DP requirements:** Completion of thesis and poster.

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**CIV5000W** MASTERS DISSERTATION: CIVIL ENGINEERING

180 NQF credits.

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**CIV5000Z** MASTERS DISSERTATION: CIVIL ENGINEERING

120 NQF credits.

**Prerequisites:** CIV5109Z.

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**CIV5001Z** CIVIL ENGINEERING REPORT

This course is only offered to candidates for the Postgraduate Diploma in Engineering.

40 NQF credits.

**Course outline:** A student registered for a diploma may be permitted to enter into a programme of individual study on a specialised topic within the engineering field. The course of study will be guided by a supervisor appropriate to the field selected. The scope of work may be experimental (laboratory or field), or new methods applicable to engineering design, or a comprehensive review.

The programme will involve the student in about 360 hours of work, and a written report must be submitted in the format of a minor thesis, which will be examined by two examiners.

**Assessment:** Project report(s).

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**CIV5002Z** STRUCTURAL CONCRETE PROPERTIES & PRACTICE

16 NQF credits.

**Course outline:** Cements, admixtures, cement extenders, aggregates; desirable properties for concrete; plastic and hardened properties, including strength, creep, shrinkage; concrete mix design; prediction of concrete structural properties; concrete failure and fracture; design approaches; concrete quality control. Special concretes, industrial visits, seminars, projects, laboratories.**Assessment:** Examination and projects.

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**CIV5006Z** ADVANCED STRUCTURAL CONCRETE ENGINEERING I

16 NQF credits.

**Course outline:** Yield line analysis and design of concrete slabs; Hillerborg strip method of analysis and design of concrete slabs; ultimate design of composite structural systems.**Assessment:** Examination and projects.

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**CIV5007S** ADVANCED CONSTRUCTION LAW

12 NQF credits.

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**Prerequisites:** CIV5025F.

**Course outline:** Interpretation of the construction and building contracts and their formation. Liability of the professionals. Remedies in the event of failure to perform and the effect of insolvency. Sub-contracts. Dispute resolution.

**Assessment:** Examination.

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### **CIV5017Z** MINOR DISSERTATION

60 NQF credits.

**Course outline:** Candidates will undertake a project of a development, review, or practical nature on a prescribed Civil Engineering topic. The project may be undertaken individually or as a group project and a project report must be written. The project will require approximately 600 hours of work.

**Assessment:** Project(s).

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### **CIV5025F** CONTRACT LAW

12 NQF credits.

**Course outline:** The course reviews the Law of Contract to develop a framework for the analysis of standard documentation for both main and subsidiary civil engineering contracts. Important aspects of mediation, arbitration and court procedures are stressed as is the need to identify and resolve legal problems through timeous negotiation. Disputes which have gone to law or arbitration will be studied to illustrate principles.

**Assessment:** Examination.

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### **CIV5030Z** CIVIL ENGINEERING PROJECT

20 NQF credits.

**Prerequisites:** Completion of appropriate postgraduate courses.

**Course outline:** On the recommendation of the supervisor and with the agreement of the Head of Department, a student registered for an MSc(Eng) may be permitted to enter into a programme of individual study on a specialised topic. A statement of objectives must be agreed upon, and the course of study will be guided by the supervisor. The programme will involve the student in about 200 hours of work, and a written report must be submitted. The written report will be examined, and a further oral examination may be held.

Details of project topics are available from the Department.

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### **CIV5032Z** INTRODUCTION TO WASTEWATER TREATMENT & WASTEWATER CHARACTERIZATION

4 NQF credits.

**Course outline:** Water resources of SA; water quality in SA, water cycle. SA water law - National Water Act and Water Services Act. Levels of service. Objectives of wastewater treatment. Wastewater chemical and physical characterization; measurement of energy, nitrogen and phosphorus in municipal wastewater; effect of settlement and filtration. Overview of unit operations in wastewater treatment.

**Assessment:** Assignments and examination.

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### **CIV5041Z** BRIDGE ANALYSIS & DESIGN

16 NQF credits.

**Course outline:** Bridge loading, analysis and design philosophy. Analysis techniques with particular emphasis on the requirements pertaining to bridge structures. Reinforced and prestressed bridge design procedures.

**Assessment:** Examination and projects.

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**CIV5045Z THE ACTIVATED SLUDGE SYSTEM**

10 NQF credits.

**Prerequisites:** CIV5032Z.

**Course outline:** Biological process modelling of the activated sludge system including nitrification; material mass balances; reactor kinetics; biological process kinetic equations of ordinary heterotrophic organism and autotrophic nitrifier organism growth and endogenous respiration; development of the steady state activated sludge model; application to design, selection of sludge age, impact of primary settling, sewage sludge disposal.

**Assessment:** Assignments and examination.

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**CIV5046Z SEDIMENTATION IN WATER & WASTEWATER TREATMENT**

8 NQF credits.

**Prerequisites:** CIV5032Z.

**Course outline:** Classes of settling; factors affecting settling tanks; column test for water-treatment solids settling characterization; application to sizing settling tanks (classes 1 and 2 settling); effect of flocculation; flux theory and application to sizing wastewater treatment plant settling tanks (classes 3 and 4); measures of activated sludge settleability and relationships between them; comparison of flux theory with other design procedures; computational fluid dynamics modelling of settling tanks.

**Assessment:** Assignments and examination.

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**CIV5047Z SEWAGE SLUDGE TREATMENT**

8 NQF credits.

**Prerequisites:** CIV5032Z.

**Co-requisites:** CIV5046Z.

**Course outline:** Introduction to sewage sludge reuse and disposal guidelines in South Africa; characterization of primary and waste activated sludge in the context of mass balances over the entire wastewater treatment plant; sludge thickening with gravity sedimentation and flotation; development and validation of steady state aerobic digestion model for primary and waste activated sludge stabilisation and application to design and analysis including oxygen transfer and sludge thickening considerations; kinetics, stoichiometry and weak acid/base chemistry of anaerobic digestion; development, validation and application of steady state anaerobic digestion model, generation of sludge treatment liquors and the impact of their recirculation on effluent quality, nutrient (N and P) reduction in sludge treatment liquors.

**Assessment:** Assignments and examination.

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**CIV5048Z STEADY STATE DESIGN OF BIOLOGICAL NUTRIENT REMOVAL SYSTEMS**

20 NQF credits.

**Prerequisites:** CIV5045Z.

**Course outline:** Ensuring nitrification; nitrification capacity, kinetics of denitrification, development of the steady state nitrification denitrification (ND) model; effect of ND on reactor volume, effluent alkalinity and oxygen demand; the role of readily biodegradable (RB) and slowly biodegradable (SB) organics; denitrification potential; effect of the influent TKN/COD ratio on un-aerated mass fraction, N removal and effluent quality; calculation of inter-reactor recycles ratios for design and analysis of pre-, post- and combined denitrification systems. Characteristics of polyphosphate accumulating organisms (PAOs); development and use of biological excess phosphorus removal (BEPR) steady state model; design and analysis of NDBEPR of systems, chemical P precipitation and its effect on BEPR; novel applications; the impact of membrane solid/liquid separation and external nitrification on NDBEPR system design.

**Assessment:** Assignments and examination.

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### CIV5049Z MODELLING & SIMULATION OF WASTEWATER TREATMENT SYSTEMS

12 NQF credits.

**Prerequisites:** CIV5048Z.

**Course outline:** Kinetics of the readily biodegradable (RBCOD) and slowly biodegradable (SBCOD) organics utilization by ordinary heterotrophic organisms (OHOs), nitrification by autotrophic nitrifying organisms (ANOs) in aerobic systems; modifications for application to anoxic-aerobic systems; kinetics of RBCOD conversion to short chain fatty acids (SCFA) in the anaerobic reactor, kinetics of SCFA uptake, P release and substrate storage under anaerobic conditions and substrate utilisation (growth) and P uptake and aerobic conditions by PAO's; model presentation in Petersen matrix format; links to and simplifications of kinetics for steady state BNR models; programming, modelling and simulation of BNR activated sludge systems with the pre-coded UCTOLD and UCTPHO programmes and the ASIM or AQUASIM shell packages. Filamentous organism type and identification, control by means of kinetic and metabolic selection; causes and control of filamentous organism proliferation in BNR systems.

**Assessment:** Assignments and examination.

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### CIV5050Z INTEGRATED WASTEWATER TREATMENT PLANT DESIGN

20 NQF credits.

**Prerequisites:** CIV5045F, CIV5046Z, CIV5047Z.

**Course outline:** Calculating daily composite average flow and loads from diurnal data; influent flow balancing; integrated wastewater treatment plant modelling and design; major project brief; economic evaluation of different wastewater treatment plant layouts to achieve different technical, environmental and economic objectives.

**Assessment:** Major project.

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### CIV5051Z AQUATIC CHEMISTRY

14 NQF credits.

**Course outline:** Chemical thermodynamics; acids and bases, activity, pH equilibria of weak acid base systems, master variable diagrams, titration of acids and bases, reference species; Alkalinity Acidity and pH, buffering intensity, detailed treatment of the carbonate system; precipitation and dissolution, Caldwell-Lawrence conditioning diagrams, critical evaluation of the Langelier index; terrestrial and ground water stabilization.

**Assessment:** Assignments and examination.

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### CIV5052Z ADVANCED AQUATIC CHEMISTRY

14 NQF credits.

**Prerequisites:** CIV5051SZ.

**Course outline:** Mixed weak acid systems; alkalinity, acidity and Deffeyes types single aqueous phase diagrams; application to pH control in anaerobic digester; the nitrogen and sulphur systems; Kinetics of precipitation reactions; redox equilibrium systems; Pourbaix (pe-pH) diagrams; application to the chemistry of iron, manganese, lead, chlorine and nitrates in treated and wastewaters; kinetics of redox reactions; applications to physico-chemical treatment processes.

**Assessment:** Assignments and examination.

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### CIV5054Z ADVANCED CHEMICAL, PHYSICAL & BIOLOGICAL PROCESSES MODELLING

10 NQF credits.

**Prerequisites:** CIV5049Z, CIV5051Z.

**Co-requisites:** CIV5052Z.

**Course outline:** Aqueous mixed weak acid base chemistry of the carbonate, phosphate, ammonia,

short chain fatty acid and sulphur systems; kinetics of gas evolution and stripping; modelling multiple mineral precipitation in 3 phases such as in mineral precipitation in anaerobic digester liquor aeration; integrated chemical, physical and biological processes modelling of activated sludge and anaerobic digestion; modelling acidogenic, methanogenic and sulphidogenic systems.

**Assessment:** Assignments and examination.

### **CIV5055Z STRUCTURAL PERFORMANCE ASSESSMENT**

16 NQF credits.

**Prerequisites:** CIV5086Z.

**Course outline:** Philosophy of structural performance assessment, Performance indicators, Strategies for structural performance assessment, Introduction to theoretical modal analysis Experimental modal analysis, instrumentation, data acquisition, data quality assurance, modal parameter estimation and validation, Introduction to model updating, Model updating methods, structural modifications, Correlation between tests and FEM models, Structural Monitoring, Measurement of live load strains/stresses, Probabilistic data analysis, Material performance assessment, Performance assessment, Estimation of remaining life.

**Assessment:** Examination.

### **CIV5064Z DEVELOPING CITIES: ISSUES & STRATEGIES**

20 NQF credits.

**Course outline:** Urbanisation; spatial structuring forces. Problems and issues of developing cities; municipal finance and funding; land tenure.

**Assessment:** Examination 50%, assignments 50%.

### **CIV5065Z URBAN RENEWAL**

20 NQF credits.

**Course outline:** Urban renewal context and policy; informal settlement upgrading; 'township' revitalisation; city centre regeneration; municipal engineering services; community services; housing.

**Assessment:** Examination 50%, assignments 50%.

### **CIV5067Z MUNICIPAL INFRASTRUCTURE MANAGEMENT**

20 NQF credits.

**Course outline:** Overview of Municipal Infrastructure Management (MIM), basic MIM, setting up MIM, MIM techniques, advanced MIM techniques.

**Assessment:** Examination 50%, assignments 50%.

### **CIV5072Z COMMUNITY PARTICIPATION IN URBAN MANAGEMENT**

20 NQF credits.

**Course outline:** Historical analysis. The theoretical basis for participation. The structure of the participation process. Types of community structures. The interaction between community organizations and government. Community participation in urban upgrading. The development of an upgrading methodology for informal settlements. Management and institutional development for low-income communities and informal settlements. Participatory project planning.

**Assessment:** Examination.

### **CIV5085S ADVANCED STRUCTURAL STEEL ENGINEERING**

16 NQF credits.

**Prerequisites:** None.

**Course outline:** Design philosophies in structural steel; design of members; buckling and instability

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phenomena; steel connections; application to design of industrial, commercial, residential buildings. Specialised topics: fire engineering; plate girders; composite construction.

**Assessment:** Examination 60%, course work 40%.

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### CIV5086Z ADVANCED STRUCTURAL MECHANICS WITH APPLICATIONS

16 NQF credits.

**Prerequisites:** None.

**Course outline:** Vibration modelling and structural dynamics; application to seismic-resistant, storm-resistant and blast-resistant design of engineering structures; buckling and instability phenomena; application to the design of thin-walled structures.

**Assessment:** Assignments and examination.

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### CIV5100F PLATE & SHELL STRUCTURES I

16 NQF credits.

**Course outline:** The course is intended to be a comprehensive treatment of plate and shell theories, and their application to the solution of various problems in structural engineering. Plate and Shell Structures I will cover plates subjected to bending and twisting (slope, curvature, twist, bending moments, transverse shears and twisting moments); the derivation of the bending equation for transversally loaded plates (rectangular and polar co-ordinates), solutions for rectangular plates and circular plates, practical applications, introduction to shell structures; the membrane hypothesis for shells, and the membrane theory of axisymmetrically loaded shells of revolution.

**Assessment:** Examination.

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### CIV5103Z REHABILITATION & REPAIR OF CONCRETE STRUCTURES

16 NQF credits.

**Course outline:** Condition surveys and assessment of deterioration of concrete structures; repair materials and strategies; compatibility aspects; structural requirements and procedures for rehabilitation; durability and repair audits; service life predictions; economics of repair and life-cycle costing; practical and contractual aspects.

**Assessment:** Examination.

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### CIV5104S PLATE & SHELL STRUCTURES II

16 NQF credits.

**Prerequisites:** CIV5100F

**Course outline:** The course is intended to be a comprehensive treatment of plate and shell theories, and their application to the solution of various problems in structural engineering. Plate and Shell Structures II will carry on from where Plate and Shell Structures I ended, and covers application of the membrane theory of axisymmetrically loaded shells of revolution, the membrane theory of non-axisymmetrically loaded shells of revolution and its application, axisymmetric bending of cylindrical shells and shells of revolution, flexibility analysis of plate and shell systems, membrane analysis of general cylinders, analysis of paraboloidal shell roofs, and practical aspects for reinforced concrete shells.

**Assessment:** Examination.

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### CIV5105S ADVANCED STRUCTURAL CONCRETE ENGINEERING II

16 NQF credits.

**Prerequisites:** CIV5006Z.

**Course outline:** Design of reinforced concrete columns for slenderness and biaxial bending, design of reinforced and prestressed beams for flexure, shear and torsion, design of flat slab concrete structures.

**Assessment:** Examination.

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**CIV5106Z TOPICS IN ADVANCED CONCRETE MATERIALS**

16 NQF credits.

**Course outline:** Cements, cement extenders, admixtures and aggregates for concrete; concrete deterioration and durability; deterioration mechanisms and processes; performance of concretes in aggressive environments; achievement of durable concrete; protection of concrete. Case studies, laboratory sessions, site visits.

**Assessment:** Examination and projects.

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**CIV5107Z INTEGRATED URBAN WATER MANAGEMENT**

20 NQF credits.

Block release course - 5 days of lectures followed by two major assignments.

**Prerequisites:** Any suitable first degree.

**Course outline:** Day 1: Introduction to Integrated Urban Water Management (IUWM). The urban water cycle; description, social imperatives, environmental considerations, economic challenges. Day 2: Water supply - availability, service levels / technical options, Free Basic Water, demand management, loss control, use of recycled water. Day 3: Sewage - public health considerations, service levels / technical options, the dry versus wet sanitation debate, social acceptance, greywater management. Day 4: Drainage - Service levels / technical options, Sustainable Urban Drainage Systems (SUDS), urban litter management, urban rivers, risk management, groundwater issues. Day 5: Management - Water Sensitive Urban Design (WSUD), introduction to asset management GIS as a water management tool, sustainability indicators.

**Assessment:** Oral presentation, two assignments.

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**CIV5108Z ADVANCED MECHANICS OF MATERIALS**

16 NQF credits.

**Prerequisites:** BSc(Eng)(Civil) or equivalent.

**Course outline:** Physical mechanisms of deformation of common construction materials. Continuum mechanics for elastic material behaviour. Non-linear continuum material behaviour, including visco-elasticity, plasticity, and modelling. Failure and fracture characteristics and modelling of these effects. Introduction to computational mechanics.

**Assessment:** Examination 50%, year mark 50%.

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**CIV5109Z DISSERTATION PREPARATION**

DP requirement for entry to CIV5000Z.

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the Masters Dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

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**CIV6000W PHD THESIS: CIVIL ENGINEERING**

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**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

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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 NQF credits, 5 lectures per week.

**Course outline:** Introduction to law, general principles of contract; sale; lease; credit agreements, agency.

**DP requirements:** See the Course Reader.

**Assessment:** The test counts 40% and the examination counts 60%.

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### 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 NQF credits, 5 lectures per week.

**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.

**DP requirements:** See the Course Reader.

**Assessment:** The test counts 40% and the examination counts 60%.

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### CML2005F LABOUR LAW I

#### CML2005L LABOUR LAW - THIRD TERM (WINTER ONLY - SEE ADMISSION CRITERIA BELOW)

18 NQF credits, 5 lectures per week.

**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.

**DP requirements:** See the Course Reader.

**Assessment:** The test counts 40% and the examination counts 60%.

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### 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 NQF credits, 5 lectures per week.

**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.

**DP requirements:** See the Course Reader.

**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. Subject 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.)

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.

### **CML6056F TELECOMMUNICATIONS LAW**

12 NQF credits, 48 lectures.

**Course outline:** Introduction: Technology and underlying economic and political concerns. Evolution of telecommunications and its regulation in South Africa. International developments and their impact on present day telecommunications in South Africa. Emerging national and international regulation of the Internet. Telecommunications applications. Detailed analysis of telecommunications legislation and regulations. Future developments.

**Assessment:** One written or oral exam to be taken at the end of the course or at the end of the second intensive week of teaching. One or two written projects.

### **CML6058S ELECTRONIC TRANSACTIONS LAW**

12 NQF credits, 48 lectures.

**Course outline:** Electronic transactions, their meaning and importance International sources of the law governing electronic transactions. Domestic sources of the law governing electronic transactions. Electronic transacting and the doctrine of functional equivalence. Electronic signatures. Electronic government. Electronic transactions including online gaming, online auctions, online dating services, online provision of adult content, online sale of restricted substances. Electronic

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payment methods. Consumer protection. Spam. Data privacy. Communication privacy and workplace privacy. Electronic damage. Electronic crime. Security standards. ISPs and their liability. Online dispute resolution. Taxing electronic commerce.

**Assessment:** Examination counts 50-75% Year mark counts 25-50% and is based on the Tests and Projects.

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### CON1004W CONSTRUCTION TECHNOLOGY I

32 NQF credits, 4 lectures per week, seminars, 1 studio session per week, field trip(s).

**Course outline:** Construction Technology appropriate for assembly of a simple single and double-storey dwelling, including: construction of such a dwelling; selection of materials and components used; construction details; typical plans, sections and elevations; and requirements of good practise and laws and bye-laws.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON1007X PRACTICAL TRAINING

**Course outline:** 160 hours (4 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).

**DP requirements:** Complete practical training and complete logbook.

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### CON1010S CONSTRUCTION INFORMATION SYSTEMS

8 NQF credits, 2 lectures per week, tutorials, practicals.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June/November examination 2 hours 50%, year mark 50%.

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### CON1011F PROPERTY STUDIES I A

16 NQF credits, 4 lectures per week, tutorials, practicals.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON1012S PROPERTY STUDIES I B

16 NQF credits, 4 lectures per week, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON1015S PROPERTY INFORMATION SYSTEMS

8 NQF credits, 2 lectures per week, tutorials, practicals.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June/November examination 2 hours 50%, year mark 50%.

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### CON1017S PROPERTY INVESTMENT MATHEMATICS I

8 NQF credits, 1 lecture per week, 2 tutorials per week.

**Course outline:** Simple Interest, Equivalence, Compound Interest, Present Value, Annuities, General Annuities, Sinking funds, Amortization.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 70%, year mark 30%.

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### CON1018W BUILDING TECHNOLOGY I T

16 NQF credits, 2 lectures per week, 1 studio session per week.

**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.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON1019F/S PROFESSIONAL COMMUNICATION STUDIES

CON1019F for Property Studies students; CON1019S for Construction Studies students.

16 NQF credits, 4 lectures per week, tutorials.

**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.

**DP requirements:** 100% attendance and 50% minimum class test average.

**Assessment:** CON1019F: June examination 2 hours, Oral examination 1 hour.

CON1019S: November examination 2 hours, Oral examination 1 hour.

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### CON1020F MANAGEMENT & ENTERPRISE

18 NQF credits, 4 lectures per week, 12 tutorials.

**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 first year 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.

**DP requirements:** 50% year mark.

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**Assessment:** Examination and year mark.

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### CON2006W CONSTRUCTION TECHNOLOGY II

32 NQF credits, 4 lectures per week, seminars, 1 studio session per week, field trip(s).

**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.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON2013X PRACTICAL TRAINING

**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 logbook.

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### CON2020S CONSTRUCTION MANAGEMENT I

16 NQF credits, 4 lectures per week, tutorials.

**Prerequisites:** BUS1010F or BUS1036F/S.

**Course outline:** The Construction Enterprise and its Environment: Types of Construction Organisation; Industry Participants; The Construction Economy and Patterns of Demand; Organizational Structures in the Construction Industry; The Construction Firm as a Complex System. Concept of Management and its Principles: Introduction to the Theory of Management and Organisations; Systems Theory; Theory of the Firm (structure of companies); Development and management of the "Virtual Organisation"; Management techniques applied to the construction industry. The Project Management Context: What is a project? What is a program? The project life cycle as a management tool. The project process: initiating processes; planning processes; executing processes; monitoring and controlling processes; closing processes group .Construction Management: Site organization; Plant and equipment; materials handling; Production; Cost control; Waste management; materials ordering; Construction works program; Environment management; Site security; Occupational Health & Safety.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON2022W MEASUREMENT & DESIGN APPRAISAL I

16 NQF credits, 2 lectures per week, 1 studio session per week.

**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.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 3 hours 25%, November examination 4 hours 25%, year mark 50%.

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**CON2024S PROPERTY STUDIES II A**

16 NQF credits, 4 lectures per week, tutorials.

**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; office, shopping centre, and industrial developments. Whole life appraisal. Risk management: the nature of risk; risk analysis; risk management and control.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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**CON2027F REAL PROPERTY LAW I**

16 NQF credits, 4 lectures per week, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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**CON2029S MEASUREMENT**

8 NQF credits, 2 lectures per week.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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**CON2030F PROPERTY INVESTMENT MATHEMATICS II**

8 NQF credits, 2 lectures per week, tutorials.

**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).

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 3 hours 70%, year mark 30%.

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**CON2031S PROPERTY STUDIES II B**

16 NQF credits, 4 lectures per week, tutorials.

**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

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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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON3012W CONSTRUCTION TECHNOLOGY III

32 NQF credits, 2 lectures per week, seminars, 1 studio session per week, field trip(s).

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON3023X PRACTICAL TRAINING

**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 logbook.

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### CON3030S CONSTRUCTION COSTING

16 NQF credits, 2 lectures per week, 1 studio session per week.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 20%, year mark 80%.

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### CON3031W MEASUREMENT & DESIGN APPRAISAL II

32 NQF credits, 4 lectures per week, 1 studio session as required.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 4 hours 25%, November examination 4 hours 25%, year mark 50%.

### CON3032W APPLIED CONTRACT LAW I

12 NQF credits, 2 lectures per week, seminars.

**Prerequisites:** CML1002F or CML1001F or CML1006S.

**Course outline:** The JBCC Principle Building Agreement; the Arbitration Act; Case studies.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

### CON3033F PROPERTY STUDIES I

16 NQF credits, 4 lectures per week, 1 tutorial session per week.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

### CON3034F PROPERTY STUDIES III A

16 NQF credits, 4 lectures per week, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

### CON3035S PROPERTY STUDIES III B

16 NQF credits, 4 lectures per week, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

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**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON3036W PROPERTY & CONTRACT LAW

16 NQF credits, 2 lectures per week, seminars, tutorials.

**Prerequisites:** CML1002F or CML1001F or CML1006S; CON2027F.

**Course outline:** JBCC Principal Building Agreement; Arbitration Act; Alternative dispute resolution; Case law.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON3038W CONSTRUCTION MANAGEMENT II

32 NQF credits, 4 lectures per week, seminars, tutorials, field trip(s), Computer laboratory sessions.

**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, constructability, value engineering. Techniques such as: Gantt charts; critical path networks; computer applications; short term planning systems; progress recording; work study. Construction procurement systems. Management accounting in construction. Industry structures and development. Health, safety and sustainable construction.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON3039S CONSTRUCTION MANAGEMENT I T

16 NQF credits, 4 lectures per week, tutorials.

**Prerequisites:** BUS1010F or BUS1036F/S.

**Course outline:** The Construction Enterprise and its Environment: Types of Construction Organisation; Industry Participants; The Construction Economy and Patterns of Demand; Organizational Structures in the Construction Industry; The Construction Firm as a Complex System. Concept of Management and its Principles: Introduction to the Theory of Management and Organisations; Systems Theory; Theory of the Firm (structure of companies); Development and management of the "Virtual Organisation"; Management techniques applied to the construction industry. The Project Management Context: What is a project? What is a program? The project life cycle as a management tool. The project process: initiating processes; planning processes; executing processes; monitoring and controlling processes; closing processes group .Construction Management: Site organization; Plant and equipment; materials handling; Production; Cost control; Waste management; materials ordering; Construction works program; Environment management; Site security; Occupational Health & Safety.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON3040W COST ENGINEERING I T

16 NQF credits, 2 lectures per week, seminars, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON3041F PROPERTY STUDIES III C

16 NQF credits, 4 lectures per week, tutorials.

**Prerequisites:** CON2024S or CON2030F, CON2031S, CON1017S, CON1018W, STA1001F, ECO1010F.

**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.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON3043F/S COST ENGINEERING UNDER UNCERTAINTY

16 NQF credits, 2 lectures per week, seminars, tutorials.

**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.

**DP requirements:** 40% subminimum in both course work and examinations.

**Assessment:** June examination 2 hours 25%, November examination 2 hours 25%, year mark 50%.

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### CON3044F/S GLOBALISATION & THE BUILT ENVIRONMENT

18 NQF credits, 26 lectures.

**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.

**DP requirements:** Completion of the final project.

**Assessment:** Year mark 100%

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### CON4030F PROPERTY STUDIES II

16 NQF credits, 4 lectures per week, project(s), seminars, tutorials.

**Prerequisites:** CON3033F.

**Course outline:** Feasibility studies; risk assessment techniques; capital budgeting and sources of finance; the property development process; whole life appraisal; maintenance management; property valuation methods.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON4032F MEASUREMENT & DESIGN APPRAISAL III

12 NQF credits, 4 lectures per week, project(s), seminars, tutorials.

**Prerequisites:** CON3012W, CON3031W.

**Course outline:** Design appraisal, measurement and preparation of tender documentation for

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complex buildings and specialist installations (electrical and mechanical). The theoretical component involves a study of: (i) critical design appraisal and the improvement of constructability and cost-efficiency; (ii) compiling the Preliminaries Bill; and (iii) descriptive clauses in the Standard System of Measuring of Building Work. The practical component involves the application of the principles of measurement to advanced/unconventional forms of building construction and specialist installations by means of elemental quantification, covering: Bulk Earthworks; Planking, Strutting and Shoring; Piling; Underpinning; Basements; Electrical Installations; and Mechanical Installations. The practicals require computerised documentation using measurement software.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 4 hours 40%, year mark 60%.

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### CON4033W APPLIED CONTRACT LAW II

16 NQF credits, 2 lectures per week, seminar(s).

**Prerequisites:** CML1002F or CML1001F or CML1006S, CON3032W.

**Course outline:** Insolvency Act. Case studies of construction and building disputes. Alternative dispute resolution. Government and New Engineering forms of contract. Common international contracts.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON4034W PROFESSIONAL PRACTICE

20 NQF credits

First Semester: 4 lectures per week, seminars, tutorials.

Second Semester: Simulated Office Project, studio sessions as required.

**Prerequisites:** CON3031W.

**Co-requisites:** CON4032F.

**Course outline:** The Quantity Surveying Profession Act (No. 49 of 2000), Rules promulgated under the Act, and the implications of the Code of Conduct for registered practitioners; the commission; the Quantity Surveyor-Client Agreement; professional liability and professional indemnity insurance; fee scales; PROCAP; the Quantity Surveying function during the pre-contract, tender, post-contract, and final account stages: preparation and presentation of cost plans and Bills of Quantities, administration and adjudication of competitive bids, valuation for interim payment certificates, recovery statement, valuation of and payment for materials on and off-site; escalation; preparation and presentation of Final Accounts. Simulated Office project.

**DP requirements:** 40% subminimum in both course work and examination. Submit Simulated Office Project Report.

**Assessment:** June examination 4 hours 45%, Simulated Office project review 40%, year mark 15%.

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### CON4035X PRACTICAL TRAINING

**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 logbook.

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### CON4037S CIVIL ENGINEERING MEASUREMENT

16 NQF credits, 2 lectures per week, 1 studio session as required.

**Prerequisites:** CON3012W.

**Co-requisites:** CON4032F.

**Course outline:** Measurement and scheduling of Civil Engineering construction. The theoretical aspects of the course cover the SANS 1200 Specifications and the SANS 10120: Part 4 Typical

Schedules of Quantities for: Site Clearance; Earthworks; and Concrete (Structural). The practical component involves the application of the principles of measurement to the elements: Site Clearance; Earthworks; and Concrete (Structural).

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 3 hours 50%, year mark 50%.

### **CON4038F** ADVANCED CONSTRUCTION MANAGEMENT

16 NQF credits, 4 lectures per week, seminars, tutorials, field trip(s).

**Prerequisites:** CON3012W, CON3038W.

**Course outline:** The concept of project management compared with the management of construction enterprises. Organisational theory and management, organisation structures for enterprises and a major projects. Leadership and motivation on projects. Precontract planning. Production and logistics management. Contractual risk management and contracting strategies. Human relations management including: industrial relations practice; health and safety requirements.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

### **CON4039S** INTEGRATED MANAGEMENT PROJECT

16 NQF credits, 2 lectures per week, field trips, tutorials, seminars.

**Prerequisites:** CON4038F, CON3031W.

**Course outline:** Using the documents for an actual construction project, simulate all activities performed during the pre-tender and construction phases of a project such as obtaining bids from suppliers and subcontractors, preparing the estimate, preparing the site layout, preparing all planning activities required; analysing production requirements such as concrete cycles and formwork selection, plant and material management; health and safety risk assessment; financial management such as interim certificate and final account preparation and reconciliation.

**DP requirements:** 50% subminimum in examination.

**Assessment:** November examination (presentation of portfolio and oral).

### **CON4041S** ADVANCED PROPERTY STUDIES A

16 NQF credits, 4 lectures per week, tutorials.

**Prerequisites:** CON3034F/S, CON3035S, CON3041F.

**Course outline:** Expropriation: The legislation; the process; compensation; methods of valuation. Property Valuation: Influence of re-zoning on value; valuation of farmland; usually non-negotiable properties; large shopping centres; air space; interest in time-share; leasehold interests; retirement villages; mining rights. Valuation of properties classified as "special" in terms of function, design, construction, or location; market/non-market properties; properties subject to particular legislation.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

### **CON4042F** ADVANCED PROPERTY STUDIES B

16 NQF credits, 4 lectures per week, seminars, field-trips.

**Prerequisites:** CON3034F/S, CON3035S, CON3036W.

**Course outline:** Introduction to Facilities Management.

*Management of building operations:* Operation of building operating systems; building maintenance and repairs; cleaning services; security services; cost control and financial reporting.

*Real property management:* Introduction to property management; role of property management; maintenance of the long-term property acquisition/lease programme; purchase of land and buildings; principles of property maintenance; leasing and insurance; leasing non-owned premises; marketing and leasing of owned premises; lease management; service and management of tenants;

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management of residential, group housing, sectional title, office, shopping centre and industrial developments; cost control and reporting.

*Office Facility Planning:* Determining workplace area standards; specifying common facilities; programming short- and long-term office space needs; maintaining the office space inventory; space allocation to individuals and user-groups.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON4043S APPLIED PROPERTY LAW

16 NQF credits, 4 lectures per week, tutorials.

**Prerequisites:** CML2011S (or equivalent), CON3036W.

**Course outline:** Detailed study of the statutes and ordinances affecting property development and valuation. Detailed study of case law relating to: malafides of valuation court; what constitutes immovable property; method of valuation; separate valuations of land and buildings; valuation of an interest in land; restrictive conditions effect on value; Expropriation Act; Expropriation in terms of Provincial ordinances; valuation of subdivided property; method of valuation.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON4045F HOUSING DEVELOPMENT & MANAGEMENT I T

16 NQF credits, 4 lectures per week, seminars, tutorials.

**Course outline:** Development theories, South Africa's housing problem, housing and its role in city-making, housing theory and policy, appropriate technology, housing delivery systems. Management issues in housing. Field trips/case studies.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** June examination 2 hours 50%, year mark 50%.

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### CON4047W RESEARCH REPORT

32 NQF credits, 13 lectures, seminar(s).

**Prerequisites:** CON1019F, STA1000S.

**Course outline:** Selection of research problem; preparation of the research proposal; conducting empirical research; analysis of findings; drawing conclusions; making recommendations; presentation of a research report.

**DP requirements:** Research proposal.

**Assessment:** November examination - Research report 100%.

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### CON4048S ADVANCED PROPERTY STUDIES C

16 NQF credits, 4 lectures or tutorials per week.

**Prerequisites:** CON3034F/S, CON3035S, CON3041S.

**Course outline:** Modern portfolio theory: portfolio risk and return; applied portfolio theory; index models; portfolio construction (structure, selection and management).

Property Portfolio: compiling an efficient property portfolio; IPD and property data sources; trading properties; diversification strategies. The property component of institutional investor portfolios; the property listed sector including property unit trusts and property loan stocks; property market research and analysis; quantitative techniques for analysis of market data.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination 2 hours 50%, year mark 50%.

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### CON4049S CONSTRUCTION INNOVATION

16 NQF credits, 2 lectures per week, field trip(s), tutorials, seminars.

**Prerequisites:** CON3038W, CON3012W.

**Course outline:** Cycles of innovation; dissemination of technology; relationship between technology, economic practice and structures of the industry using examples such as lean production, intelligent buildings, standardisation and pre-assembly, design management and sustainable construction, entrepreneurship.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** November examination - 2 hours 50%, year mark 50%.

### **CON5006Z PROPERTY DEVELOPMENT**

20 NQF credits, one week block lectures.

**Prerequisites:** CON5041Z.

**Course outline:** Investment evaluations; property development evaluation, incorporating: environmental impact assessments; land assembly and servicing; economic viability analysis; management and marketing of property developments; risk assessment; and whole life appraisal.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

### **CON5007Z PROPERTY LAW**

20 NQF credits, one week block lectures.

**Course outline:** The Meaning and Function of Law and Legal Rules; the Main Divisions of the Law; the Structure of the Courts, Officers of the Courts and Different Court Procedures; Sources of South African Law; Basic Concepts of Private Law; an Outline of South Africa's Constitution; the Bill of Rights and Land Use; the Expropriation Act; the Impact of the Environmental Clause and Environmental Legislation on Land Use; Sectional Title and Share Block Schemes; General Principles of the Law of Contract; Specific or Applied Contracts: Sale and Lease; Forms of Security: Contractual and Property Rights; Insolvency law: The Effect of Insolvency on Property and Uncompleted Contracts; Commercial Agency: Estate Agents; Alternative Dispute Resolution; Case Studies.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination at end of module 50%, Assignments 50%.

### **CON5008Z URBAN LAND ECONOMICS**

20 NQF credits, one week block lectures.

**Course outline:** Urban economics and urban problems. The urbanization process. The urban hierarchy. Urban rent. Theories of urban spatial structure. Location theory. Problems in developing countries.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination at end of module 50%, Assignments 50%.

### **CON5009Z PROPERTY FINANCE**

20 NQF credits, one week block lectures.

**Prerequisites:** CON5041Z.

**Course outline:** Application of business finance theory to property. Mathematics of finance. Property investment decision-making; capital budgeting; financing decision and capital structure; capital markets; sources and flows of capital for property investments; and types of financial instruments.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

### **CON5010Z MINOR DISSERTATION**

60 NQF credits.

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**Prerequisites:** CON5037Z and CON5041Z.

**Course outline:** Students to select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a minor dissertation.

**Assessment:** Research report.

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### CON5014Z PROJECT MANAGEMENT & SYSTEMS THEORY

20 NQF credits, one week block lectures.

**Course outline:** An overview of the Project Management Knowledge Areas, Project Management Processes and the relationship of Project Management to other management disciplines. The Project Management Body of Knowledge and its place in the trans-disciplinary study of the abstract organisation of projects, investigation of both the principles common to all complex projects; and the models which can be used to describe them. Emphasis is placed on real systems that are open to, and interact with, their environment. The relationship between the business environment and the project environment.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

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### CON5016Z PROJECT PLANNING & IMPLEMENTATION

20 NQF credits, one week block lectures.

**Course outline:** The need for planning which include the rules for planning and control; scope management, project strategy, project methodology; project scheduling techniques; change management and project integration.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

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### CON5018Z HUMAN RESOURCE MANAGEMENT & INTERPERSONAL COMMUNICATION

20 NQF credits, one week block lectures.

**Course outline:** The Human Resource management needs of project management, changes in employment practice, interfacing with stakeholders, group dynamics, leadership, motivation methods of achieving objectives through others in a people intensive environment, communication, conflict resolution, negotiation, ethics and culture and the management organisation structures used in project teams.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

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### CON5021Z PROPERTY PORTFOLIO MANAGEMENT

20 NQF credits, one week block lectures.

**Prerequisites:** CON5041Z.

**Course outline:** Portfolio Management: The Property Cycle; The Economic Cycle; Modern Portfolio Theory; The Property Portfolio Operational Property/Asset Management: Introduction to Property Management; Legal Aspects/Tenant Issues; Maintenance/Services; Investment Strategy and Value; current trends; Case Studies. Strategic Property/Asset Management; Shopping Centre Management: Management; Leasing; Financial Control. Facilities Management: Space planning and management; Relocation; Maintenance management and Life cycle costing; Energy management; environmental issues; Outsourcing.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

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### CON5022Z TOTAL QUALITY MANAGEMENT IN A PROJECT ENVIRONMENT

20 NQF credits, one week block lectures.

**Course outline:** Total Quality Management as a set of management processes and systems and the application of TQM in Project Environments; new product development, value engineering, lean supply, supply chain management and safety, health and welfare.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, Assignments 50%.

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**CON5024W MASTERS DISSERTATION: CONSTRUCTION ECONOMICS & MANAGEMENT**

180 NQF credits.

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**CON5025Z MASTERS DISSERTATION: CONSTRUCTION ECONOMICS & MANAGEMENT**

120 NQF credits.

**Prerequisites:** CON5040Z DP.

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**CON5029Z PROJECT RISK MANAGEMENT**

20 NQF credits, one week block release lectures.

**Course outline:** The nature of risks and the nature of projects; risk perceptions and the communication of risk; systematic risk management; creating a project risk management framework; establishing risk registers and reviewing risk management performance.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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**CON5030Z PROJECT FINANCE & PROCUREMENT**

20 NQF credits, one week block release lectures.

**Course outline:** The theory of procurement for products and services; the concept of value-for-money; principles of risk transfer; specifying services as outputs; integration of a wide range of tasks under a single contract; flexibility of long-term contracting; organising bidding competitions; sources of procurement and bid (transaction) costs; principles of payment mechanisms (e.g. performance related payment); alternative models for private sector organisation.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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**CON5032Z RESEARCH REPORT (HOUSING DEVELOPMENT & MANAGEMENT)**

60 NQF credits.

**Prerequisites:** CON5037Z, CON5042Z.

**Course outline:** Statistics: data modelling using the Statistica software package. Methodology: selection of the research problems; preparation of the research proposal. Research Report: conducting empirical research; analysis of findings; drawing conclusions; making recommendations; presentation of a research report.

**Assessment:** Research report.

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**CON5033Z MASTER OF SCIENCE IN PROJECT MANAGEMENT: DISSERTATION**

120 NQF credits.

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**CON5034Z MASTER OF SCIENCE IN PROPERTY STUDIES: DISSERTATION**

120 NQF credits.

**Prerequisites:** CON5040Z.

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**CON5035Z MASTER OF PHILOSOPHY IN HOUSING DEVELOPMENT & MANAGEMENT: DISSERTATION**

120 NQF credits.

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**CON5036Z INTRODUCTION TO RESEARCH**

4 NQF credits, distance learning (attendance required for examination only)

**Course outline:** Research and writing skills; plagiarism; research ethics; critical analysis of literature; creating an argument; writing in an academic style; referencing conventions.

**Assessment:** One-and-a-half-hour examination at end of module 100%.

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**CON5037Z RESEARCH METHODOLOGY**

6 NQF credits, half week block lectures.

**Prerequisites:** For MSc Property Studies candidates: CON5006Z, CON5007Z, CON5008Z, CON5009Z, CON5021Z, CON5036Z, CON5043Z.

For MSc Project Management candidates: CON5014Z, CON5016Z, CON5018Z, CON5022Z, CON5036Z.

For MPhil Transport Studies candidates: None.

**Course outline:** Research methodology, the research experience; knowledge and problems; the proposal chapter; designing the research; theoretical frameworks; overview of research methods - from quantitative to qualitative; case studies; writing the literature review, data presentation and analysis; concluding research.

**DP requirements:** 100% attendance at lectures in block week.

**Assessment:** Evaluation of Research Proposal at end of module 100%.

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**CON5038Z PROPERTY DEVELOPMENT & FINANCE**

20 NQF credits, one week block lectures.

**Course outline:** Mathematics of finance. Property taxation. Overview of managerial finance theory. Working capital management. Long term asset management. Property investment decision-making. The financing decision and capital structure. Capital markets. Sources and flows of capital for property investments. Types of financial instruments. Investment evaluation. Environmental impact assessment. Risk assessment. Land assembly and servicing. Economic viability analysis. The construction stage. Marketing of improvements. Whole life appraisal.

**Assessment:** Three hour exam 40%; assignment 60%

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**CON5039Z PROJECT IMPLEMENTATION & MANAGEMENT**

20 NQF credits, one week block lectures.

**Course outline:** Programme and project management: work breakdown structures; project cycle management; budgeting and cash flows; developing indicators; monitoring and evaluation systems and cycles. Procurement Management: principles; modes; brief writing; control of outsourced works; control of outsourced services; monitoring reporting. Institutional Aspects: legislative requirements and options; operating in the context of intergovernmental relations; contractual forms and options; contract management; government budgeting and project packaging; managing integration and IDPs. Planning and project cycle methodologies.

**Assessment:** Three hour exam 40%; assignment 60%

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**CON5040Z DISSERTATION PREPARATION**

DP NQF requirement for entry to CON5025Z.

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the Masters Dissertation. Work required includes literature searches and reviews; identification of the

research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

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### CON5041Z BASIC APPLIED STATISTICS

4 NQF credits.

**Prerequisites:** Knowledge of Excel.

**Course outline:** *Data presentation:* Identifying an appropriate population; drawing a sample from the population; organising data; discrete and continuous data types; graphical presentation of data. *Descriptive statistics:* Exploratory data analysis and summary statistics. *Applied mathematics:* Simple interest; equivalence; compound interest; present value; annuities; general annuities; sinking funds; amortization.

**Assessment:** Examination.

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### CON5042Z FURTHER APPLIED STATISTICS

6 NQF credits.

**Prerequisites:** CON5041Z.

**Course outline:** *Design of a questionnaire:* Defining the "target" population, drawing a sample from the population, organising the data into an appropriate format for further analysis.

*Presenting the results:* Summarizing the data, and interpreting the results.

*Statistical methods:* Contingency tables; (Chi Square tests); multiple regression; t-test and Anova; confidence interval equivalence.

**DP requirements:** Class attendance and submission of all worksheets, projects and assignments.

**Assessment:** Continuous Assessment.

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### CON5043Z PROPERTY VALUATION THEORY & PRACTICE

20 NQF credits.

**Course outline:** *Introduction:* The Valuer; Valuation Theory - concepts and historical development; Accuracy of Valuations; The Surveyor General; Register of Deeds; Local Authorities; Town Planning Schemes; the Valuer's Records; Factors Affecting Supply and Demand in the Property Market; Different Types of Fixed Property; Factors Influencing the Value of Property; Approaches to the Valuation of Property; the Valuation Report.

*Potential and its Influence on Value:* Legal Concept of Potential; Economic Concept of Potential; Potential for an Alternative Use; Redevelopment Potential; Quantifying the Influence of Potential on Value; Highest and Best Use of a Property; Under-improved Property; Over-improved Property; "Wrong" or Inappropriate Development; Influence of Re-zoning on Value.

*Methods of Valuation I:* Sales, Cost and Income Methods of Valuation. Valuation of Residential Properties: Definition of a Residential Property; Valuation Approach; Sources of Information; the Valuation Process; Limitations on Use and Development; Unimproved Properties; Improved Properties; Valuation of Township Developments including Developers' Interests. Valuation of Income Producing Properties I: Influence of Leases on Value; Valuation of Leasehold Interests; Valuation of Income Producing Properties; Overview of Capitalisation Rates and their Use in the Valuation of Income Producing Properties.

*South African Legislative Environment:* Relevant legislation and its application to the Valuation Process.

*Case Law:* Relevant Case Law as it pertains to the Valuation of Property.

*Expropriation:* Legislation; Valuation for Expropriation; Valuation of Servitudes.

*ARGUS - Valuation DCF Software:* Use of the ARGUS software for the valuation of property.

**DP requirements:** 50% for year mark.

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**Assessment:** Examination and year mark.

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### CON50445Z CORPORATE REAL ESTATE PORTFOLIO MANAGEMENT

20 NQF credits.

**Course outline:** 1. *Strategy and Strategic Alignment* - Understanding corporate strategy drivers and their alignment to the portfolio; Defining portfolio objectives; Corporate Real Estate and competitive advantage.

2. *Corporate Real Estate Portfolio Management* - A process for managing corporate exposures; Risk management in the CRE environment; Demand planning, site selection and the role and cost of flexibility; Lease v own decisions; The impact of workplace strategy and design; Total occupancy cost management; Benchmarking and portfolio performance management.

3. *The Impact of Property Exposures on Corporate Financial Statements* - Accounting principles; Financial reporting principles and areas of direct impact; Impact of CRE on shareholder value.

**DP requirements:** 100% attendance of block week lectures. Submission of all assignments.

**Assessment:** Examination and year mark.

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### CON5044Z ADVANCED PROPERTY VALUATION

20 NQF credits.

**Course outline:** *Valuation of Income Producing Properties II:* Valuation of Residential, Commercial and Industrial Properties; Capitalisation Rates - Detailed Discussion of Capitalisation Rates; Usage and Derivation from Market; Pitfalls.

*Methods of Valuation II:* Residual and Accounts Methods of Valuation.

*Valuation of Special Properties:* Valuation of Sectional Titles; Valuation for Fractional Ownership; Valuation of Farms and Agricultural Land; Valuation of Shopping Centres; Valuation of Special Properties, including Petrol Stations, Air Space, Mining Rights and Minerals, Industrial Plant and Machinery; Non-Negotiable Properties, and Properties Subject to Particular Legislation.

*Introduction to Non-Market Valuation Methods:* Travel Cost Method; Contingent Valuation Method; and Hedonic Pricing Method.

*Valuations for Rating Purposes (Municipal / Mass Valuations):* Fiscal Requirements; Legislative Framework; Valuation Process; Appeals Process.

*South African Legislative Environment:* Relevant Legislation and its application to the Valuation Process.

*Case Law:* Relevant Case Law as it pertains to the Valuation of Property.

*Issues in Valuation Theory and Practice:* Contemporary and Emerging Issues in Valuation Theory and Practice; Developing World Issues.

*Valuation for Insurance Purposes:* Types of Property Insurance; Purpose of Insurance; Insurance Cover; Methods of Estimating and Sources of Cost Data; Inclusions in a Cost Estimate; Location; Professional Fees; Demolition Costs and Site Clearance.

*GIS:* Type of GIS systems; Application of GIS systems to property.

*Valuation and Listed Property:* Understand the relationship between property valuation and listed property.

**DP requirements:** 50% for year mark.

**Assessment:** Examination and year mark.

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### CON6009W PHD THESIS: CONSTRUCTION ECONOMICS & MANAGEMENT

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### CSC1015F COMPUTER SCIENCE 1015

18 NQF credits, 4 lectures per week, 1 practical per week.

**Prerequisites:** Mathematics 5 or better.

**Course outline:** Introduction to computing and applications. Problem solving, algorithm development and object-oriented programming in Java. Fundamental programming constructs and

abstractions. Number representation, boolean algebra and logic gates.

**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 NQF credits, 4 lectures per week, 1 practical per week.

**Prerequisites:** CSC1015F (or Supp) or CSC1018F.

**Course outline:** Advanced programming constructs and techniques in the object-oriented paradigm. Linear abstract data structures, including Lists, Stacks and Queues. Binary trees and their applications. Event-driven programming, graphics and graphical user interfaces. Ethics and professional issues in computing.

**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.

### CSC1018F COMPUTER SCIENCE 1018

18 NQF credits.

**Prerequisites:** Mathematics 5 or better. Information Technology 7. Passing a Java competency examination

**Objective:** This course is an alternative to CSC1015F. It is intended for students who have mastered the Java programming language as part of Computer Studies at school level and wish to learn an alternative programming paradigm.

**Course outline:** The following fundamental Computer Science concepts are taught:

- the Object Orientated approach to program design and implementation
- general techniques for algorithmic Problem Solving
- methodologies for Software Engineering.

This will be taught within the context of Python Open Source interpreted scripting language. The course will be timetabled with one lecture and practical assignment per week. This will be combined with structured self-learning.

**DP requirements:** Minimum of 45% aggregate in practical work.

**Assessment:** Theory tests 15%; quizzes 5%; practical assignments 20%, June examination 3 hours 60%.

**Subminima:** 45% for practicals and 45% for theory.

### CSC2001F COMPUTER SCIENCE 2001

24 NQF credits, 5 lectures per week, 1 practical per week.

**Prerequisites:** CSC1016S/CSC1011H, MAM1000W or equivalent.

**Course outline:** CONCEPTS OF C++: C++ vs Java. Building a C++ program, Basic Constructs, Overloading and Inheritance.

ADVANCED C++: Templates, Advanced STL Containers and Iterators, Operator Overloading, Exceptions, File I/O.

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.

SOFTWARE ENGINEERING: Process models, requirements engineering, analysis, design, UML, testing.

**DP requirements:** Minimum of 45% aggregate in practical work.

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**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.

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### CSC2002S COMPUTER SCIENCE 2002

24 NQF credits, 5 lectures per week, 1 practical per week.

**Prerequisites:** CSC2001F (or Supp), MAM1000W or equivalent.

**Course outline:** SOFTWARE ENGINEERING-2: Project Management (Scoping, Cost and Effort Estimation, Risk Analysis, Scheduling and Tracking, Software Quality Assurance, Software Configuration Management). HCI: User Centred System Design, User Modelling, Universal Access and Design for All, Evaluation Techniques.

**DATABASES:** database management systems, conceptual modelling, database design theory, relational database query and manipulation.

**ARCHITECTURE:** Abstractions, performance, instructions, arithmetic, the processor: datapath and control, pipelining, memory hierarchy, peripherals and parallel processors.

**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.

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### CSC2003S COMPUTER GAMES

24 NQF credits, 5 lectures per week, 1 practical per week.

**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. Game Software Engineering - Game SE Methodology. AI/Simulation - Simulation and Search Strategies. Text Based Games and Advanced Topics.

**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.

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### CSC3002F COMPUTER SCIENCE 3002

36 NQF credits, 5 lectures per week, 2 practicals per week.

**Prerequisites:** CSC2001F and CSC2002S.

**Course outline:** This course consists of: Operating systems, Networks, XML and web-based computing.

**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.

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### CSC3003S COMPUTER SCIENCE 3003

36 NQF credits, 5 lectures per week, 2 practicals per week.

**Prerequisites:** CSC2001F and CSC2002S.

**Course outline:** This course consists of: compilers (30); and Theory of Algorithms (30).

**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.

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### CSC3012 and CSC4015Z

Students with credit for one of these courses will be able to take the other in 2010. These courses are

otherwise no longer available (replaced by CSC3021Z).

**Prerequisites:** CSC2001F and CSC2002S.

**Course outline:** Process management (asynchronous processes, interprocess communication and synchronisation, multithreading, deadlocked and starvation, scheduling); storage management (paging/segmentation, virtual memory, file systems); protection and security issues.

**Assessment:** Tests 15%, practicals 35%, 1.5 hr written June examination 50%.

**Subminima:** 45% for tests and examination.

### CSC3015D THEORY OF ALGORITHMS

18 NQF credits, 30 lectures, 1 practical per week.

**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.

**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 NQF credits, 2.5 lectures per week, 1 practical per week.

**Prerequisites:** CSC2001F, CSC2002S and CSC2003S.

**Course outline:** Computer Graphics for Gaming, Agents in Gaming, multi-user and distributed games, Game design.

**Assessment:** November examination 3 hours 50%, Test(s) 16 2/3%, Practical 33 1/3%.

**Subminima:** 45% for practicals; 45% for tests and examination.

### CSC3021Z OPERATING SYSTEMS

18 NQF credits, 30 lectures, 1 practical per week.

**Prerequisites:** CSC2001F and CSC2002S.

**Course outline:** Process management (asynchronous processes, interprocess communication and synchronisation, multithreading, deadlocked and starvation, scheduling); storage management (paging/segmentation, virtual memory, file systems); protection and security issues.

**Assessment:** Tests 15%, practicals 35%, 1.5 hr written June examination 50%.

**Subminima:** 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 NQF credits, lectures, tutorials.

**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.

**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 NQF credits, 48 lectures, 12 tutorials.

**Prerequisites:** Senior Certificate with at least a D on the Higher Grade for Mathematics; or NSC

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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.

**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%.

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### ECO1011S MACROECONOMICS

18 NQF credits, 48 lectures, 12 tutorials.

**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.

**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%.

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### ECO2003F MICROECONOMICS II

18 NQF credits, second year, first semester course, 4 lectures and 1 tutorial/workshops per week.

**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.

**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.

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### ECO2004S MACROECONOMICS II

18 NQF credits, second year, second semester, 5 lectures/workshops per week.

**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.

**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.

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### EEE1000X PRACTICAL TRAINING

**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.

### EEE1003W COMPUTING FOR ELECTRICAL ENGINEERS

16 NQF credits, 72 lectures, 8 laboratory sessions.

**Course outline:** The course begins by discussing computer programming from its basic binary instructions to high level programming. Different computer applications (databases, spreadsheets, compilers) are discussed, and also different programming: structured, procedural and object-oriented. Python is introduced with examples of graphical programming and simple algorithms. Sorting and searching algorithms are introduced. Practical laboratories are used to enable students to write programmes that deal with real devices.

**DP requirements:** Attendance at all laboratory sessions, 40% or more for class tests

**Assessment:** November examination 2 hours 50%, class tests 30%, laboratories 10%, project 10%.

### EEE1004W ENGINEERING I

32 NQF credits, 96 lectures, 20 laboratory sessions, 1 project.

**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.

**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 ELECTRICAL ENGINEERING PART 2

20 NQF credits.

**Prerequisites:** EEE1003W, , CSC1015F, MAM1003W or PHY1010W or equivalent.

**Module D:** Introduction to Microprocessors

8 NQF credits, 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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** November Examination of D and E modules 3 hours (80%) and Year mark (20%).

**Module E:** Analog Electronics

8 NQF credits, 24 lectures, 4 tutorials and 1 practical.

**Outline:** The characterisation and operation of electronic devices such as the bipolar transistor, field effect devices and thyristor. Operation of these devices involving biasing and amplification. The application of these devices as components in electronic circuits such as Op amps and other analog integrated circuits. Application of electronic devices and ICs into everyday circuits like basic linear power supplies, amplifiers and switching circuits.

**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 NQF credits, 4 practicals

## 246 COURSES OFFERED

**Outline:** Projects on opamps/voltage regulators, filter, logic, transistors.

**DP requirements:** Satisfactory completion of coursework for each and every module.

**Assessment:** On practical work.

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### EEE2030F ELECTRICAL ENGINEERING I

For students in Mechanical Engineering Department only.

12 NQF credits, 36 lectures, 8 tutorials.

**Prerequisites:** MAM1003WS, PHY1010W or MAM1017F/S, PHY1012F/S.

**Course outline:** Electrical quantities, circuit components, Network theorems, AC circuits including Phasor diagrams, resonance, RMS values, power and power factor. Transducers, electronic devices.

**DP requirements:** Completion and hand in of all tutorials and laboratory report.

**Assessment:** June examination 3 hours.

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### EEE2031S ELECTRICAL ENGINEERING II

For students in Mechanical Engineering Department only

12 NQF credits, 36 lectures, 8 tutorials, 1 practical.

**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.

**DP requirements:** Completion and hand in of all tutorials.

**Assessment:** November examination 80%, year mark 20%.

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### EEE2035F SIGNALS & SYSTEMS I

12 NQF credits, 30 lectures and 6 tutorials.

**Prerequisites:** MAM1003W.

**Co-requisites:** MAM2080W (or equivalent).

**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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** June examination 2 hours.

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### EEE2036S PROBABILITY & STATISTICAL DESIGN IN ENGINEERING

12 NQF credits, 36 lectures; tutorials as required.

**Prerequisites/Corequisites:** MAM1003W or MAM1017F/S.

**Course outline:** Fundamental concepts of sample spaces; counting, combinations and permutations; and probability. 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 daily life as well as in engineering. Some topics may extend to limit theorems.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** November examination - 60%, year mark 40%.

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### EEE2038W FUNDAMENTALS OF ELECTRICAL ENGINEERING

24 NQF credits, 72 lectures; 20 tutorials, 3 practicals, 1 project.

**Prerequisites:** MAM1003W or PHY1010W or MAM1017F/S, PHY1012F/S or equivalent.

**Module A: Electrical Circuits**

12 NQF credits, 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.

**Assessment:** June examination 2 hours.

**DP requirements:** Satisfactory completion of coursework.

**Module C: Power Engineering**

12 NQF credits, 36 lectures, 10 tutorials, 2 practicals, 1 project.

**Outline:** Three phase circuits, magnetic circuits; the single phase transformer; d.c. machines.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** November examination 2 hours.

**EEE2039W FUNDAMENTALS OF ELECTRONIC ENGINEERING**

36 NQF credits, 96 lectures; 12 tutorials, 18 practicals.

**Prerequisites:** EEE1003W, CSC1015F, MAM1003W or PHY1010W or equivalent.

**Course outline:** Divided into Modules B, D, E and F.

**Module B: Digital Electronics**

12 credits, 24 lectures, 12 tutorials, 12 practicals

**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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** June Examination of module B 2 hours

**Module D: Introduction to Microprocessors**

8 credits, 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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** November Examination of D and E modules 3 hours (80%) and Year mark (20%).

**Module E: Analog Electronics**

8 credits, 24 lectures, 4 tutorials and 1 practical.

**Outline:** The characterisation and operation of electronic devices such as the bipolar transistor, field effect devices and diodes. Operation of these devices involving biasing and amplification. The application of these devices as components in electronic circuits such as Op amps and other analog integrated circuits. Application of electronic devices and ICs into everyday circuits like basic linear power supplies, amplifiers and switching circuits.

**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 credits, 4 practicals

**Outline:** Projects on opamps/voltage regulators, filter, logic, transistors.

**DP requirements:** Satisfactory completion of coursework for each and every module.

**Assessment:** On practical work.

## 248 COURSES OFFERED

### **Module G: Computing II for Electrical Engineers**

4 credits, 12 lectures, Programming projects

**Outline:** To write C++ programs with application to electrical engineering problems.

**DP requirements:** Completion of every assignment.

**Assessment:** On programming assignments.

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### **EEE2040F BASICS OF ELECTRONIC ENGINEERING**

24 NQF credits, 60 lectures; 22 tutorials, 13practicals.

**Prerequisites:** MAM1003W or PHY1010W or MAM1017F/S, PHY1012F/S or equivalent.

**Course outline:**

#### **Module A: Electrical Circuits**

Module A: Electrical Circuits 12 credits, 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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** June examination 2 hours.

#### **Module B: Digital Electronics**

12 credits, 24 lectures, 12 tutorials, 12 practicals

**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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** June Examination of module B 2 hours

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### **EEE3000X PRACTICAL TRAINING**

**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.

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### **EEE3017W DIGITAL ELECTRONICS**

16 NQF credits, 48 lectures, 7 practicals, 3 tutorials.

Not for EC students.

**Prerequisites:** EEE2039W or equivalent.

**Course outline:** Algorithmic state machines, processors, interfacing, data converters, networks, instrument busses, automatic test systems, C programming, memory technologies, process control.

**DP requirements:** Attendance of at least 50% of laboratories, 50% or more for at least 2 class tests.

**Assessment:** November examination 2 hours 45%, year mark 55%.

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### **EEE3031S ENERGY UTILIZATION**

10 NQF credits, 24 lectures, 2 practicals, 1 project, 3 tutorials.

**Prerequisites:** EEE2038W or equivalent.

**Course outline:** Introduction to the features, characteristics and operations of three phase AC induction and synchronous machines. Introduction to power electronics.

**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 NQF credits, 24 lectures, 2 practicals.

**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.

**DP requirements:** Satisfactory completion of course and laboratory work.

**Assessment:** November examination 2 hour paper.

### EEE3055F ELECTROMAGNETIC ENGINEERING

20 NQF credits, 48 lectures, 12 tutorials, 2 practicals, 1 design project.

**Prerequisites:** MAM2080W, EEE2038W or equivalent, PHY2010S.

**Course outline:**

**Module A:** Electromagnetic Field Theory.

Electromagnetic field theory, giving the derivation and some applications of Maxwell's equations in an electrical engineering context.

**Course Outline:** Time-varying electromagnetic fields; Maxwell's equations; continuity and displacement current; basis of Kirchoff'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.

**Course 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.

**DP requirements:** Satisfactory completion of coursework. Completion of laboratory session.

**Assessment:** June examination 3 hours.

### EEE3057S POWER ENGINEERING

20 NQF credits, 48 lectures, 6 tutorials, 4 practicals, 1 field trip, 1 project.

**Prerequisites:** EEE2038W or equivalent.

**Course outline:**

**Module A Course Outline:** Introduction to the features, characteristics and operation of three phase AC induction and synchronous machines. Introduction to power electronics.

**Module B Course Outline:** Introduction to power systems engineering. Structure of a power system; AC power; electrical loads and tariffs, introduction to power systems, economic operation of power systems.

**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 NQF credits, 24 lectures, 24 practicals, 6 tutorials.

**Prerequisites:** EEE2038W, EEE2039W or equivalent.

## 250 COURSES OFFERED

**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.

**DP requirements:** Submission of all projects and class mark of 40% plus.

**Assessment:** Project, November examination 1½ hours.

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### EEE3062F DIGITAL ELECTRONICS

For Electro-Mechanical Engineering students only.

12 NQF credits, 24 lectures, 6 tutorials, 6 practicals.

**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.

**Assessment:** June examination 2 hours.

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### EEE3063F TRANSMISSION LINES

10 NQF credits, 24 lectures, 6 tutorials, 1 design project.

**Prerequisites:** MAM2080W or equivalent.

**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.

**DP requirements:** None.

**Assessment:** April examination 1½ hours.

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### EEE3064W DIGITAL ELECTRONICS & MICROPROCESSORS

16 NQF credits, 48 lectures, 6 practicals.

**Prerequisites:** EEE2039W or equivalent.

**Course outline:** Advanced digital electronics with emphasis on VHDL and Algorithmic state machine design methods.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** November examination 2 hours combined with class mark.

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### EEE3067W DIGITAL ELECTRONICS & MICROPROCESSORS

For Science students only. Please see the Science Faculty Handbook for further details.

**Assessment:** November examination 3 hours.

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### EEE3068F ELECTRONIC CIRCUITS

12 NQF credits, 30 lectures.

**Prerequisites:** EEE2038W or equivalent, EEE2039W or equivalent.

**Course outline:** Frequency analysis of circuits: poles and zeros, manual Bode plot techniques for plotting magnitude and phase, breakpoints analysis. Design of small signal AC transistor amplifiers, DC and differential amplifiers based on the long-tail pair. 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.

**Assessment:** June examination 2 hours.

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### EEE3069W CONTROL ENGINEERING

*Electrical and Mechatronics Students only.*

20 NQF credits, 48 lectures, tutorials as required, practicals as required, design project.

**Prerequisites:** MAM2080W, EEE2035F, EEE2038W, EEE2039W or equivalent.

**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.

**DP requirements:** Completion of course assignments.

**Assessment:** June examination 2 hours, November Examination 2 hours - 90%, year mark 10%.

### EEE3070S MEASUREMENT & MICROPROCESSORS

8 NQF credits. For Electro-Mechanical Engineering students.

**Course outline:** Refer to the course outline for Module D of EEE2039W.

**Assessment:** Programming test and November Examination.

### EEE3073S PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students

12 NQF credits, 24 lectures.

**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.**

**DP requirements:** 100% attendance and 50% minimum class test average. Pass in Ethics assignment.

**Assessment:** Oral examination 1 hour, October/November examination 2 hours.

### EEE3074W EMBEDDED SYSTEMS

20 NQF credits, 48 lectures, 6 practicals, projects.

**Prerequisites:** CSC2001F, CSC2002S, EEE2039W or equivalent.

**Course outline:** To introduce the student to the programming of an embedded system, controlled by, for example, a RISC processor (ARM9). After writing simple embedded code, the tool chains for loading, testing and debugging the code are introduced, followed by experience in writing drivers for various peripherals. By the end of the course, operating systems suitable for small embedded systems are used, where application complexity required this. The implications of multitasking and real time are stressed.

Course Outcomes: Program an embedded processor in C using an Open Source tool chain, test and debug simple code on this processor using the JTAG interface. Write and use code to interface to specific peripherals attached to the embedded processor. Decide whether an operating system is required for an embedded system, configure and load the appropriate operating system. Write, test and debug C code running in user space of a simple operating system. Use simple network interfaces to the system, as supported by the operating system.

**DP requirements:** Completion of all practical reports and project report.

**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.

## 252 COURSES OFFERED

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### EEE3078W DIGITAL EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

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### EEE3079W EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

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### EEE3081F CONTROL ENGINEERING A

*For Electrical and Computer Engineering Students only.*

10 NQF credits, 24 lectures, tutorials as required, practicals as required, design project.

**Prerequisites:** MAM2080W, EEE2035F, EEE2038W, EEE2039W or equivalent.

**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.

**DP requirements:** Completion of course assignments.

**Assessment:** Examination 2 hours 90%, year mark 10%.

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### EEE3082S CONTROL ENGINEERING B

*For Electrical and Computer Engineering Students only.*

10 NQF credits, 24 lectures, tutorials as required, practicals as required, design project.

**Co-requisites:** 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.

**DP requirements:** Completion of course assignments.

**Assessment:** Examination 2 hours 90%, year mark 10%.

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### EEE3083F COMMUNICATION SYSTEM & NETWORK DESIGN 1

12 NQF credits, 36 lectures, 12 tutorials, 3 practicals.

**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.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 2 hours 50%, year mark 50%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/#course>.

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### EEE3084W COMMUNICATION SYSTEM & NETWORK DESIGN

24 NQF credits, 72 lectures, tutorials and practicals as required.

**Co-requisites/Prerequisites:** EEE2036F.

**Module A (First Semester):** Communication system and network design I

12 credits, 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 credits, 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 of error with bandpass detection, MSK.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 50%, year mark 50%.

**Website:** Check <http://web.uct.ac.za/depts/commnetwork/#course> for information about the curriculum in broadband communication / telecommunication/wireless networks.

### EEE3085S COMMUNICATION SYSTEM & NETWORK DESIGN II

12 NQF credits, 36 lectures, tutorials and practical work as required.

**Telecommunication Stream:** This fundamental course in telecommunication is pre-requisite to all 4th year telecommunication courses.

**Prerequisites:** EEE2039W, MAM2080W.

**Co-requisites:** EEE3083F, EEE2036S/F.

**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 of error with bandpass detection, MSK.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 2 hours 50%, year mark 50%.

**Website:** Check <http://web.uct.ac.za/depts/commnetwork/#course> for information about the curriculum in broadband communication / telecommunication/wireless networks.

### EEE3086F SIGNALS & SYSTEMS II

12 NQF credits, 36 lectures, 6 tutorials, 2 practicals.

**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.

## 254 COURSES OFFERED

Calculation of signal to noise ratio. Decibel calculations. Amplitude modulation and demodulation. Frequency division multiplexing. Heterodyning (shifting in frequency). 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.

**DP requirements:** Submission of all assignments and drill problems, attendance at laboratory sessions.  
**Assessment:** Examination 2 hours.

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### EEE4001F DIGITAL SIGNAL PROCESSING

20 NQF credits, 48 lectures, tutorials as required, practicals as required.

**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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** Examination 3 hours.

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### EEE4006F PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students  
8 NQF credits, 24 lectures.

**Prerequisites:** CHE3062S or EEE3073S or MEC3037S.

**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; posters; readability; and group presentations using PowerPoint to an audience drawn from industry.

**DP requirements:** 100% attendance and 50% minimum class test average.

**Assessment:** Examination by projects and presentations, oral examination 1 hour.

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### EEE4013F CONTROL SYSTEMS

*For Electro-Mechanical and Mechanical Engineering students only.*

8 NQF credits, 24 lectures, 2 practicals, 12 tutorials, design project.

**Prerequisites:** MAM2080W. 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 and space methods.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** June examination 2 hours.

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### EEE4022F/S THESIS PROJECT

40 NQF credits.

**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.

**DP requirements:** Project report(s).

**Assessment:** Oral presentation, open day exhibition of project.

### **EEE4036A/C** ELECTRICAL ENGINEERING DESIGN

8 NQF credits, 12 lectures, project.

**Prerequisites:** EEE3057W or EEE3086F, EEE3069W or equivalent.

**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.

**Assessment:** Project plan 50%. Two hour examination in May/September 50%. There is a sub-minimum requirement of 50% in the examination in order to pass the course.

### **EEE4051F** NEW VENTURE PLANNING

8 NQF credits, 24 lectures.

**Prerequisites:** MAM2080W, EEE2038W, EE2039W or equivalent and EEE3073S.

**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.

**Assessment:** Individual learning log 5%, presentations 10%, project report(s) 85%.

### **EEE4080C** ELECTRICAL MACHINES & DRIVES

8 NQF credits, 20 lectures, 3 tutorials, 1 project.

**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.

**DP requirements:** Submission of two tutorials, writing of two class tests and achieve a class mark

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of at least 40%.

**Assessment:** September examination, 2 hours.

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### EEE4084F DIGITAL SYSTEMS

20 NQF credits, 48 lectures, 2 projects.

**Prerequisites:** CSC3021Z, 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 embedded 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 main component of the coursework involves two projects, which students work on during the assigned practical sessions. A number of compulsory quizzes are held, for which advanced notice and a syllabus is provided. The first project involves digital design using high-level description language and mode-integrated development environments (such as Altera Quartus II) for special-purpose FPGA-based hardware acceleration. The second project concerns high performance application development using cloud computing clusters and GPU hardware accelerators. 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.

**DP requirements:** Coursework assessment mark of at least 40%.

**Assessment:** June examination 40%, year mark 60%.

**Website:** <http://crg.ee.uct.ac.za/~eee4084F>.

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### EEE4087F MOBILE BROADBAND NETWORKS

20 NQF credits, 48 lectures, 12 practical, 6 tutorials.

**Prerequisites:** EEE3055F or EEE3063F; EEE3085S, EE3083F, EEE3084F, EEE3086F or equivalent.

**Course outline:** Selected topics in (1) wireless and fixed access networks (18 lectures), (2) mobile broadband transport and services (16 lectures), and (3) broadband networks (14 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, Self Similar Traffic, 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 Routing; Deploying Quality of Service: Network Convergence; Network Trends; evolution and market Internetworking; Hierarchical TDM networks, Internet, LAN/SOHO and Access Networks, WAN Application requirements; QoS; Service Platform, AAA, VoIP, API (Parlay, JAIN); Next Generation Networks; Multiservice platform, 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.

**DP requirements:** Minimum 80% in attendance and in completion of coursework.

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### EEE4088F WIRELESS COMMUNICATION SYSTEMS DESIGN

20 NQF credits, 48 lectures, 12 practicals, 12 tutorials.

**Prerequisites:** EEE3055F or EEE3063F; EE3085S or EEE3083F, EEE3084, EE3086F or equivalent.

**Course outline:** Selected topics in (1) wireless and fixed access networks (18 lectures), (2) mobile broadband transport and services (16 lectures), and (3) broadband networks (14 lectures).

**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 topic 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.

**DP requirements:** Minimum 80% in attendance and in completion of coursework.

### EEE4089F POWER DISTRIBUTION & TRANSMISSION NETWORKS

20 NQF credits, 48 lectures, 3 practicals, 2 Field trips.

**Prerequisites:** EEE3057S.

**Course outline:** Distribution and transmission systems, protection systems, steady state operation of transmission lines, high voltage engineering, electricity pricing, micro grids and smart grids.

**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 NQF credits, 48 lectures, 2 practicals, 2 field trips.

**Prerequisites:** EEE3057S.

**Course outline:** Load flow studies, fault calculation, power system operations, power system stability and control, Grid operations and Competitive market conditions.

**DP requirements:** Satisfactory completion of coursework and continuous assessment mark of at least 35%.

**Assessment:** June examination 3 hours.

### EEE4093F PROCESS CONTROL & INSTRUMENTATION

20 NQF credits, 48 lectures, tutorials and practicals as required, design project.

**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.

**DP requirements:** Attendance at all laboratory sessions and class mark of 40% plus.

**Assessment:** Project, June examination 3 hours.

### EEE4096S NEURAL, FUZZY & EVOLVING SYSTEMS

8 NQF credits, 24 lectures, project(s).

**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

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with Matlab.

**DP requirements:** 80% submission of all assignments, satisfactory completion of hands-on proficiency test.

**Assessment:** November examination 2 hours.

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### EEE4098F ACOUSTICS: NOISE CONTROL ENGINEERING

12 NQF credits, 36 lectures, 2 practicals, 8 tutorials.

**Prerequisites:** All second year core courses and one third year core course.

**Course outline:** Revision of fundamentals of vibration; control of structure-borne sound. Acoustic intensity; specific acoustic impedance; the decibel. Radiation of sound from point source and extended surfaces; radiation impedance; directivity. Hearing and speech; psychological and physiological effects of noise. Measurement and analysis of sound and vibration; accelerometer, sound level meter. A-weighting network. SA National Standards; Noise control regulations. Sound transmission through boundaries; criteria and rating of partitions; sound absorbing materials. Resonance and radiation from pipes; dissipative and reactive silencers. Sound fields in enclosures; reverberation time, pressure and power levels of noise sources.

**DP requirements:** Complete all tutorials and laboratories.

**Assessment:** June examination 3 hours 80%, year mark 20%.

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### EEE4099F ELECTRICAL MACHINES & POWER ELECTRONICS

20 NQF credits, 48 lectures, 3 labs, 6 tutorials.

**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, CŪK, 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.

**DP requirements:** Satisfactory completion of tutorials and laboratory and 40% plus for class mark.

**Assessment:** June Examination 3 hours.

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### 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.

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### EEE4101F NUCLEAR POWER ENGINEERING

20 NQF credits, 48 lectures, 4 tutorials, 2 site visits and 3 laboratories.

**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 Practical: At Koeberg Power Station and iThemba Labs.

**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.

**DP requirements:** 30% on CAM and attendance of both site visits.

**Assessment:** Examination 70%, year mark 30%.

### EEE4102F ARCHITECTURAL ACOUSTICS

For Architectural students only.

12 NQF credits, 14 lectures; 2 tutorials.

**Co-requisites:** APG5002F

**Course outline:** Description of simple and complex sounds. Interaction of sound with structures: sound insulation - keeping sound in or out, sound absorption - application to room finishes. Perception and measurement of sound; the sound level meter. Sources of Noise Effects of noise on people: hearing loss, speech interference, sleep interference, physiological effects National Standards, Legislation. Room acoustics : direct sound early reflections, reverberation; Room modes, standing waves, building materials structure. Criteria for good acoustics - speech and music.

**DP requirements:** 80% attendance, 100% completion of project work.

### EEE4103F NUCLEAR POWER SOURCES

For Mechanical, Electro-mechanical and Chemical Engineering students only.

12 NQF credits, 24 lectures, 3 labs and 2 site visits.

Module A of EEE4100F.

**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.

**Practicals:** At Koeberg Power Station and iThemba Labs.

**DP requirements:** 30% attendance on CAM and both site visits.

**Assessment:** Examination 70%, year mark 30%.

### EEE5000W MASTERS DISSERTATION: ELECTRICAL ENGINEERING

180 NQF credits.

### EEE5001Z ELECTRICITY PRICING & MARKET OPERATION

12 NQF credits.

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*Not offered in 2010.*

**Course outline:** The course is designed for postgraduate students and especially for people working in the electricity supply industry. The aim of the course is to expose students to the concepts and theory of pricing and the operation of electricity markets.

**Assessment:** Continuous assessment.

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### EEE5002S ADVANCED NOISE CONTROL ENGINEERING

8 NQF credits, project(s), 1 tutorial per week, 24 lectures.

**Prerequisites:** EEE4098F.

**Course outline:** Topics including one or more of the following: Sound radiation and propagation; human response to noise. Sound and vibration measurement, noise control approaches, noise source identification, reactive and dissipative silencers, room acoustics. Machinery noise, machine health and diagnostics, signal processing techniques, active noise cancelling. Environmental Noise.

**Assessment:** November examination 3 hours.

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### EEE5002Z MASTERS DISSERTATION: ELECTRICAL ENGINEERING

120 NQF credits.

**Prerequisites:** EEE5103Z DP.

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### EEE5003Z ANALYSIS, OPERATING & CONTROL OF POWER SYSTEMS

8 NQF credits.

*Not offered in 2010.*

**Course outline:** The course is designed for postgraduates and decision makers in power industry. The course has been designed by the Power Group - UCT with the scope of transferring and developing knowledge which would enable the participants to master the current and future challenges in a competitive power industry.

**Assessment:** Continuous assessment.

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### EEE5004Z MASTERS PROJECT: TELECOMMUNICATIONS

60 NQF credits.

**Course outline:** Candidates for the Degree of MEng in Telecommunications will be required to complete a project to be selected in consultation with the Programme Convener. A written project report written in the format of a master thesis is required. In addition, a concise paper summarising the research results with the quality for a suitable conference paper is needed. The paper typically follows IEEE conference paper format.

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### EEE5005Z RESEARCH METHODS & ETHICS

12 NQF credits.

*Not offered in 2010.*

**Course outline:** The course is designed for postgraduate students who are embarking on research. The course will provide a background to the idea of scientific enquiry, searching the published literature, problem solving, statistical analysis and inference and writing up a research report. The course also considers aspects of intellectual property, plagiarism and patents, with which it is important that researchers are aware.

**Assessment:** Continuous assessment.

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### EEE5017Z ADVANCED TOPICS IN INSTRUMENTATION

16 NQF credits, 24 lectures, 12 tutorials, 6 projects.

*Not offered in 2010.*

**Prerequisites:** CSC1015F, EEE3069W or equivalent

**Course outline:** The purpose and applications of instrumentation. Functional descriptions and characteristics of instruments. Measurement of fundamental variables. Industrial sensors and fieldbus systems. Embedded microprocessors in instruments. Data acquisition systems and practices. Nonlinearities in instrumentation systems. Feedback loops in instrumentation systems.

**Assessment:** Examination 3 hours.

### EEE5018Z MULTIVARIABLE CONTROL SYSTEM DESIGN

16 NQF credits, 24 lectures, project.

**Prerequisites:** EEE3069W or equivalent.

**Course outline:** The course will cover selected topics from: Structure of large-scale systems, system decomposition. Frequency domain design methods: inverse nyquist arrays, characteristic loci, direct nyquist arrays. State Space design methods: pole placement control, state observers. Adaptive control methods: parameter estimators, minimum variance, pole placement designs in self-tuning regulators, and model reference adaptive controllers.

**Assessment:** Examination 3 hours.

### EEE5021S NEURAL, FUZZY & EVOLVING SYSTEMS

12 NQF credits, 24 lectures, 1 project.

**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). The material will be the same as that covered in the companion undergraduate course, but covered in greater depth with additional theoretic background. The course will culminate with a major individual project involving several soft-computing techniques.

**Assessment:** November examination 3 hours.

### EEE5024F SPACE TECHNOLOGY

24 NQF credits, 36 lectures.

**Prerequisites:** BSc(Hons) or completed 3rd year Electrical Engineering (EE, ECE or ME).

**Course outline:** This course comprises a set of core lectures covering a wide range of topics in space science and technology. The lectures are given by experts from academic and research institutions, and also from industry. The lectures are complemented by course reading taken from the professional space literature and dealing with topical issues in space affairs. A number of homework exercises are set to allow students to assimilate lecture material in areas such as rocket performance, communications and space policy. The second half of the course comprises a team project. The aim of the team project is to allow students to put into practice the knowledge gained in the core lectures in a multidisciplinary fashion. Students are given broad parameters for the development of a rocket payload which is launched at the Overberg Test Range in Arniston. The Team Project allows students to contribute to the project in a variety of ways, depending on their own specialisation and expertise.

**Assessment:** 50% from 1.5hr examination, 50% from project.

### EEE5025Z WIRELESS DATA NETWORKS & SYSTEMS

15 NQF credits, 24 lectures, tutorials, practicals, and project as required.

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** Wireless network systems: Cellular technology, GSM and General Packet Radio Service 2.5G Wireless, 3G Wireless: UMTS and CDMA2000, 3.5G and 4G Wireless, WirelessLAN, WirelessMAN, Bluetooth, ad hoc networks, Sensor area networks. Wireless network technology: wireless applications, wireless links, mobility in different wireless systems, wireless security.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination Counts 40% and year mark 60% of final grade.

**Website:** <http://web.uct.ac.za/depts/commnetwork/index.html#course>.

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### EEE5026Z CONVERGENT TELECOMMUNICATION & DATA NETWORKS

15 NQF credits, 24 lectures, tutorials, practicals, and project as required.

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** Network Convergence, standards, and evolution from Telecommunication network to IP network; API; Internetworking with PSTN; Service requirements; Next generation network including multi-service platform and softswitch; Data plane technologies; Control plane technology including H.323/H.248/SIP protocols; Multimedia in data networks.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 40%, year mark 60%

**Website:** <http://web.uct.ac.za/depts/commnetwork/index.html#course>.

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### EEE5027Z NETWORK & INTERNET SECURITY

15 NQF credits, 24 lectures, tutorials, practicals, and project as required.

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** Security services; conventional encryption (classical encryption techniques, DES/AES, key distribution, key generation); public-key cryptology (RSA algorithm, key management, certification hierarchies); authentication and digital signatures; LDAP directory services for authentication & authorisation; security protocol analysis; intruders, viruses and worms (intrusion detection); cryptographic algorithms (MD5, SHA, IDEA, SKIPJACK); authentication and key exchange (Kerberos, Diffie-Hellman); electronic mail security (PEM/PGP); world-wide web authentication (Basic, Digest, Mediated, RPA); world-wide web security (S-HTTP, SSL, capabilities); secure electronic commerce (SET/iKP); web-services security (WS-Security, SAML).

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 40%, year mark 60%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/index.html#course>.

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### EEE5029Z BROADBAND NETWORKS

15 NQF credits, 24 lectures, tutorials, practicals, and project as required.

**Prerequisites:** EEE3084W or EEE3083F and EEE3085S or equivalent.

**Course outline:** The course aims at exposing the fundamental techniques, algorithms and protocols underlying the recent advances in the field of Broadband Networking. It provides an introduction to broadband networking, covering principles and fundamentals of the high performance technologies that enable the delivery of voice, video and data services, and providing a foundation for understanding the broadband communications infrastructure and the framework needed for broadband network solutions.

These aspects include traffic control, policing and shaping, QoS provisioning, routing, flow control, scheduling and signalling. Besides learning the architectural frameworks, students will be exposed to various analytical methods and simulation tools that are used in the design and engineering of next-generation networks.

Design and analysis of computer networks, Modelling and performance evaluation, queuing theory applied to computer networks. Traffic flow management and error control. Routing algorithms and protocols. Switch and router architectures. Selected issues in high-speed network design.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 40%, year mark 60%.

**Website:** <http://crg.ee.uct.ac.za/~eee5029z>

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### EEE5030Z FORMAL METHODS & ANALYSIS OF COMPUTER NETWORK

15 NQF credits, 24 lectures, tutorials, practicals, and project as required.

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** Basic Markov theory and queuing theory, Poisson processes and Bernoulli and

Poisson Modulated Markov Processes for network traffic models. Finite state machine methods with SDL, UML, MSC. Also modelling network protocols with Ordinary and Stochastic Petri nets, process algebras and LOTOS.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 40%, year mark 60%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/index.html#course>.

### EEE5031Z DATA MODELLING, PREDICTION & OPTIMISATION

12 NQF credits.

**Course outline:** Nearest-neighbour and regression methods in classification, data representation, feature selection, kernel methods, kernel ridge regression, support vector machines, time series analysis, classical and spectral clustering, evolutionary and stochastic optimisation.

**Assessment:** Examination 100%.

### EEE5032Z DIGITAL COMMUNICATIONS

15 NQF credits, 24 lectures; tutorials and 8 practical exercises as required.

**Prerequisites:** MAM2080W, EEE3084W, EEE3086F or equivalent.

**Course outline:** Digital Communication Systems Theory: probability, random variables and random signal principles, modelling of digital communication signals and systems; modelling of information sources; optimum receivers, channel and system performance in the presence of Gaussian noise, synchronisation; channel models, channel capacity, and equalisation, resource allocation, multichannel and multicarrier systems, spread-spectrum signalling, optical communication signalling principles, and software-defined radios. Practical Applications : selected topics from baseband and bandpass signalling; technical standards for wireless / optical / satellite-based communication systems; multiplexing and multiple access standards; next generation communication systems

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** June Examination 30%, year mark 70%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/#course>.

### EEE5033Z ADVANCED TOPICS IN COMMUNICATIONS & NETWORKS

8 NQF credits, 24 lectures; tutorials and 8 practical exercises as required.

**Prerequisites:** MAM2080W, EEE3084W, EEE3086F or equivalent.

**Course outline:** To introduce students to advanced topics and their research areas in communication and network. To understand subjects that are important to communication and network but are not yet covered in existing courses.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** June Examination 30%, year mark 70%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/#course>.

### EEE5034Z SPECIAL TOPICS IN ELECTRICAL ENGINEERING

8 NQF credits.

**Prerequisites:** MAM2080W, EEE3084W, EEE3086F or equivalent.

**Course outline:** To introduce students to specialized topics in their research areas in electrical engineering. To understand subjects that are important to communication and network but are not yet covered in existing courses.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** June Examination 30%, year mark 70%.

**Website:** <http://web.uct.ac.za/depts/commnetwork/#course>.

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### EEE5091Z MULTIDIMENSIONAL DIGITAL SIGNAL & IMAGE PROCESSING

12 NQF credits, 24 lectures, project(s).

*Not offered in 2010.*

**Prerequisites:** All core courses except EEE4022F/S.

**Course outline:** Review of 1-D Digital Signal processing. 2-D Transforms such as Fourier, Hadamard, K-L, etc. Multidimensional transforms; fast algorithms. Image enhancement, restoration, coding segmentation and analysis. Multidimensional feature extraction and pattern recognition. Machine vision.

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### EEE5103Z DISSERTATION PREPARATION

DP NQF requirement for entry to EEE5002Z.

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the Masters Dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

**Assessment:** Examination 60%, year mark 40%.

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### EEE6000W PHD THESIS: ELECTRICAL ENGINEERING

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### EGS4006F INTRODUCTION TO ENVIRONMENTAL ASSESSMENT & MANAGEMENT

12 NQF credits, 48 lectures, 8 practicals, 2 Field trips.

**Co-requisites:** Any one of CIV4031F, CIV4034F, CIV4040F, CIV40401Z.

**Course outline:** Introduction to environmental management and sustainable development. Environmental assessment: process, methods, reports, and public involvement. Environmental management of construction. Practical sessions: Case studies. Field Trips: Impact control during construction/operation, and course project.

**Assessment:** June examination 2½ hours.

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### END0007F FOUNDATIONS OF ENGINEERING MATHEMATICS

Administered by the ASPECT coordinator.

0 NQF credits, 36 lectures, 3 tutorials, 24 practicals.

**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

**DP requirements:** 40% in class tests and weekly tests.

**Assessment:** June examination 30%, year mark 70%.

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### END1008Z INTRODUCTION TO COMMUNICATION

Administered by the ASPECT coordinator.

8 NQF credits 30 lectures/workshop sessions.

**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. A project rounds off the activities of the year.

**Assessment:** June and November examination 3 hours, assignment and project.

**DP requirements:** Completion of assignments and project.

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**END1017F/S MATHEMATICS 1017**

Administered by the ASPECT coordinator.

16 NQF credits, 48 lectures, 12 tutorials.

**Prerequisites:** END1007W or MAM1003W (first semester attendance) and examination written.

**Course outline:** Functions and models; Limits and derivatives; rules of differentiation; applications of differentiation - maxima, minima, related rates, optimization and graph sketching; integrals and applications of integration.

**DP requirements:** 40% in class tests and in weekly tests.

**Assessment:** November examination, class tests.

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**END1018S MATHEMATICS 1018**

Administered by the ASPECT coordinator.

16 NQF credits, 48 lectures, 24 tutorials.

**Prerequisites:** END1017S.

**Course outline:** Integrals and applications of integration; an introduction to differential equations; infinite sequences and series; Taylor polynomials for a function of one variable; complex numbers; matrices; vectors and the geometry of space.

**DP requirements:** 40% in weekly tests, class tests and assignments.

**Assessment:** Examination 60%, year mark 40%.

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**END5035Z MANAGEMENT OF TRANSPORT SUPPLY & DEMAND**

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** The rationale for the management of transport systems through alternatives to large scale infrastructure provision. Traffic impact assessment and access management as a means of managing the impacts of new land use development on transport systems. Road safety management. 'Transport system management' as a means of managing transport supply. 'Travel demand management' as a means of managing travel behaviour. The use of 'intelligent transport systems' in supply and demand management.

**Assessment:** Assignments and test(s).

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**END5036Z LOCAL AREA TRANSPORT PLANNING, MANAGEMENT & DESIGN**

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** The planning and implementation of transport improvements at a local area (as opposed to citywide) scale. Urban design, landscaping and geometric design of streets. The design and management of local area movement networks. Accommodating pedestrians, bicycles and persons with movement disabilities in local area movement networks.

**Assessment:** Assignments and test(s).

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**END5037Z MINOR DISSERTATION**

(For MPhil candidates only.)

60 NQF credits.

**Prerequisites:** END5035Z, END5038Z, END5047Z.

**Course outline:** Selection of research problem/topic; preparation of research project/proposal; conducting a literature review; conducting of research, including information/data acquisition; and analysis, preparation of minor dissertation.

**Assessment:** Projects.

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**END5038Z INTEGRATED LAND USE-TRANSPORT PLANNING**

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Theoretical perspectives on the relationship between transport systems and urban activity systems. Co-evolution of transport systems and urban form. Sustainable transport and the problem of 'automobile dependent' cities. Planning paradigms and rationales for public intervention into land use and transport systems. Legislative, institutional and financial frameworks for land use and transport planning in South Africa. Conceptual framing and practical application of approaches to integrated land use-transport planning in the South African context. Local and international case studies and experiences.

**Assessment:** Assignments and test(s).

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**END5039Z NON-MOTORISED TRANSPORTATION**

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Current South African realities and the importance of non-motorised travel modes. Planning frameworks for non-motorised transportation infrastructure improvements and network management. Methods of site and network analysis, and approaches to modelling and simulation. Footway and pathway design. The design of pedestrian precincts. Low-cost bicycle supply and promotion. Cycleway and bicycle parking design. Pedestrian and bicycle crossing facilities. (NB. The course will not be offered in 2008 if insufficient students register.)

**Assessment:** Assignments and test(s).

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**END5040W MASTERS DISSERTATION: TRANSPORT STUDIES**

180 NQF credits.

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**END5041Z MASTERS DISSERTATION: TRANSPORT STUDIES**

120 NQF credits.

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**END5042Z SUSTAINABLE URBAN SYSTEMS**

Administered by the Department of Civil Engineering.

20 NQF credits, 1-week block-release contact.

**Prerequisites:** Four year degree but registered honours students accepted, subject to approval of HOD.

**Course outline:** The quest for sustainable development is a major contemporary challenge. A fundamental condition for achieving this is restructuring the processes of production-consumption-waste generation within urban/industrial complexes. This transdisciplinary course explores the need for, and ways of, undertaking 'restructuring', including the following: the imperative of Sustainable Development; physical constraints based on energy and mass balances and thermodynamics; General Systems Theory with respect to the interactions between industrial/Urban systems and ecological systems; Environmental/Ecological Economics; the concept of Industrial/Urban metabolism; case studies of Industrial and Urban Ecology in practice; institutional constraints and Decision Making Tools for Industrial/Urban sustainability.

**Assessment:** Essay 35%, project 65%.

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**END5043Z COMMUNITY DEVELOPMENT**

20 NQF credits.

**Course outline:** Sustainable livelihood, participation, governance, partnerships, development action plans, survey methods.

**Assessment:** Examination 50%, assignments 50%.

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**END5044F/S** PROFESSIONAL COMMUNICATION STUDIES: POSTGRADUATE

16 NQF credits, 18 hours lectures, 12 hours tutorials, 20 hours practicals.

**Prerequisites:** Undergraduate degree.

**Course outline:** This course includes modules designed to improve academic argumentation, writing, presenting and visual aids. The content includes requirements for sections of a thesis and presentation of thesis topics with emphasis in the proposal, introduction, literature review. Students give a PowerPoint presentation on an aspect of their thesis.

**DP requirements:** 50% minimum in written and oral work.

**Assessment:** Class test, 2 hour written examination paper, presentation examination. (Examination 21.5%, projects 78.5%.)

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**END5045Z** INTERMODAL PUBLIC TRANSPORT PLANNING & ECONOMICS

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Intermodal public transport planning and mode economics. Legislative, institutional and financial frameworks for integrated public transport planning, management and operation. Operating characteristics and selection of different modes. Integrated public transport operations. Integrated public transport infrastructure. Finances, integrated ticketing and fare structures. Service marketing and integrated public information systems.

**Assessment:** Assignments and test(s).

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**END5047Z** TRANSPORT DEMAND ANALYSIS & PROJECT ASSESSMENT

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Travel data collection and survey design. Data processing and analysis. The link between methodological approaches to transport analysis and the analytical questions raised by different policy environments. Theoretical and philosophical backgrounds of assessment and evaluation methods. Techniques for the assessment and evaluation of urban transport proposals.

**Assessment:** Assignments and test(s).

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**END5048Z** TRANSPORT MODELLING

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Theories of travel behaviour and traffic flow. Overview of model types from strategic to nanoscopic. Travel demand modelling methods, including, trip generation, trip distribution, mode choice and trip assignment. Output analysis. The link between models and the analytical questions raised by different policy environments.

**Assessment:** Assignments and test(s).

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**END5049Z** RESEARCH COMMUNICATION & METHODOLOGY

Administered by the Department of Chemical Engineering.

16 NQF credits, 20 lectures or seminar sessions, 4 assignments and 1 final report.

**Course outline:** The aim of the course is to provide postgraduate students with the competency to execute meaningful research in a structured way, to critically analyse the results of this research and to communicate these results effectively. The course topics include: Research philosophy, research planning, hypothesis development and research methodology; literature review skills; research ethics; research communication and related technical skills; experimental practice; structuring, writing and presentation of scientific outputs. The assignments include: oral presentation of seminars, scientific and technical writing tasks, experimental design tasks and literature review. The final examination comprises the compilation and presentation of the final report which is a complete research proposal.

**DP requirements:** Completion of all assignments and the final report.

**Assessment:** Assignments and final report.

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**END5050X MASTERS PAPER REQUIREMENT**

**Course outline:** For candidates submitting either a full (160 credits) or half (80 credits) dissertation for the following degrees: MArch, MIndAdmin, MSc(ApplSc), MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc (Property Studies). Refer to the appropriate degree rules.

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**END5067Z RAIL PLANNING & OPERATIONS MANAGEMENT**

20 NQF credits, 40 lectures (block contact time over one week).

**Course outline:** Institutional, legislative, financing and planning framework for rail infrastructure provision and service operation (including policy debates on competition and ownership). Basic rail system concepts, station design, alternative rail technologies and operating characteristics. Service planning, scheduling and managing passenger operations. Train movement control systems. Reliability, disruption and incident management. Asset management. Contracts and cost control management. International case studies of successful rail service revitalisation.

**Assessment:** Assignments and test(s).

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**END5068Z BUS PLANNING & OPERATIONS MANAGEMENT**

20 NQF credits, 40 lectures (block contact time over one week).

**Entrance requirements:**

**Course outline:** Institutional, legislative, financing and planning framework for road-based public transport infrastructure provision (including bus lanes, bus stops, interchanges, ranks and depots) and service operation (including policy debates on competition, regulation and the interface between scheduled bus systems and paratransit systems). Basic bus system concepts, stop, rank and interchange design, right-of-way options, alternative vehicle types and operating characteristics. Service planning, scheduling and managing passenger operations. Reliability, disruption and incident management. Contracts and cost control management. International case studies of successful bus system rationalisation and paratransit regulation.

**Assessment:** Assignments and test(s).

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**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 NQF credits, 1 practical per week, 5 lectures per week, one 1 day and one 3 day field trip.

**Prerequisites:** ERT1000F/ERT1002F/GEO1009F.

**Course outline:** Crystals and minerals; igneous and metamorphic rocks; structured geology; mineral deposits and economic geology; palaeontology.

**Assessment:** Class test(s) 35%, Field reports 15%, November examination one 2 hour theory examination counts 50% (sub-minimum 40%).

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**GEO1008F INTRODUCTION TO GEOLOGY FOR CIVIL ENGINEERS**

12 NQF credits, 48 lectures, 12 practicals, including 2 afternoon field trips.

**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.

**Assessment:** June examination 3 hours 60%, year mark 40%.

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**GEO1009F INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES**

18 NQF credits, 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.

**Entrance requirements:** Senior Certificate Biology, Geography or Physical Science on the Higher Grade, or an 'A' on Standard Grade.

**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 Cape Peninsula.

**DP requirements:** An average of 30% on all marked classwork and tests.

**Examination requirements:** 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. This course is particularly valuable for students considering postgraduate studies in Biomedical Engineering.

8 NQF credits, 24 lectures.

**Course outline:** Medical terminology; Overview of health-care and health-care technology; Physical diagnosis; Cardiopulmonary physiology; The circulation system in health and disease; The electrical activity of the heart and ECG; Cardiac pacemakers; Basic measurements of blood pressure and flow; Biomechanics of the musculoskeletal system; Joint forces and torques; Body segment parameters; Medical instrumentation design considerations; Medical imaging physics and applications.

**Assessment:** Two class tests 40% (each test worth 20%), June examination 3 hours 60%.

### HUB4007F BIOMECHANICS OF THE MUSCULOSKELETAL SYSTEM

8 NQF credits, 24 lectures, 4 practical sessions.

**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.

**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 NQF credits, 26 lectures, 4 practical sessions.

**Course co-ordinator(s):** 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 topography, ultrasound, magnetic resonance imaging, nuclear imaging.

**Assessment:** Assignments, written assessment or a final project.

## 270 COURSES OFFERED

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### MAM1000W MATHEMATICS I

36 NQF credits, 5 lectures per week, 1 double-period tutorial per week.

**Course outline:** Differential and integral calculus of functions of one variable, differential equations, partial derivatives, vector geometry, matrix algebra, complex numbers, Taylor series.

**Assessment:** November examination two no longer than 3 hour papers: 66.67%, year mark: 33.33%.

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### MAM1017F/S ENGINEERING MATHEMATICS A

16 credits, 4 lectures per week, 1 double-period tutorial per week, offered in each semester.

**Course outline:** An introduction to differential and integral calculus. Functions, limits and continuity. Rational functions, the natural exponential and logarithm 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. Permutations and combinations, finite series and the binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.

**DP requirements:** 30% For class record, high tutorial attendance.

**Assessment:** Examination, not longer than 2½ hours in June or November: 70%, two class tests: 30%.

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### MAM1018F/S ENGINEERING MATHEMATICS B

16 credits, 4 lectures per week, 1 double-period tutorial per week, offered in each semester.

**Prerequisites:** MAM1017F/S.

**Course outline:** Further calculus of a single variable. Radian measure, the trigonometric and 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.

**DP requirements:** 30% For class record, high tutorial attendance.

**Assessment:** Examination, not longer than 2½ hours in June or November: 70%, two class tests: 30%.

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### MAM1042S ENGINEERING STATICS

16 NQF credits, 4 lectures per week, 1 two hour tutorial per week.

**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.

**DP requirements:** 35% for class record and high tutorial attendance.

**Assessment:** November examination 2.5 hours: 67%, year mark: 33%.

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### MAM1043H MODELLING & APPLIED COMPUTING

18 NQF credits, 2½ lectures per week, one 1-hour tutorial every week.

**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.

**Lectures:** 1st semester: 2nd period Monday, Wednesday and Friday.

2nd semester: 2nd period Tuesday and Thursday.

**Assessment:** November examination 60%; year mark 40%.

### **MAM1044H DYNAMICS**

18 NQF credits, 2½ lectures per week, 1 practical every two weeks.

**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.

**Assessment:** November examination no longer than 3 hours: 67%, year mark: 33%.

### **MAM1045S MODELLING & PROGRAMMING WITH MATLAB FOR ELECTRICAL ENGINEERS**

16 NQF credits, 4 lectures per week, 1 double-period tutorial per week.

**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).

**DP requirements:** 30% Class record.

**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 credits, 24 NQF credits, 24 credits, 12 credits and 24 credits respectively.

**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 coordinator 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.

16 NQF credits, 4 lectures per week, 1 double-period tutorial per week.

### **MAM2044F INTRODUCTION TO MATHEMATICAL MODELLING**

This course is identical to module 2MM of MAM2046W for Science students.

12 NQF credits, 30 lectures, 1 tutorial per week.

**Prerequisites:** MAM1003W or MAM1000W.

**Co-requisites:** Modules 2LA and 2AC of MAM2000W/2004H or MAM2080W.

## 272 COURSES OFFERED

**Course outline:** Formulation, construction and interpretation of mathematical models for problems in the natural and life sciences. Modelling with first and second order differential equations. Introduction to population modelling, heat transfer and fluid flow. Analytical, qualitative and numerical methods and solutions. Basic use of the Laplace transform.

**Assessment:** June examination no longer than 2 hours: 70%, year mark: 30%.

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### MAM2050S BOUNDARY-VALUE PROBLEMS

This course is identical to module 2BP of MAM2046W for Science students.

12 NQF credits, 30 lectures, 1 tutorial per week.

**Prerequisites:** At least 40% in MAM2080W.

**Course outline:** Boundary-value problems. Green's functions, eigenvalue problems. Diffusion, Laplace's and wave equation. Solution by separation of variables.

**Assessment:** November examination no longer than 2 hours: 70%, year mark: 30%.

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### MAM2053S NUMERICAL ANALYSIS & SCIENTIFIC COMPUTING

12 NQF credits, 30 lectures, 1 tutorial per week. Note: Credit cannot be obtained for both MAM2053S and MAM3080F.

**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.

**Assessment:** November examination no longer than 2 hours: 70%, year mark: 30%.

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### MAM2082F COMPUTER PROGRAMMING IN MATLAB

**Aim:** To introduce basic scientific programming in MATLAB. 8 NQF credits, 1 lecture and 1 tutorial per week.

**Prerequisites:** MAM1003W or 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).

**DP requirements:** 30% Class record.

**Assessment:** June examination no longer than 2 hours: 60%, year mark: 40%.

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### MAM2083F/S VECTOR CALCULUS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 NQF credits, 4 lectures per week, 1 double-period tutorial per week.

**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 in 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.

**Assessment:** One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

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**MAM2084F/S LINEAR ALGEBRA & DES FOR ENGINEERS**

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 NQF credits, 4 lectures per week, 1 double-period tutorial per week.

**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. Introduction to partial differential equations and the method of separation of variables.

**Assessment:** One paper written in June or November no longer than 2.5 hours:60%, year mark: 40%.

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**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 NQF credits, 72 NQF credits, 36 NQF credits, 36 NQF credits and 18 NQF credits respectively.

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**MAM3043S METHODS OF MATHEMATICAL PHYSICS**

This course is identical to module 3MP of MAM3040W for Science students.

18 NQF credits, 30 lectures, 1 tutorial per week.

**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.

**Assessment:** November examination no longer than 2 hours: 75%, year mark: 25%.

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**MAM3049S INTRODUCTION TO GENERAL RELATIVITY**

This course is identical to module 3GR of MAM3040W for Science students.

18 NQF credits, 30 lectures, 1 tutorial per week.

**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.

**Assessment:** November examination no longer than 3 hours: 75%, year mark: 25%.

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**MAM3050F NUMERICAL MODELLING**

This course is identical to module 3AN of MAM3040W for Science students.

18 NQF credits, 30 lectures, 1 tutorial per week.

**Prerequisites:** MAM2080W or equivalent courses.

**Course outline:** Advanced methods for ODEs, boundary value problems, differential eigenvalue problems. Numerical solutions of PDEs by the method of finite differences, finite elements and spectral methods.

**Assessment:** June examination no longer than 2 hours: 65%, year mark: 35%.

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### MAM3052F NONLINEAR DYNAMICS

This course is identical to module 3ND of MAM3040W for Science students.

18 NQF credits, 30 lectures, 1 tutorial per week.

**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.

**Assessment:** June examination no longer than 2 hours: 65%, year mark: 35%.

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### MAM3054S FLUID DYNAMICS

This course is identical to module 3FD of MAM3040W for Science students.

18 NQF credits, 30 lectures per week, 1 tutorial per week.

**Prerequisites:** MAM2080W or equivalent courses.

**Course outline:** Description of fluids, equations of fluid flow for simple fluids, analytic techniques. Applications.

**Assessment:** November examination no longer than 2 hours: 75%, year mark 25%.

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### MAM3080F NUMERICAL METHODS

12 NQF credits, 3 lectures per week, 1 double tutorial per week.

**Prerequisites:** At least 40% in MAM2080W.

**Course outline:** Computational issues: finite precision, speed of algorithm, Matlab Polynomial interpolation: Lagrange 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.

**Assessment:** June examination no longer than 2 hours: 65%, year mark: 35%.

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### MEC1000X PRACTICAL TRAINING

**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).

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### MEC1002W ENGINEERING DRAWING

16 NQF credits, 18 lectures, 20 tutorials, 5 CAD practical sessions, 5 lectures related to the specific EBE discipline.

**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.

**Assessment:** Projects, tests, portfolio and June examination 2½ hours.

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### **MEC1003F ENGINEERING DRAWING**

8 NQF credits, 12 lectures, 12 tutorials, 5 CAD practical sessions.

**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.

**Assessment:** Projects, tests, portfolio and June examination 2½ hours.

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### **MEC1004W ENGINEERING I**

32 NQF credits, 6 lectures per week.

**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.

**Assessment:** Assignments, tests.

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### **MEC2000X PRACTICAL TRAINING**

**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.

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### **MEC2020W DESIGN I**

32 NQF credits, 48 lectures, 48 studio sessions.

**Entrance requirements:**

**Prerequisites:** MEC1002W, MEC1004W, MEC1000X.

**Co-requisites:** All second year core courses.

**Course outline:** Machine drawing and foundations for 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 and generic design tools such as the Product Requirement Specification, Functional Analysis and Quality Function Deployment.

**Assessment:** Design projects, assignments, tutorials, tests, November examination 3 hours.

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### **MEC2022S THERMOFLUIDS I**

16 NQF credits, 48 lectures, 3 laboratory sessions, 1 tutorial per week.

**Course outline:** Fluids and their properties; Basic concepts of Thermodynamics; Pressure and Head Hydrostatics; Bouyancy; Properties of pure substances; The First Law of Thermodynamics; Closed

## 276 COURSES OFFERED

systems; Control Volumes; Introduction to Heat Transfer; Motion of Fluid particles; Momentum equation and applications.

**Assessment:** Laboratory reports, tests, November examination 3 hours.

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### MEC2023F/S DYNAMICS I

16 NQF credits, 48 lectures, 12 tutorials.

**Prerequisites:** MAM1003W, MAM1042S, PHY1010W.

**Course outline:** Particle kinematics; Coordinate systems; Particle Kinetics, Newton's laws, work and energy, momentum, impact and impulse. Rigid body dynamics, plane kinematics, plane kinetics.

**Assessment:** Class tests, tutorial tests and June examination 3 hours.

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### MEC2025F MECHANICS OF SOLIDS I

12 NQF credits, 36 lectures, 10 tutorials.

**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.

**Assessment:** Tutorials, tests and June examination 3 hours.

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### MEC2026S PROJECT MANAGEMENT

8 NQF credits, 24 lectures.

**Prerequisites:** 3rd year status.

**Course outline:** Project management approach, complexity of project environment, feasibility studies, management, risk, commissioning, reporting, planning, design, time, cost and quality, scheduling, control, contracts administration.

**Assessment:** Project, tests and examination.

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### MEC2042F MATERIALS SCIENCE IN ENGINEERING

12 NQF credits, 36 lectures, 4 tutorials, 2 assignments.

**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.

**Assessment:** Class tests, June examination 3 hours.

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### MEC2043F ELECTRICAL & MECHANICAL MATERIALS

12 NQF credits, 36 lectures, 6 tutorials.

**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.

**Assessment:** Class tests, June examination 3 hours.

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**MEC3000X PRACTICAL TRAINING**

**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.

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**MEC3023F MECHANICS OF SOLIDS II**

12 NQF credits, 36 lectures, 3 practicals.

**Prerequisites:** MEC2025F, MAM2080W (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.

**Assessment:** Class tests, laboratory reports, June examination 3 hours.

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**MEC3031S DYNAMICS II**

16 NQF credits, 48 lectures, 2 practicals.

**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.

**Assessment:** Class tests, take home assignment, lab classes, November examination 3 hours.

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**MEC3033F THERMOFLUIDS II**

20 NQF credits, 60 lectures, 4 laboratory sessions, 1 tutorial per week.

**Prerequisites:** MEC2022S.

**Course outline:** The energy equation; The Second Law of Thermodynamics; Entropy; Laminar and Turbulent flows; Gas, Vapour and Refrigeration cycles; Incompressible flow in pipe systems; Gas Vapour mixtures; Chemical reactions; Performance of Rotodynamic Machines.

**Assessment:** Class tests, June examination 3 hours .

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**MEC3035F COMPUTER INTEGRATED MANUFACTURE & ROBOTICS**

For Electro-Mechanical Engineering students only.

8 NQF credits, 24 lectures, 2 practical sessions.

**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.

**Assessment:** Assignments, June examination 2 hours.

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**MEC3035S COMPUTER INTEGRATED MANUFACTURE & ROBOTICS**

For Mechatronics students only.

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8 NQF credits, 24 lectures, 2 practical sessions.

**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.

**Assessment:** Assignments, November examination 2 hours.

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### MEC3037S PROFESSIONAL COMMUNICATION STUDIES

For Electro-Mechanical and Mechanical Engineering students.

12 NQF credits, 24 lectures.

**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.)**

**Assessment:** Tests, oral examination, October/November examination 2 hours.

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### MEC3044S THERMOFLUIDS III

12 NQF credits, 36 lectures, 2 practicals.

**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.

**Assessment:** Tests, November examination 3 hours.

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### MEC3045F EXPERIMENTAL METHODS

12 NQF credits, 36 lectures, practical sessions.

**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.

**Assessment:** Practicals, test, June examination 3 hours.

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### MEC3050W DESIGN II

24 NQF credits, 48 lectures, 24 tutorials.

**Prerequisites:** MEC2020W.

**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.

**Assessment:** Assignment(s), tests, and November examination 3 hours.

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### MEC3060F MATERIALS UNDER STRESS

8 NQF credits, 24 lectures, 3 tutorials, 4 practicals.

**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.

**Assessment:** Class tests, June examination 2 hours.

### **MEC3068C FUNCTIONAL MATERIALS**

8 NQF credits, 24 lectures, 3 tutorials.

**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.

**Assessment:** Class tests, September examination 2 hours.

### **MEC3069S PRODUCTION PROCESSES**

8 NQF credits, 24 lectures, 2 tutorials.

**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.

**Assessment:** Examination and year mark.

### **MEC4022Z INDUSTRIAL LAW**

8 NQF credits, 24 lectures.

**Course outline:** Elements of the law of contract; agency; partnership; companies; and patents. Labour Law.

**Assessment:** September examination 2 hours.

### **MEC4035F FRACTURE MECHANICS**

8 NQF credits, 24 lectures, 2 practicals.

**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.

**Assessment:** Tutorials, class tests, June examination 3 hours.

### **MEC4036C POWER PLANT**

8 NQF credits, 24 lectures, 2 practicals.

**Course outline:** Boilers; steam turbines; condensers and cooling circuits; renewable energy; solar

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power generation; hydrogen; energy conservation; fuel cells; energy storage; environmental aspects of power generation.

**Assessment:** September examination 2 hours.

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### MEC4042Z INDUSTRIAL MANAGEMENT

8 NQF credits, 24 lectures, case study.

**Course outline:** Introduction to Management and Organisational Theory, Leadership, Organisational culture, Customer Value, Human Resources, Finance, Economics, Strategic Thinking, ethics and roles of managers.

**Assessment:** Projects, tests, September examination 2 hours.

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### MEC4044Z MAINTENANCE MANAGEMENT & RELIABILITY IN SYSTEMS

For non Electro-Mechanical Engineering students only.

8 NQF credits, 24 lectures.

**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.

**Assessment:** Group report, continuous assessment tests, September examination 2 hours.

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### MEC4045F NUMERICAL METHODS IN HEAT & FLUID FLOW

12 NQF credits, 36 lectures.

**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.

**Assessment:** June examination 3 hours.

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### MEC4047F MECHANICAL VIBRATIONS

12 NQF credits, 36 lectures.

**Prerequisites:** MEC3031S.

**Course outline:** Vibration is usually an undesirable effect in most machines and structures. Some machines, of course, are designed to vibrate in order to accomplish their objectives. In either case, the engineer must understand the effects of vibration and be able to analyze the causes and consequences. This course introduces the student to the modelling of vibrations in machines and structures: single- and multi- degree of freedom models; analytical and numerical solutions; practical applications.

**Assessment:** Laboratory report, class tests, June examination 3 hours.

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### MEC4048F ADVANCED HEAT TRANSFER

12 NQF credits, 36 lectures, 2 practicals.

**Prerequisites:** MAM2080W or equivalent.

**Course outline:** Laws of heat transfer; principles of conduction; steady and unsteady state heat transfer, convection, radiation; pc interaction and problem solving.

**Assessment:** Laboratory reports, class tests, June examination 3 hours.

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### MEC4049F TURBOMACHINES

8 NQF credits, 24 lectures, 2 practicals.

**Prerequisites:** MEC3044S.

**Course outline:** Types of turbomachines; dimensionless specific speed, head flow and power coefficients; hydraulic pumps; hydraulic turbines; centrifugal compressors; axial flow compressors; steam and gas turbines.

**Assessment:** Class tests, June examination 2 hours.

### **MEC4051Z** NEW VENTURE PLANNING

8 NQF credits, 24 lectures.

**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.

**Assessment:** Individual learning log, presentations, project report(s).

### **MEC4053Z** MEASUREMENT & CONTROL IN ENGINEERING SYSTEMS

16 NQF credits.

**Prerequisites:** 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.

**Assessment:** Practical examinations, technical reports, 3 hour examination.

### **MEC4054Z** QUALITY, RELIABILITY & MAINTENANCE MANAGEMENT

12 NQF credits, 24 lectures, field work.

**Course outline:** Quality, Reliability, Maintenance Planning, Preventative Maintenance, Reliability Centred Maintenance, Total Productive Maintenance, condition monitoring, problem solving, safety, systems view..

**Assessment:** Project, continuous assessment tests, assignments, June examination 2 hours.

### **MEC4055Z** DESIGN III

16 NQF credits, 12 lectures, 12 studios.

**Entrance requirements:**

**Prerequisites:** MEC3050W and prerequisite/corequisite MEC2026S.

**Co-requisites:** Fourth year elective courses.

**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.

**Assessment:** Project report, oral presentation.

### **MEC4061F/Z** INDIVIDUAL LABORATORY/RESEARCH PROJECT

48 NQF credits.

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**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.

**Assessment:** Project report, oral examination.

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### MEC4062Z AIR CONDITIONING & REFRIGERATION

12 NQF credits, 36 lectures, 1 practical.

**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.

**Assessment:** Class tests, practical/demonstration, September examination 3 hours.

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### MEC4063C INDUSTRIAL ECOLOGY

8 NQF credits, 18 lectures/seminars.

**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.

**Assessment:** Project, essays, assignments.

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### MEC4065F FINITE ELEMENTS IN MECHANICAL DESIGN

16 NQF credits, 24 lectures, 12 studio sessions.

**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 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.

**Assessment:** Project, class tests, June examination 3 hours.

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### MEC4087Z FAILURE ANALYSIS

8 NQF credits, 24 lectures, 2 practicals.

**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.

**Assessment:** Tutorials, class test, September examination 2 hours.

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**MEC4088Z MANUFACTURING WITH MATERIALS**

12 NQF credits, 36 lectures, 3 tutorials, 3 practicals.

**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.

**Assessment:** Projects, class tests, September examination 3 hours.

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**MEC4091S RESEARCH REPORT**

48 NQF credits.

**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.

**Assessment:** Project(s).

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**MEC4092F INTERNAL COMBUSTION ENGINES**

12 NQF credits, 36 lectures, 2 practicals.

**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.

**Assessment:** Assignments, June examination 3 hours.

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**MEC4094F APPLIED OPERATIONS ENGINEERING**

20 NQF credits, 8 lectures, 30 projects.

**Entrance requirements:** Final year student. This course is limited to 10 students. Students will be selected based on academic record and in consultation with the Head of Department.

**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.

**Assessment:** Year mark.

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**MEC4095Z LEAN OPERATIONS**

8 NQF credits, 24 lectures, 4 tutorials.

**Entrance requirements:** Final year student.

**Co-requisites:** MEC4094F.

**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

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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.

**Assessment:** Year mark 30%, June examination 70%.

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### MEC4096Z MANUFACTURE & PROPERTIES OF COMPOSITES

12 NQF credits, 36 lectures, 3 tutorials, 2 practicals, 1 site visit.

**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.

**Assessment:** Class tests, examination 3 hours.

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### MEC4097Z MANUFACTURE & PROPERTIES OF CERAMICS

8 NQF credits, 24 lectures, 2 tutorials, 2 practicals, 1 site visit.

**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.

**Assessment:** Class tests, examination 2 hours.

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### MEC4098Z PROPERTIES & MANUFACTURE OF METALLIC MATERIALS

16 NQF credits, 48 lectures, 4 practicals.

**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.

**Assessment:** Projects, class tests, examination 3 hours.

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### MEC4099Z PHASE TRANSFORMATIONS IN MATERIALS

8 NQF credits, 24 lectures.

**Prerequisites:** MEC3060F.

**Course outline:** Thermodynamics and kinetics of phase equilibria and phase transformations in metals, alloys and ceramic materials.

**Assessment:** Class tests, examination.

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### MEC4100F MANUFACTURE & PROPERTIES OF POLYMERS

12 NQF credits, 36 lectures, 2 tutorials, 2 practicals, 1 site visit.

**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.

**Assessment:** Practicals, class tests, examination 3 hours.

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**MEC4101C** ADVANCED MANUFACTURING & NANO TECHNOLOGY

8 NQF credits, 24 lectures, 4 tutorials, 2 practicals.

**Co-requisites:** 4th year courses.

**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

**Assessment:** Examination and year mark.

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**MEC4102C** HYDRAULICS & PNEUMATICS

8 NQF credits, 24 lectures, 2 tutorials.

**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.

**Assessment:** Examination and year mark.

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**MEC5000W** MASTERS DISSERTATION: MECHANICAL ENGINEERING

180 NQF credits.

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**MEC5010Z** MASTERS DISSERTATION: MECHANICAL ENGINEERING

120 NQF credits.

**Prerequisites:** MEC5097Z DP.

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**MEC5024S** STRUCTURAL IMPACT

12 NQF credits.

**Course outline:** Static plastic behaviour of beams; plates and shells. Dynamic plastic behaviour of beams, plates and shells. Influence of transverse shear and rotary inertia. Influence of finite displacements; strain rate sensitive behaviour of materials; dynamic progressive buckling; plastic buckling. Scaling laws and experimental techniques.

**Assessment:** Project(s).

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**MEC5025Z** MASTERS IN ENGINEERING MANAGEMENT: DISSERTATION

120 NQF credits.

**Prerequisites:** Completion of 80 credits of approved postgraduate coursework, MEC5097Z DP.

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**MEC5035Z** PROJECT MANAGEMENT

20 NQF credits.

**Prerequisites:** Registration for a postgraduate qualification

**Course outline:** The need for and objectives of project management. Organising for project management. Project manager qualities and competency. Planning and implementing a human resource management, team motivation, planning, feasibility studies. Managing project time, cost and quality. Estimating budgeting cost control. Procurement and expediting. Contractual arrangements and legal aspects. Communications, controlling meetings, handling contractors.

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Project commissioning. Risk analysis and hazard assessment. Conflict management. Time value of money and use of discounted cash flows for project appraisal and decision making. The perspective is managerial, with emphasis on the use of the techniques to aid project decision making. Information systems, projects in developing countries.

**Assessment:** Project report(s), assignments, examination.

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### MEC5036Z MANAGING FOR PERFORMANCE IMPROVEMENT

20 NQF credits.

**Prerequisites:** Registration for a postgraduate qualification

**Course outline:** Productivity: definition and importance. Productivity models, measurement and quality. People and productivity. The nature of quality, costs of quality and Kaizen, and 14000; organising and managing for quality, quality engineering, quality assurance and control; ISO9000 series, techniques of quality control, vendor rating; process capability, precontrol and advanced techniques; total quality management, quality friction development. Just-in-Time; human factors in quality, the zero defects approach; computer use in quality systems. Job design, BPR and work improvement. Value analysis and simultaneous/concurrent engineering. Theory of constraints. Total productive maintenance. Continuous productivity. Improvement programmes.

**Assessment:** Assignments, project report(s), examination.

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### MEC5037Z OPERATIONS MANAGEMENT PROJECT

20 NQF credits.

**Course outline:** On the recommendation of the supervisor and with the agreement of the Head of Department, a student may be permitted to enter into a programme of individual study on a specialised topic. A statement of objectives must be agreed upon, and the course of study will be guided by the supervisor. the programme will involve the student in about 180 hours of work, and a written report must be submitted. The written report will be examined, and a further oral examination may be held.

**Assessment:** Project(s).

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### MEC5038Z ENGINEERING MANAGEMENT TECHNICAL REPORT

Postgraduate diploma candidates only.

40 NQF credits.

**Prerequisites:** 20 credits towards the diploma

**Course outline:** A student registered for a diploma may be permitted to enter into a programme of individual study on a specialised topic within the engineering field. The course of study will be guided by a supervisor appropriate to the field selected. The scope of the work may be experimental or new methods applicable to engineering management, or a comprehensive review.

The programme will involve the student in about 360 hours of work, and a written report must be submitted in the format of a minor thesis, which will be examined by two examiners.

**Assessment:** Project report(s).

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### MEC5043Z DESIGN & MANAGEMENT OF OPERATIONAL SYSTEMS

40 NQF credits.

**Course outline:** Viable Systems Modelling . The Nature and Characteristics of Operational Systems. Core operational decision areas. The Operations Management Process. Socio-technical Systems. Professional Communication Studies gives input on this course.

**Assessment:** Position papers, portfolio of projects.

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### MEC5046Z SYSTEMS ENGINEERING PRACTICE

40 NQF credits.

**Course outline:** Introduction to systems thinking. Management and organisational concepts.

Qualitative mapping and modelling. A system's approach to problem solving.

**Assessment:** Position papers, portfolio of projects.

### **MEC5047W** MASTERS IN ENGINEERING MANAGEMENT: DISSERTATION

180 NQF credits.

### **MEC5048S** NON-DESTRUCTIVE TESTING & EVALUATION

12 NQF credits, 24 lectures.

**Prerequisites:** BSc(Eng) degree.

**Course outline:** Methods and guidance to non-destructive techniques. Selected topics in: Principles of Ultrasonic inspection and methods and their applicability. Electronic Speckle Pattern Interferometry as applied to flow detection. Shearography as the novel optical non-contacting defect detection method. Eddy current versatility for the measurement of thickness of coatings, the detection of seams, cracks, voids and inclusions. Leak detection devices and methods. Condition monitoring of bearings. Testing for flaws in composite materials by mechanical impedance.

**Assessment:** Project, November examination 3 hours.

### **MEC5049S** ADVANCED REFRIGERATION

12 NQF credits.

**Course outline:** Aspects of compression refrigeration. Effects that degrade vapour compression refrigeration; multiple compression; multiple evaporators; flash chambers; cascade systems; compressors (screw, turbine, piston). Aspects of absorption refrigeration. Theory of mixtures; absorption continuous cycle; mathematical and graphical analysis of the cycle; intermittent systems; lithium-bromide water system; water-ammonia-hydrogen system. Aspects of combined compression/absorption cycle: comparison of performance.

**Assessment:** November examination 3 hours.

### **MEC5051Z** MECHANICAL ENGINEERING PROJECT

20 NQF credits.

**Prerequisites:** Completion of appropriate postgraduate courses.

**Course outline:** On the recommendation of the supervisor and with the agreement of the Head of Department, a student registered for a Masters degree may be permitted to enter into a programme of individual study on a specialised topic. A statement of objectives and/or a syllabus must be agreed upon, and the course of study will be guided by a member of the department, usually the supervisor. The programme will involve the student in about 180 hours of work. This can include assignments and projects of an appropriate nature. The course will be assessed by examination or project or both and an oral examination may be held thereafter, if required.

**Assessment:** Examination and/or project.

### **MEC5052S** GAS DYNAMICS

12 NQF credits, 36 lectures.

**Course outline:** Basic equations of compressible flow; Wave propagation in compressible media; Isentropic flow of a perfect gas; Normal shock waves; Applications to nozzles and shock tubes; Oblique shock waves; Prandtl Meyer flow; Applications to supersonic nozzles, supersonic aerofoils; Flow with friction; Flow with heat addition or loss.

**Assessment:** November examination 3 hours.

### **MEC5054Z** INTRODUCTION TO BUSINESS ADMINISTRATION

40 NQF credits.

**Course outline:** Introduction to business and the business environment. Marketing Management. Finance Management. Human Resources Management. Operations Management. General

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Management. Quantitative Methods in Management Economics. Accounting. Business and Society.

**Assessment:** Position papers, portfolio of projects.

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### MEC5056Z ENERGY EFFICIENCY & DEMAND SIDE MANAGEMENT

20 NQF credits.

**Course outline:** Energy use patterns in the commercial, industrial, mining, transport and domestic sectors. Energy efficiency trends. Energy efficiency management and technologies used in heating and electrical equipment as well as in buildings. Analysis of energy balances, energy audits, efficiency economics and tariff structures. Local case studies and international experience of energy efficiency. Two written reports will be required, one a scan of an industrial sub-sector and the other a group project detailing an economically optimal energy efficiency plan for a given scenario.

**Assessment:** Project.

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### MEC5059Z ENERGY MODELLING

20 NQF credits.

**Course outline:** The syllabus will include applications of energy modelling such as energy demand projections, price projections, energy supply planning, policy planning, environmental impact assessment, climate change mitigation assessment, and integrated resource planning. Different types of models such as simulation and optimisation models will be outlined. Linkages between energy modelling, energy statistics and scenario planning will be discussed. Examples of existing energy modelling software and modelling systems will be demonstrated. Important considerations in energy modelling, such as energy-economic relationships or technology advances, will be discussed. Students will engage in exercises on modelling for energy utilities or national energy systems. After having being exposed to most energy modelling issues, students will select a project which may involve researching a particular issue in energy modelling, or involve the modelling of a particular situation.

**Assessment:** Examination and project.

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### MEC5060W MASTERS DISSERTATION: SUSTAINABLE ENERGY ENGINEERING

180 NQF credits.

**Course outline:** In exceptional cases and on the recommendation of the supervisor, and with the approval of the Head of Department, a student registered for the Masters degree may be permitted to enter a programme of individual study on a specialised topic, WITHOUT registering for additional course work. A research proposal must be agreed upon, and the supervisor will guide the project. The programme will involve the student in 1 440 hours of work, and a written report must be submitted, which will be examined by internal and external examiners.

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### MEC5061Z MASTERS DISSERTATION: SUSTAINABLE ENERGY ENGINEERING

120 NQF credits.

**Prerequisites:** MEC5097Z DP.

**Course outline:** The purpose of the dissertation, which complements the course work that is a requirement of the degree, is to afford the student the opportunity to demonstrate his/her ability to conduct independent research. Although the student will work under the direction of a supervisor, the quality and content of the work must be a reflection of the ability of the candidate. The subject chosen for the dissertation will be by mutual agreement between supervisor and student and should incorporate elements of the course work whole also being relevant to the general field of sustainable energy. Where practical, the area of research chosen should be appropriate to the student's country of origin.

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**MEC5062Z POWER PRODUCTION SYSTEMS**

20 NQF credits.

**Course outline:** A summary of energy conversion technologies for power generation. Simple and combined thermal cycles. Internal and external combustion engines. Steam and gas turbines. Basics of nuclear power. Coal boilers including conventional pulverised fuel, supercritical, fluidised bed and integrated gasification. Wind, solar and hydro power. Pumped storage. Efficiency of energy conversion and transmission. Practical advantages and difficulties of each technology.

**Assessment:** Project, examination.

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**MEC5063Z AN INTRODUCTION TO FINITE ELEMENTS**

12 NQF credits, 36 lectures.

**Course outline:** Formulation of the finite element method. Finite elements available in 1-D and 2-D applications. Approach to problem solving techniques using finite elements. Topics include stress analysis, heat transfer, and fluid flow.

**Assessment:** June examination.

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**MEC5064Z FINITE ELEMENT ANALYSIS**

12 NQF credits, 36 lectures.

**Prerequisites:** MEC5063Z.

**Course outline:** Advanced topics in finite element analysis. Element formulations. Introduction to nonlinear procedures and the structure of finite element programs.

**Assessment:** November examination.

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**MEC5065Z PROGRAMMING FOR SCIENTISTS & ENGINEERS**

12 NQF credits, 36 lectures.

**Course outline:** The objective of this course is to prepare students for the development, implementation and management of engineering software for research and/or professional purposes. Such software is characterised by reliable, efficient and user-friendly programmes. Topics covered include fundamentals of C++; program design and implementation; project management strategies; and algorithms and data structures. C++ will be used to demonstrate features and usage of modern object-oriented programming languages. A substantial project component is included.

**Assessment:** June examination.

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**MEC5066Z CONTINUUM MECHANICS**

12 NQF credits, 36 lectures, 12 tutorials.

**Course outline:** Introduction to tensors. Kinematics of continuous media. Balance of mass, linear and angular momentum, and energy. Stress. Constitutive theory. Linear elasticity. Ideal fluids. Newtonian fluids.

**Assessment:** June examination.

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**MEC5067Z NONLINEAR MATERIAL BEHAVIOUR**

12 NQF credits, 36 lectures.

**Prerequisites:** MEC5066Z, MEC5063Z.

**Course outline:** Topics in nonlinear mechanics. Nonlinear elasticity. Behaviour of elastic-plastic solids. Viscoplasticity and creep. Non-Newtonian fluids. Biological materials.

**Assessment:** November examination.

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**MEC5068Z TOPICS IN COMPUTATIONAL & APPLIED MECHANICS**

12 NQF credits, 36 lectures.

**Prerequisites:** MEC5063Z, MEC5066Z.

## 290 COURSES OFFERED

**Course outline:** The aim of this course is to provide an opportunity for students to be exposed to topics which are of relevance to current research at CERECAM, but which are not covered by the existing courses offered in the Faculty. The choice of topics will depend on the interests of the class and on the lecturer available. Subjects from which the topics will be chosen may include: nonlinear elasticity; visco-elasticity; inelastic material behaviour, including damage and viscoplasticity; fluid mechanics; metals processing; dynamic plasticity; fracture mechanics; nondestructive testing.

**Assessment:** November examination.

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### MEC5069Z COMPUTATIONAL FLUID DYNAMICS: A FIRST COURSE

12 NQF credits, 36 lectures.

**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 programmes in a computer language of his/her choice. Topics include: discretisation, interpolation, boundary conditions, solution procedures, complex geometries.

**Assessment:** Examination and Project.

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### MEC5070W MASTERS DISSERTATION: MATERIALS ENGINEERING

180 NQF credits.

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### MEC5071Z MASTERS DISSERTATION: MATERIALS ENGINEERING

120 NQF credits.

**Prerequisites:** MEC5097Z DP.

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### MEC5074Z BOUNDARY LAYER FLOWS

12 NQF credits, 36 lectures.

**Prerequisites:** MEC3060F, MEC3067F or MEC3065F or MEC3064F or MEC3063S.

**Course outline:** The course aims to provide the student with the necessary knowledge and skills to make informed decisions when selecting the different modelling strategies to resolve boundary layer flows numerically.

**Assessment:** Examination and project.

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### MEC5075Z NEW & RENEWABLE ENERGY TECHNOLOGIES

20 NQF credits.

**Course outline:** Renewable energy resources, solar radiation and wind meteorology, water and biomass resource base; solar thermal, heat transfer essentials, solar water heating, passive and active solar building design; solar thermal electric, thermodynamic essentials, engine cycles; photovoltaics: wind, fluid mechanics essentials; small hydro-electric systems; alternative liquid fuels; wave, tidal, OTEC, geothermal; fuel cells, hydrogen; storage, environmental issues.

**Assessment:** Examination.

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### MEC5080Z MANAGING NEW VENTURE PROJECTS

20 NQF credits.

**Course outline:** In this course students will learn how to prepare a business plan for launching a high potential new business. Students will work in teams which will be given the opportunity to pool their skills and experience and apply them to a very practical hands-on project focused on developing a comprehensive plan for a new business.

**Assessment:** Project, presentations.

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**MEC5082Z ENERGY FOR TRANSPORTATION**

12 NQF credits.

**Prerequisites:** BSc (Mech Eng) or equivalent.**Course outline:** Vehicles have become one of the most vital components in the world economy equation. The aim of this course is to provide a partial overview of the dynamics that operate on the fuel supply side of this equation, i.e. the oil industry. This subject cannot be studied in isolation and the perspectives of the three other main stakeholders in the transport industry need to be also considered, ie, the motorist, the motor manufacturers and the government.**Assessment:** Projects and examination.

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**MEC5083Z ENGINE DESIGN**

16 NQF credits.

**Prerequisites:** BSc (Mech Eng) or equivalent.**Course outline:** The modern motor vehicle represents a sophisticated example of technology and engineering. The aim of this course is to show how a systems approach can be used to establish the basic relationships between the engine and vehicle in terms of various performance indicators and fuel consumption. The various building blocks for such an analysis were laid in the Mechanical Engineering undergraduate programme and this course represents an integration of this foundation by means of a high-level synthesis for a specific application.**Assessment:** Projects and examination.

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**MEC5084Z ENGINE THERMODYNAMICS & COMBUSTION**

16 NQF credits.

**Prerequisites:** BSc (Mech Eng) or equivalent.**Course outline:** Fuel and engine form a complementary pair. Combustion research cannot be divorced from either the engine or the fuel and it is the goal of this course to show how these two are integrated by the combustion event. The course will focus strongly on combustion and engine modelling.**Assessment:** Projects and examination.

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**MEC5087Z ENERGY MARKETS & GOVERNANCE**

20 NQF credits.

**Course outline:** National and international energy markets (oil, gas, electricity), their structure, dynamics and implications for national planning. Energy governance, the role of the state and management of the energy sector: market failure; regulatory theory; monopolies; institutional reform. Energy pricing theory and methods. Institutional and governance challenges of demand-side programmes. Environmental governance in the energy sector; key issues; mechanisms and policy.**Assessment:** Examination and project.

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**MEC5088Z ENERGY, POVERTY & DEVELOPMENT**

20 NQF credits.

**Course outline:** Availability, consumption, and characteristics of energy use in developing areas; assessing consumption patterns and problems. Introduction to social research techniques. Relationships between energy, poverty, education, health, water access, and development. Gender perspectives on energy procurement and uses. Urban and rural energy technologies and strategies as applied to households, community facilities and small scale enterprises, (including electrification, biomass and renewable energy). Related energy and environment issues.**Assessment:** Examination.

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**MEC5089Z ENERGY PROJECT**

20 NQF credits.

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**Course outline:** On the recommendation of the supervisor, and with the approval of the Director of the Energy Research Centre, a student registered for a Masters degree may be permitted to enter a programme of individual study on a specialised topic. A research proposal must be agreed upon, and the project will be guided by the supervisor. The programme will involve the student in 200 hours of work, and a written report must be submitted which will be examined by an internal and external examiner.

**Assessment:** Project(s).

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### **MEC5090Z ENERGY & CLIMATE CHANGE**

20 NQF credits.

**Course outline:** Causes of climate change: greenhouse effects, carbon cycle, current status and climate variability. Future changes and impacts of climate change: emissions and concentrations, stabilisation prospects, temperature effects, ecological and socio-economic impacts. Energy development and use and climate change: GHG emissions from energy supply and use, non-GHG emissions from energy supply and use. Climate change debate and Assessment: Agenda 21, UNFCCC, Kyoto Protocol, obligations and commitments of countries, IPCC reports. Energy options for mitigation of climate change: supply, building, transport, industry erosion, waste management, and human health. Energy technology transfer: transfer trends, transfer strategies. Sustainable policies and measures: domestic, international, UNFCCC and KP instruments.

**Assessment:** Project, examination.

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### **MEC5091Z INTRODUCTION TO ENERGY POLICY & SUSTAINABLE ENERGY ENGINEERING**

20 NQF credits.

**Course outline:** Introduction to energy concepts and terminology. Energy resources and reserves, extraction methods and conversion techniques, including coal, gas, liquid fuels, hydro, nuclear, renewable energy and new energy technologies. An overview of the current world-wide energy situation. Energy demand and energy balances. Energy issues related to development, sustainability and conservation with environmental and economic linkages. Integrated resource planning and integrated energy planning. Introduction to policy science and theory. South African and international energy policy issues.

**Assessment:** Project, examination.

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### **MEC5092Z MASTERS DISSERTATION: ENERGY & DEVELOPMENT STUDIES**

120 NQF credits.

**Prerequisites:** MEC5097Z.

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### **MEC5093W MASTERS DISSERTATION: ENERGY & DEVELOPMENT STUDIES**

180 NQF credits.

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### **MEC5094Z CLEANER FUELS & CLEANER ENGINES**

16 NQF credits, 36 lectures over six weeks and 1 tutorial per week.

**Prerequisites:** BSc(Mech Eng) or equivalent.

**Course outline:** Air quality and emission legislation; life-cycle analysis; emission and pollution formation processes; in-cylinder & after-treatment control and electronic engine management; fuel and lubricant effects; emission measurements.

**Assessment:** Year mark, examination.

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### **MEC5095Z ENGINEERING MANAGEMENT RESEARCH REPORT**

60 NQF credits.

**Prerequisites:** Registration for a postgraduate degree or diploma.

**Course outline:** In agreement with a suitable supervisor, a research topic will be selected, a research proposal agreed, research will be undertaken and a research report prepared. This will represent at least 600 hours of work.

**Assessment:** The written report will be examined, and a further oral examination may be held.

### **MEC5096Z** ATMOSPHERIC FLIGHT MECHANICS

12 NQF credits.

**Prerequisites:** BSc(Eng)

**Course outline:** Kinematics and dynamics of particles, particle systems and rigid bodies in three-dimensions: Vector transformations, vector derivatives in rotating frames, Newton's Laws, linear and angular impulse and momentum, the inertia tensor, Euler angles, quaternions and equations of motion. Introduction to applied aerodynamics: Nature of subsonic, transonic and supersonic flow, shockwaves and boundary layers, laminar and turbulent flow, vortex flow, Buckingham's pi theorem and aerodynamic coefficients, Reynolds and Mach numbers, compressible flow, wind tunnel testing, the atmosphere, air speed measurement. Approximate analysis of propulsive devices: the gas turbine and its components, ramjets, rocket motors and propellers. Aircraft performance: power required and available, take-off, rate of climb, time to climb, ceiling, range, endurance, flight envelopes, excess specific power, velocity-load-factor diagrams. Static stability and trim: static stability, control power, g-capability, elevator trim position, hinge moments, stick force, stick-free stability, mass centre limits. Small perturbation stability and response of aircraft: linearized equations of motion, estimation of stability derivatives, lateral and longitudinal equations of motion, frequency response, transient response, mode roots and mode shapes.

**DP requirements:** Completion of assignments and tests.

**Assessment:** Year mark, examination.

### **MEC5097Z** DISSERTATION PREPARATION

DP requirement for entry to MEC5010Z, MEC5025Z, MEC5060Z, MEC5071Z.

**Course outline:** The aim of this course is to allow the student to undertake preparatory work for the Masters Dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

### **MEC6000W** PHD THESIS: MECHANICAL ENGINEERING

### **MEC6002W** PHD IN ENGINEERING MANAGEMENT

### **MEC6003W** PHD THESIS: SUSTAINABLE ENERGY ENGINEERING

### **MEC6004W** PHD THESIS: MATERIALS ENGINEERING

### **MEC6005W** PHD THESIS IN ENERGY & DEVELOPMENT STUDIES

### **PBL6036S** ENVIRONMENTAL LAW FOR NON-LAWYERS

**Course co-ordinator(s):**

**Entrance requirements:** Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree.

**Course outline:** The inclusion of an environmental right in South Africa's Constitution has led to the emergence of many environmental laws and court decisions in the past ten years. These

## 294 COURSES OFFERED

developments are of key relevance to those working in the environmental sector including developers, consultants, biologists, zoologists, planners, sociologists and anthropologists. This course provides students undertaking postgraduate studies relevant to the environment with an insight into relevant principles of international and domestic environmental law. Key content covered in the course includes: nature and scope of environmental law; an introduction to basic legal principles and resources; constitutional aspects (environmental rights, access to information, administrative justice and access to courts); framework environmental laws; land-use planning laws (planning law, environmental impact assessment and protected areas); natural resource laws (biodiversity, water and marine living resources); and pollution laws (fresh water, land and air pollution).

**Lectures:** to be arranged.

**DP requirements:** Satisfactory attendance of lectures and completion of essays.

**Assessment:** Short assignment counts 10%, essay counts 40%, one 3-hour examination counts 50%.

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### PHI2040S PHILOSOPHY OF SCIENCE

24 NQF credits.

**Course co-ordinator(s):** 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?

**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%.

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### PHY0011F ENGINEERING PHYSICS FOUNDATIONS

16 NQF credits, 54 lectures, 4 tutorials 27 practicals.

**Course outline:** Models in physics; Coordinate systems and kinematics problems; Problem solving Vector analysis using analytical and graphical techniques; Forces and Free body diagrams State diagrams for energy conservation; Rotational motion; Conceptual reasoning.

**Assessment:** June examination 50%, year mark 50%.

**DP requirements:** 40% in class tests and in weekly tests.

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### PHY1012F/S ENGINEERING PHYSICS A

16 NQF credits, 48 lectures, 12 Exercise sessions, 12 tutorials/practicals.

**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, static equilibrium, elasticity, elastic moduli, simple harmonic motion, 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.

**Assessment:** June and November examinations, laboratory work, class tests.

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### PHY1013F/S ENGINEERING PHYSICS B

16 NQF credits, 48 lectures, 12 exercise sessions, 12 tutorials/practicals.

**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, static equilibrium, elasticity, elastic moduli, simple harmonic motion, 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.

**Assessment:** June and November examinations, laboratory work, class tests.

### PHY1023H FOUNDATIONS & PRINCIPLES OF PHYSICS

18 NQF credits, 120 lectures, 24 tutorials/practicals.

**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. The second half of the course has a similar content to PHY1031F, but at a calculus level.

**Assessment:** Class record 25%, November examination 50%, laboratory work 25%.

### PHY1024F PHYSICS OF RADIATION & MATTER

For students registered in the Engineering Foundation Programme.

18 NQF credits, 60 lectures, 12 tutorials/practicals.

**Prerequisites:** PHY1032F.

**Course outline:** Similar content to PHY1032S, but at a calculus level.

**Assessment:** Class record 25%, June examination 50%, laboratory work 25%.

### PHY1031F PHYSICS OF NATURAL SYSTEMS I

18 NQF credits, 60 lectures, 12 tutorials/practicals.

**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.

**Assessment:** Class record 25%, June examination 50%, laboratory work 25%.

### PHY1032S PHYSICS OF NATURAL SYSTEMS II

18 NQF credits, 60 lectures, 12 tutorials/practicals.

**Prerequisites:** At least 40% for PHY1031F.

**Course outline:** Electricity and magnetism: electric charge, electric field, Gauss's law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Bio-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, Doppler effect. Atomic physics: the electron, quantum physical phenomena, atomic structure, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.

**Assessment:** Class record 25%, November examination 50%, laboratory work 25%.

### PHY2009S THE PHYSICS OF FLUIDS & FIELDS

24 NQF credits, 60 lectures, 12 practicals.

**Prerequisites:** A half course in mathematics, PHY1024F.

**Co-requisites:** A full course in mathematics.

**Course outline:** Liquids and Gases: Interatomic forces and potentials. Perfect and real gases, Boltzmann distribution, Maxwell velocity distribution, transport properties of gases. Thermodynamics, entropy, free energy. Latent heat and phase transitions. Ideal and real fluids. Vectors and Fields: introductory vector analysis; div, grad, curl; flux and circulation, hydrostatics,

## 296 COURSES OFFERED

fluidynamics, Navier-Stokes equation, drag.

**Assessment:** Class work 25%, November examination 50%, laboratory work 25%.

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### PHY2010S ELECTROMAGNETISM FOR ENGINEERS

16 NQF credits, 6 practicals, 36 lectures.

**Prerequisites:** PHY1010W.

**Co-requisites:** MAM2080W.

**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.

**Assessment:** Class work 25%, November examination 50%, laboratory work 25%.

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### PHY2014F WAVES & ELECTROMAGNETISM

24 NQF credits, 60 lectures, 12 practicals.

**Prerequisites:** PHY1004W or PHY2009S or 60% pass in both PHY1010W and MAM1003W. First full year course in Mathematics.

**Course outline:** 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, harmonic oscillations, damped and forced oscillations, resonance, Fourier analysis, harmonic chains, waves, dispersion, interference, diffraction.

**Assessment:** Class record 25%, June examination 50%, laboratory work 25%.

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### PHY2015S CLASSICAL & QUANTUM MECHANICS

24 NQF credits, 60 lectures, 12 practicals.

**Prerequisites:** PHY1004W or PHY2009S or 60% pass in both PHY1010W and MAM1003W.

**Course outline:** Classical and quantum mechanics: Review of Newton's laws. Constraints. D'Alembert principle. Lagrangian formulation of mechanics. Conservation laws. Applications. Central forces. Planetary motion. Non-inertial frames of reference. Small oscillations. Normal coordinates. The basic assumptions of quantum mechanics. Solutions of Schrodinger's equation. Properties of wave functions and operators. One-dimensional applications. Angular momentum in quantum mechanics. Three-dimensional applications. The hydrogen atom. Approximate methods.

**Assessment:** Class work 25%, November examination 50%, laboratory work 25%.

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### PHY3021F ADVANCED PHYSICS I

24 NQF credits, 60 lectures, 12 practicals.

**Prerequisites:** PHY2014F and PHY2015S. A full second year course in mathematics or applied mathematics.

**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, realistic electrodynamics, the electromagnetic field tensor.

THERMODYNAMICS & 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, phase changes, applications to classical and quantum systems.

**Assessment:** Class work 25%, June examination 50%, laboratory work 25%.

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**PHY3022S** ADVANCED PHYSICS II

24 NQF credits, 60 lectures, 12 practicals.

**Prerequisites:** PHY2014F and PHY2015S. A full second year course in mathematics or applied mathematics.

**Course outline:** The hydrogen atom. Transitions and selection rules. Fine structure. The helium atom. The hydrogen molecular ion. The hydrogen molecule. Basic properties of nuclei. Nuclear binding energy and the semi-empirical mass formula. Bound state of the deuteron and the nuclear force. Nuclear shell model. Radioactivity and the radioactive decay series. Alpha, beta and gamma radioactivity. Interaction of nuclear radiation with matter. Radiation dosimetry. Nucleosynthesis in stars Cosmic radiation, crystal structure, lattice vibrations, electron states in solids, energy band theory, semiconductor physics and devices.

**Assessment:** Class work 25%, November examination 50%, laboratory work 25%.

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**STA1000F/S** STATISTICS 1000

18 NQF credits, 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.

**Prerequisites:** **STA1000F:** A pass in any of MAM1004F/H or MAM1005H or MAM1006H or MAM1000W or MAM0102W/X or MAM1003W or STA1001F/H.

**STA1000S:** A pass in any of MAM1004F/H or MAM1005H or MAM1006H or MAM0102W/X or STA1001F/H/S.

**Co-requisites:** In addition students will be admitted to STA1000S if they are currently registered for MAM1000W or MAM1003W 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.

**Assessment:** June/November examination 3 hours.

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**STA1001F/S** STATISTICS 1001

18 NQF credits, 60 lectures.

**Note:** No student will be permitted simultaneous credit any equivalent or subsuming first year Mathematics course.

**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.

**Assessment:** June/November examination 3 hours.

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**STA2020F** BUSINESS STATISTICS

18 NQF credits, 48 lectures, 12 tutorials.

**Prerequisites:** (MAM1000W or MAM1002W or MAM1005S or MAM1004F/H or MAM1005H or MAM1006H or MAM1010 or MAM1012 or STA1001F/H) plus (STA1000F/S or STA1006S).

**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.

**Assessment:** Class record 30%, June/November examination 3 hours 70%.

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**STA5083Z** INTRODUCTION TO STATISTICAL METHODS FOR PLANNERS

8 NQF credits. (*Might not be offered in 2010.*)

**Course outline:** Scales of measurement; descriptive statistical methods; data summaries; introduction to statistical inference; tests of association; measures of correlation; simple linear regression.

**DP requirements:** Class attendance and submission of all assignments.

**Assessment:** 2 hour computer based examination.

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