

# UNIVERSITY OF CAPE TOWN

## FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT (POSTGRADUATE)

### 2016

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

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

- Book 1:** Undergraduate Prospectus
- Book 2:** Authorities and information of record
- Book 3:** General Rules and Policies
- Book 4:** Academic Calendar and Meetings
- Book 5:** Student Support and Services
- Book 6-11:** Handbooks of the Faculties of Commerce, Engineering & the Built Environment, Health Sciences, Humanities, Law, Science
- Book 12:** Student Fees
- Book 13:** Bursary and Loan Opportunities for Undergraduate Study
- Book 14:** Financial assistance for Postgraduate Study and Postdoctoral Research

## 2 CONTENTS

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

- (i) make alterations or changes to any of the published details of the opportunities on offer; or
- (ii) add to or withdraw any of the opportunities on offer.

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

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# CONTENTS

<b>Guide to the usage of this Handbook.....</b>	<b>5</b>
<b>General Information .....</b>	<b>6</b>
Officers in the Faculty .....	6
Student Councils .....	8
Postgraduate Centre .....	8
Distinguished Teachers.....	8
Fellows in the Faculty.....	8
Lecture timetable .....	8
Minimum Requirements for Admission .....	8
Degrees and Diplomas Awarded by the Faculty.....	9
Lecture periods .....	10
Ethics Clearance .....	10
<b>Rules for Postgraduate Qualifications .....</b>	<b>13</b>
Postgraduate Diplomas .....	13
Honours Degrees .....	19
Master's Degrees .....	36
Doctoral Degrees .....	81
<b>Departments in the Faculty .....</b>	<b>84</b>
Architecture, Planning and Geomatics .....	84
Chemical Engineering .....	113
Civil Engineering.....	130
Construction Economics and Management .....	161
Electrical Engineering .....	179
Mechanical Engineering.....	203
<b>Centres and other Entities Established in the Faculty .....</b>	<b>225</b>
African Centre for Cities.....	225
Centre for Bioprocess Engineering Research (CeBER) .....	225
Centre for Catalysis Research (Cat Centre).....	225
Centre for Research in Computational & Applied Mechanics (CERECAM).....	225
Centre for Materials Engineering (CME) .....	225
Centre for Minerals Research (CMR).....	225
Centre for Research in Engineering Education (CREE).....	225
Centre for Transport Studies.....	225
DST - NRF Centre of Excellence in Catalysis (c*change).....	225
DST Hydrogen Catalysis Competence Centre (HySA/ Catalysis) .....	225
Energy Research Centre (ERC) .....	225
Blast Impact & Survivability Research Unit (BISRU).....	225
Crystallisation and Precipitation Research Unit (CPU).....	225
Minerals to Metals .....	225
Continuing Professional Development .....	236
Geographical Information Systems Unit .....	236
Professional Communication Studies .....	236
<b>Centres, departments, schools and units established in other faculties .....</b>	<b>238</b>
Departments Established in the Faculty of Commerce .....	238
<i>College of Accounting</i> .....	238
Centres and Departments Established in the Faculty of Humanities .....	238
<i>School of African &amp; Gender Studies, Anthropology &amp; Linguistics</i> .....	238
Departments Established in the Faculty of Law .....	240
<i>Commercial Law</i> .....	240
<i>Public Law</i> .....	240
<b>Scholarships, Prizes, Class Medals and Dean's Merit List .....</b>	<b>242</b>

#### 4 CONTENTS

Scholarships/Awards.....	242
Class Medals .....	244
Prizes.....	244
Dean's Merit List.....	252
<b>Professional Status and Recognition of Degrees .....</b>	<b>253</b>

## 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, each of which has a particular focus. The sections are interlinked by cross-references where relevant.

- a) *General Information*: This section includes information on officers in the faculty, student councils, minimum requirements for admission, degrees and diplomas awarded by the faculty, lecture times, course codes and terminology and the credit system. Detailed information on the undergraduate entrance requirements can be found in the University Prospectus.
- b) *Rules for degrees*: This section covers the Faculty rules for each of the degree programmes. These rules should be read in conjunction with the general University rules in the General Rules and Policies Handbook (Handbook 3), which also contains the rules for the PhD degree. 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, taking particular note of the following:
  - i. rules relating to registration and examinations;
  - ii. rules relating to changes of curriculum;
  - iii. rules relating to leave of absence;
  - iv. rules on Academic Conduct, especially the rules concerning dishonest conduct and plagiarism.
- c) *Programmes of Study*: This section gives a brief introduction to each programme and lists the curricula (required courses) in table form. The curriculum tables must be read together with the course outlines in the Departments in the Faculty and Courses Offered section.
- d) *Departments in the Faculty and Courses Offered*: This section contains entries for each department in the Faculty, and lists members of staff and programmes of study, as well as course outlines of each course offered by the departments.
- e) *Centres and other entities established in the Faculty*: There are entries for the principal faculty entities, centres and units which do not fall directly under academic departments, such as the Centre for Research in Engineering Education, and Continuing Professional Development.
- f) *Departments in other Faculties and Courses Offered*: This section contains entries for departments located in other faculties, with course outlines for courses commonly taken by students in the Faculty of Engineering & the Built Environment.
- g) *Scholarships, Prizes, Class Medals and the Dean's Merit List*: This section lists the various prizes, medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.
- h) *Professional Status and Recognition of Degrees*: This section includes information on the professional status and recognition of the Faculty's degrees and its links with professional bodies.

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# GENERAL INFORMATION

## Officers in the Faculty

### Academic

#### Dean of the Faculty:

Professor AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FRSAIChe FSAIMM  
MASSAf FSAAE FIChemE

#### Personal Assistant to the Dean:

Ms J Baron

#### Deputy Deans:

Associate Professor BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* FSAIMechE  
Professor P Moyo, BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang* MSAICE,  
MIABSE  
T Winkler, BSc(TRP) MUD *Witwatersrand* PhD *British Columbia*

#### Assistant Dean:

Professor JE van Zyl, PrEng BEng MEng *RAU* PhD *Exeter* MASCE MSAICE MIWA FWISA

#### Heads of Departments:

##### Architecture, Planning and Geomatics:

Professor T Berlanda, Dipl Arch, USI, PhD (Arch & Design) *Italy*

##### Chemical Engineering:

Professor E van Steen, MSc(Eng) *Eindhoven* PhD *Karlsruhe* FSAIChe FSAAE

##### Civil Engineering:

Professor NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA  
FSAIMunE Mem IAHR Mem IAHS FIWA

##### Construction Economics and Management:

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

##### Electrical Engineering:

Professor ES Boje, PrEng BSc(Eng) *Wits* MSc(Eng) PhD *Natal* SMSAIMC MIEEE

##### Mechanical Engineering:

Professor RD Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE

##### Convener Professional Communication Studies:

Associate Professor J English, BA MPhil *Cape Town* PhD *Glasgow Caledonian*

## Academic Administration

#### Faculty Manager (Academic Administration):

G Valodia, BA Hons HDE *Cape Town*

#### Undergraduate Manager (Academic Administration):

D Chuter, BA HDE *Cape Town*

**Postgraduate Manager (Academic Administration):**

I Dilraj, BSoc Sc Hons *Cape Town*

**Administrative Officer and Data Support:**

B Cleenwerck, LLB BSocSc *Cape Town*

**Administrative Assistants:**

D Botha, BPrimEd *Wits*

Z Chikte, BSoc Sc Hons *Cape Town*

KW Ho, BA Hons *Stell* BSoc Sc Hons *Cape Town*

T Rossouw, BA(Gen) NC (Archival Studies) *UNISA*

**Senior Secretary - Receptionist:**

S Reizenburg

**Clinical Psychologist**

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

**Communications, Marketing and Development**

**Manager:**

M Hilton

**Alumni Officer:**

M Zitha, BA (Media Studies) *Cape Town*

**Finance**

**Faculty Finance Manager:**

B Daubenton, HND Civil Engineering Structures *Cape Technikon*

**Assistant Faculty Finance Manager:**

S Kriel, BCom *Cape Town*

**Senior Finance Officer:**

M Hyland

**Finance Officer:**

A Burmeister, BA *UNISA*

**Human Resources**

**Human Resources Officer:**

Z Matthews, BAdmin *UWC*

**IT and Facilities**

**Manager:**

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 2015/2016 Chair of the undergraduate student council is Dominic Schorr (SCHDOM007@myuct.ac.za) and the Vice-Chair is Ms Khensani de Klerk (DKLKHE001@myuct.ac.za). 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 2015/2016 Chair is Ms Takunda Chitaka (CHTTAK002@myuct.ac.za) and Mr Mehdi Safari (SFRMEH001@myuct.ac.za) is the Vice-Chair. They can be contacted 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 Master's and Doctoral students as well as postdoctoral research fellows. Postgraduates are encouraged to make full use of this centre, in particular, the Funding Office, which administers all postgraduate bursaries and scholarships. The Postgraduate Centre may be contacted at [pgcentre@uct.ac.za](mailto:pgcentre@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 Teacher's Award in recognition of the importance of excellence in teaching at all levels in the University. The following current members of the Faculty staff have received this award.

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

### Fellows in the Faculty

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

Professor MG Alexander	(Civil Engineering)
Emeritus Professor D Dewar	(Architecture, Planning and Geomatics)
Professor GA Ekama	(Civil Engineering)
Professor STL Harrison	(Chemical Engineering)
Professor AE Lewis	(Chemical Engineering)
Professor G Nurick	(Mechanical Engineering)
Emeritus Professor CT O'Connor	(Chemical Engineering)
Emeritus Professor H Rüter	(Architecture, Planning and Geomatics)
Professor E van Steen	(Chemical Engineering)
Professor V Watson	(Architecture, Planning and Geomatics)

### Lecture timetable

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

## Minimum Requirements for Admission

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

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

## Degrees and Diplomas Offered in the Faculty

Degrees	SAQA ID
Bachelor of Architectural Studies	3933
Bachelor of Architectural Studies (Honours)	66569
Bachelor of Science in Construction Studies	11703
Bachelor of Science in Engineering in Chemical Engineering	13983
Bachelor of Science in Engineering in Civil Engineering	13974
Bachelor of Science in Engineering in Electrical Engineering	13979
Bachelor of Science in Engineering in Electrical & Computer Engineering	66518
Bachelor of Science in Engineering in Mechatronics	13980
Bachelor of Science in Engineering in Electro-Mechanical Engineering	13982
Bachelor of Science in Engineering in Mechanical Engineering	13977
Bachelor of Science in Geomatics	TBC
Bachelor of Science in Property Studies	11693
Bachelor of Science (Honours) in Geographical Information Systems	TBC
Bachelor of Science (Honours) in Construction Management	11703
Bachelor of Science (Honours) in Materials Science	21339
Bachelor of Science (Honours) in Property Studies	11699
Bachelor of Science (Honours) in Quantity Surveying	14435
Bachelor of Science (Honours) specialising in Nuclear Power	TBC
Master of Architecture	3977
Master of Architecture (Prof)	TBC
#Master of City Planning and Urban Design	
#Master of City and Regional Planning	
Master of Engineering	TBC
Master of Geotechnical Engineering	TBC
#Master of Landscape Architecture	
Master of Science in Engineering	10681
Master of Science in Project Management	13854
Master of Philosophy	TBC
Master of Science in Property Studies	11697
Master of Transport Studies	TBC
Doctor of Philosophy	TBC
Doctor of Architecture	19272
Doctor of Science in Engineering	10687
<b>Diplomas</b>	
*Postgraduate Diploma in Project Management	PGDip(ProjMgmt)
*Postgraduate Diploma in Engineering	PGDipEng
*Postgraduate Diploma in Property Studies	PGDip(PropStudies)
*Postgraduate Diploma in Transport Studies	PGDip(Transport Studies)

*Unless otherwise indicated all qualifications are HEQS-F aligned but SAQA registration numbers are still awaited, except for those marked with \* which are to be discontinued, and with a # to be offered in a different format from 2016.*

## Term Dates for 2016

### 1st Semester

1st Quarter	15 February to 24 March
Mid-term break	25 March to 3 April
2nd Quarter	4 April to 10 June
<b>Mid-year Vacation</b>	11 June to 17 July

### 2nd Semester

3rd Quarter	18 July to 26 August
Mid-term Break	27 August to 4 September
4th Quarter	5 September to 21 December

## Lecture periods

1	08:00 to 08:45	The meridian	13:00 to 14:00
2	09:00 to 09:45	6	14:00 to 14:45
3	10:00 to 10:45	7	15:00 to 15:45
4	11:00 to 11:45	8	16:00 to 16:45
5	12:00 to 12:45	9	17:00 to 17:45

## Ethics Clearance

Research that involves human participants or animal use for research or teaching must undergo ethics review, according to faculty-specific guidelines. Review generally entails prior approval of a research proposal by a Research Ethics or Animal Ethics Committee. In cases where prior approval is not appropriate, the research proposal should be subjected to appropriate deliberative procedures, according to faculty-specific guidelines. Research papers or dissertations that involve human participants or animal use may not be submitted for examination if they have not undergone any ethics review process.

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>AXL</b>	African & Gender Studies, Anthropology & Linguistics
<b>BIO</b>	Biological Sciences
<b>BUS</b>	Management 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 Sciences
<b>END</b>	Faculty of Engineering & the Built Environment

<b>GEO</b>	Geological Sciences
<b>HST</b>	Historical Studies
<b>HUB</b>	Human Biology
<b>MAM</b>	Mathematics & Applied Mathematics
<b>MEC</b>	Mechanical Engineering
<b>POL</b>	Political Studies
<b>PBL</b>	Public Law
<b>PHI</b>	Philosophy
<b>PHY</b>	Physics
<b>SOC</b>	Sociology
<b>STA</b>	Statistical Sciences

## Course Codes – Explanatory Notes

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

<b>AAA</b>	represents the department offering the course;
<b>nnnn</b>	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>B</b>	(the course suffix) represents the position in the year in which the course is offered (as before).

The following suffixes are used:

A	1st quarter course
B	2nd quarter course
C	3rd quarter course
D	4th quarter course
F	1st semester course
S	2nd semester course
H	half course taught over whole year
W	full course, year-long
L	Winter Term
M	Multiterm
U	Summer Term Sessions 1 and 2
J	Summer Term Session 1
P	Summer Term Session 2
X	not classified
Z	other
EWA	Examination without attendance at course

The following example shows how this works:

**CIV2031S** Structural Engineering

The code shows that this is a Civil Engineering course (CIV), of second year level (2031) and that it is a second semester (S) course.

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

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

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

## Courses: Guide To Terminology

<b>Core courses:</b>	These courses form a central part of a Bachelor's degree programme. Inclusion of such courses in a curriculum is compulsory.
<b>Co-requisites:</b>	A co-requisite course is one for which a student must be registered together with (i.e. concurrently) another specified course.
<b>Elective core courses:</b>	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.
<b>Elective courses:</b>	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 (e.g. Humanities courses), and subject to timetable constraints.
<b>Major Course:</b>	A major course refers to the Design & Theory Studio and Technology courses in the BAS curriculum.
<b>Optional courses:</b>	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.
<b>Prerequisites:</b>	A prerequisite course is one which a student must have completed in order to gain admission to a specific other course.
<b>Undergraduate course:</b>	This is a course which is required for a first qualification, e.g. a Bachelor's degree.
<b>Postgraduate course:</b>	This is a course which is required for a higher qualification, e.g. a Postgraduate Diploma, Honours or a Master's degree.
<b>DP requirements:</b>	The classwork and test results which must be achieved in order to be allowed to write the examination in a course (DP = duly performed).
<b>NQF credits:</b>	The weighting a course is given in the national qualifications framework system. Students should ignore NQF credit values, and complete their degrees by faculty rules for number of courses.

## Credit System

The Faculty has adopted the Higher Education Qualifications Framework (HEQSF) course credit system with effect from 2004. The Faculty's course credit ratings which were in effect prior to 2004 have been converted to HEQSF course credits. This conversion involves multiplying the pre-2004 credit values by four. The HEQSF 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.

# RULES FOR POSTGRADUATE QUALIFICATIONS

## Postgraduate Diplomas

Qualification	Plan Code	Qual Code
*Postgraduate Diploma in Engineering Management	MEC02	EG003
*Postgraduate Diploma in Engineering	CIV02	EG004
*Postgraduate Diploma in Property Studies	CON03	EG007
*Postgraduate Diploma in Project Management	CON06	EG008
*Postgraduate Diploma in Transport Studies	CIV06	EG009

### \*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.)*

#### Minimum Admission Requirements

- FGA1 A person shall not be admitted as a candidate for the Postgraduate Diploma unless he or she is proficient in English and
- holds a four year bachelor's degree or honours degree of the University or of any other university recognised for the purpose;
  - 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 Minimum Admission Requirements 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

- 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.

## 14 HONOURS DEGREES

### **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.

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

### **Upgrading to Master's Degree Registration**

FGA11 Senate may, on the recommendation of the Programme Director, upgrade a candidate's registration to candidature for a Master's Degree and permit the candidate to count the courses completed toward the Postgraduate Diploma as credits for the Master's 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 is proficient in English and
- (a) holds a four year bachelor's degree or honours degree of the University; or
  - (b) holds an approved three year degree and (i) who has a minimum of five years of senior managerial 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. Completion of the four year bachelor's or honours degree with a weighted average of at least 65% (supplementary results excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

### **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

## 16 HONOURS DEGREES

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.

FGE8.1 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 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 Master's 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 Master's 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 Department of Civil Engineering. (No new applications will be considered in 2015).

### **Selection**

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

### **Duration**

FGF3 A candidate must be registered for the diploma 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 reregister by not later than 28 February.

### **Obtaining the Postgraduate Diploma**

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.

### **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.

## 18 HONOURS DEGREES

### **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 him 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**

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

## HONOURS DEGREES

Qualification	Qual Code	Plan Code
Bachelor of Science (Honours) <i>in</i> Geographical Information Systems	EH001	APG07
Bachelor of Science (Honours) <i>in</i> Construction Management	EH002	CON02
Bachelor of Science (Honours) <i>in</i> Property Studies	EH003	CON03
Bachelor of Science (Honours) <i>in</i> Quantity Surveying	EH004	CON05
Bachelor of Science (Honours) <i>in</i> Materials Science	EH005	MEC04
Bachelor of Architectural Studies (Honours)	EH006	APG01
Bachelor of Science (Honours) <i>specialising in</i> Nuclear Power	EH007	EEE08
Bachelor of City Planning (Honours)	EH009	APG03

### Bachelor of Architectural Studies (Honours)

An honours degree in architecture that provides 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 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).

#### Minimum Admission Requirements

- FHA1.1 A person may be considered as a candidate for the degree if he or she is proficient in English and
- 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 a credit weighted average of 70% or higher, of all the following subjects combined, will be afforded automatic entry into the Bachelor of Architectural Studies (Honours) programme: APG3023W (Technology III), APG3037W (Design and Theory Studio III), APG3000F (History and Theory of Architecture V), APG3001S (History and Theory of Architecture VI).

## 20 HONOURS DEGREES

### 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 year's 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 in the first semester. A candidate shall comply with the curriculum requirements prescribed by Senate, which are published in the Programmes of Study and Courses Offered section of this 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.

### 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 studio work project, tutorial or 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 Awarded in the First Class**

FHA7 The degree will be awarded in the first class to a candidate who has obtained first class passes in both Studio work 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 is proficient in English

- (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 Bachelor's Degree in Construction Studies or equivalent with a Grade Point Average (GPA) of at least 65% is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

For the purposes of FHC2, GPA is defined as the credit weighted average. This is calculated by multiplying each course's percentage by its credit weighting, totaling these products, and then dividing this total by the sum of the credits used in the calculation.

The GPA of a candidate holding a BSc Construction Studies degree from this university will be determined by taking into account all core, elective core and elective courses completed while registered for that degree, whether required for the degree or not.

**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.

## 22 HONOURS DEGREES

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. 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**

#### *General*

FHC7.1 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.

#### *Formal Examination*

FHC7.2 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.

#### *Duly Performed (DP) Certificate*

FHC7.3 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.

*Duly Performed (DP) Courses*

FHC7.4 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).

*Review*

FHC7.5 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 in the First Class**

FHC10 In order to be considered for the award of the degree in the first class, 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 is proficient in English and

- (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

## 24 HONOURS DEGREES

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. 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**

#### *General*

FHG6.1 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.

#### *Formal Examination*

FHG6.2 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.

#### *Duly Performed (DP) Certificate*

FHG6.3 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**

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 in the First Class**

FHG8 In order to be considered for the award of the degree in the first class, a candidate must complete the degree in one year and obtain at least 75% for the thesis project APG4050W 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 is proficient in English and

- (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. Completion of the Bachelor's degree with a weighted average of at least 60% (supplementary results excluded) is the normal academic prerequisite for admission. 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.

## 26 HONOURS DEGREES

### 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

#### *General*

- FHM6.1 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.

#### *Formal Examination*

- FHM6.2 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.

#### *Duly Performed (DP) Certificate*

- FHM6.3 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 in the First Class**

- FHM8 In order to be considered for the award of the degree in the first class, a candidate must complete the degree in one year and obtain at least 75% for the Honours Research 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 Nuclear Power**

*(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) specialising in Nuclear Power degree is offered by the Faculty through the Department of Electrical Engineering.

**Minimum Admission Requirements**

- FHN1 A person shall not be admitted as a candidate for the degree unless he or she is proficient in English and
- (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**

- FHN2 Selection is based on an applicant's academic record and experience. Completion of the Bachelor's degree with a weighted average of at least 60% (supplementary results excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

**Duration**

- FHN3 A candidate must be registered for a minimum of one academic year.

**Registration Requirements**

- FHN4.1 Subject to the provisions of the Rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

- FHN4.2 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**

## 28 HONOURS DEGREES

- FHN5.1 A candidate:
- (i) must comply with the curriculum and course requirements prescribed by S published in the Programmes of Study and Courses Offered sections of this H
  - (ii) must complete approved coursework of a value not less than 148 credits.
- FHN5.2 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.
- FHN5.3 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 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.
- FHN5.4 Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

### **Method of Assessment**

#### *General*

- FHN6.1 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.

#### *Formal Examination*

- FHN6.2 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.

#### *Duly Performed (DP) Certificate*

- FHN6.3 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**

- FHN7 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 in the First Class**

FHN8 In order to be considered for the award of the degree in the first class, a candidate must complete the degree in one year and obtain at least 75% for the Research Project and an average of at least 75% for all coursework.

**Exemption from or Modification of Rules**

FHN9 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 is proficient in English and

- (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 Bachelor's Degree in Property Studies or equivalent with a Grade Point Average (GPA) of at least 65% is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

For the purposes of FHP2, GPA is defined as the credit weighted average. This is calculated by multiplying each course's percentage by its credit weighting, totaling these products, and then dividing this total by the sum of the credits used in the calculation.

The GPA of a candidate holding a BSc Property Studies degree from this university will be determined by taking into account all core, elective core and elective courses completed while registered for that degree, whether required for the degree or not.

**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.

### 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 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

#### *General*

- FHP7.1 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.

#### *Formal Examination*

- FHP7.2 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.

#### *Duly Performed (DP) Certificate*

- FHP7.3 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.

#### *Duly Performed (DP) Courses*

- FHP7.4 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).

*Review*

FHP7.5 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 in the First Class

FHP10 In order to be considered for the award of the degree in the first class, 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 is proficient in English and

- (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 Bachelor's Degree in Construction Studies or equivalent with a Grade Point

## 32 HONOURS DEGREES

Average (GPA) of at least 65% is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

For the purposes of FHQ2, GPA is defined as the credit weighted average. This is calculated by multiplying each course's percentage by its credit weighting, totaling these products, and then dividing this total by the sum of the credits used in the calculation.

The GPA of a candidate holding a BSc Construction Studies degree from this university will be determined by taking into account all core, elective core and elective courses completed while registered for that degree, whether required for the degree or not.

### **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***General*

FHQ7.1 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.

*Formal Examination*

FHQ7.2 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.

*Duly Performed (DP) Certificate*

FHQ7.3 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.

*Duly Performed (DP) Courses*

FHQ7.4 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).

*Review*

FHQ7.5 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 in the First Class**

FHQ10 In order to be considered for the award of the degree in the first class, 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.

## **Bachelor of City Planning Honours**

An Honours degree in City Planning which is a pre-requisite qualification for admission to the Master's degree in City and Regional Planning. This degree does not provide access to professional qualification by accrediting bodies without the additional completion of the linked Master's degree. The Honours degree will equip students with core values, knowledge, methodologies and techniques in the field of city planning. An introduction to research methodology prepares them for both the research components of the Honours degree and the linked Master's Degree. It is focused on developing creative and critical inquiry, reflective understanding and cultural, social and technical knowledge in preparation for self-motivated independent learning.

### **Minimum Admission Requirements**

FHB1 A person may be considered as a candidate for the degree if he or she is proficient in English and

- (a) is a graduate of the University or of another University recognized by the Sen
- (b) has passed at any University or at any Institution recognized by the Senate I the opinion of the Senate, equivalent to the examinations prescribed for a deg
- (c) has in any other manner attained a level of competence which, in the opini Faculty, is adequate for the purposes of admission as a candidate for the degre

### **Selection**

FHB2 Admission into the BCP(Hons) is limited and by application. 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 HEQSF Level 7 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 departmental requirements set by the Programme Convenor, which may vary from time to time. Entry into the programme is limited by the space available.

### **Duration of Degree**

FHB3 The minimum duration of the Bachelor of City Planning (Honours) degree is one year of full-time study. The curriculum for the degree could extend over a maximum of two academic years of study.

FHB4 Subject to the provisions of the rule on Readmission, below, a candidate must register annually unless granted leave of absence by Senate. A candidate must register or re-register by not later than the end of Registration Week for all courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.

### **Readmission Requirements**

FHB5 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. With respect to studio work, the completion of APG4022F is a prerequisite for registration in APG4026S.

**Obtaining the Degree and Validity of Credits**

- FHB6.1 The curriculum comprises two semesters, each consisting of a studio course and five non-studio courses in the first semester and four non-studio courses in the second semester. A candidate shall comply with the curriculum requirements prescribed by Senate, which are published in the Programmes of Study and Courses Offered section of this Handbook.
- FHB6.2 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.
- FHB7 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 Awarded in the First Class**

- FHB8 A candidate who obtains first class passes in at least five theory courses (constituted as APG4020F, APG4021F, APG4028F, APG4029F and APG4035F in the first semester and APG4023S, APG4024S, APG4025S, APG4038S in the second semester) and two first class passes in studio work projects (constituted as APG4022F and APG4026S) shall be awarded the degree with distinction.

## MASTER'S DEGREES

Qualification	Specialisation	Plan Code	ProgCode
Master of Architecture	Architecture	APG01	EM006
Master of City & Regional Planning	City and Regional Planning	APG03	EM007
Master of City Planning & Urban Design	City Planning & Urban Design	APG04	EM008
MSc in Property Studies	Property Studies	CON03	EM013
MSc in Project Management	Project Management	CON06	EM014
Master of Landscape Architecture	Landscape Architecture	APG06	EM015
Master of Architecture (Professional)	Architecture	APG01	EM021
Master of Geotechnical Engineering	Geotechnical Engineering	CIV08	EM028
Master of Transport Studies	Transport Studies	CIV06	EM029
Master of Engineering	Minerals Beneficiation	CHE02	EM017
	Water Quality Engineering	CIV02	
	Structural Engineering & Structural Materials	CIV04	
	Radar	EEE06	
	Nuclear Power	EEE08	
Master of Science in Engineering	Telecommunications	EEE09	EM023/ EM024
	Geomatics	APG08	
	Chemical Engineering	CHE01	
	Civil Engineering	CIV01	
	Geotechnical Engineering	CIV08	
	Water Quality Engineering	CIV02	
	Electrical Engineering	EEE01	
	Mechanical Engineering	MEC01	
	Materials Engineering	MEC03	
	Sustainable Energy Engineering	MEC07	
Master of Philosophy	Architecture & Planning	APG02	EM025/
	Conservation of the Built Environment	APG05	EM026/
	Sustainable Mineral Resource Development	CHE05	EM027
	Urban Infrastructure Design & Management	CIV03	
	Transport Studies	CIV06	
	Civil Infrastructure Management & Maintenance	CIV07	
	Construction Economics & Management	CON01	
	Radar	EEE06	
	Space Studies	EEE07	
	Nuclear Power	EEE08	
	Mechanical Engineering	MEC01	

Engineering Management  
Energy & Development Studies

MEC02  
MEC08

## Master of Architecture

NOTE: These rules must be read with the general rules for Master's 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 BAS(Hons) graduate of this University, or a graduate of another University, who holds a degree recognised by Senate as being equivalent to a BAS(Hons) degree in the University, and be proficient in English.

### 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.

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 (180 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.

## 38 MASTER'S DEGREES

### 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, one unbound copy 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 Master's degree in the Faculty of Engineering & the Built Environment.

### **Examination and Ethics Clearance**

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.

FMAA10.4 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### **Publication**

FMAA11.1 When presenting the 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 may be awarded with distinction if both examiners recommend that the dissertation be awarded with distinction.

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.

## 40 MASTER'S DEGREES

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

*The Degree of MArch(Prof) 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, and be proficient in English.

### Selection

FMAB2.1 Graduates of the Bachelor of Architectural Studies (Honours) from this University will be eligible to apply for 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 ; and  
(b) a Design Research Report 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 studio work 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.

**Ethics Clearance**

- FMAB8 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

**Master of City Planning and Urban Design**

*(NOTE: These rules must be read with the general rules for Master's 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 of City Planning and Urban Design while registered for that degree, may obtain exemption from courses in the first semester of the curriculum for the MCPUD degree. All students entering the programme 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 he or she is proficient in English and
  - (a) is a graduate in Architecture of the University or of another University Senate for the purpose; or
  - (b) has passed at any University or at any Institution recognised by the Senat such examinations as are, in the opinion of the Senate, equivalent to

## 42 MASTER'S DEGREES

- prescribed for the BAS(Hons) and MArch(Prof) degrees 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 the Bachelor of Architectural Studies degree of a University may be accepted on evidence of demonstrated spatial design ability.

### Selection

FMB2 Selection is based on an applicant's academic record and where an applicant holds a three-year Bachelor of Architectural Studies degree, they would be expected to reflect Studio work results in the range of 65% and above, in order to be considered for entry into the MCPUD programme. All applicants must also submit a portfolio of design work, and other material as specified in the Application Form, for consideration by an Admissions Committee. Entry into the programme is limited.

### 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 exemption from courses in the first semester of the curriculum to a BArch graduate of the University who has completed prescribed work in the theory of City Planning and Urban Design while registered for the BArch 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
- (b) shall complete at least three quarters of the courses prescribed for the deg

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 APG5050Z 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 and Ethics Clearance**

- 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.
- FMB8.2 The candidate must submit two permanently bound copies of the dissertation and a CD to the Academic Administrative Officer 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 internal. The external examiner retains his/her copy while the second copy is retained by the University after the examination result has been approved.
- FMB8.3 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

**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 studio work projects (constituted as APG4022F, APG4026S, APG5055F and APG5050Z), one of which must be APG5050Z, shall be awarded the degree with distinction.
- FMB10.2 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 Master's 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 he or she is proficient in English and
- (a) is a graduate of the University or of another University recognized by the Senate for the purpose; 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 examinations prescribed for a 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, 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 HEQSF Level 7 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/Institution**

- 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 and Ethics Clearance**

- 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.
- FMC8.2 The candidate must submit two permanently bound copies of the dissertation and a CD to the Academic Administrative Officer 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 internal. The external examiner retains his/her copy while the second copy is retained by the University after the examination result has been approved.

## 46 MASTER'S DEGREES

FMC8.3 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### 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 studio work 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.

FMC10.3 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

## Master of Engineering

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

*This degree is offered through the Faculty for specialisations in Minerals Beneficiation (Department of Chemical Engineering), Structural Engineering, Structural Materials, Transport Studies and Water Quality Engineering (Department of Civil Engineering) Radar, Nuclear Power and Telecommunications (Department of Electrical Engineering).*

### Minimum Admission Requirements

FMD1 A person shall not be admitted as a candidate for the degree unless he or she is proficient in English and

- (a) holds a four year bachelor's 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

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 minor dissertation 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 and Ethics Clearance**

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 minor dissertation to a value of 60 credits.

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

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

FMD7.4 No dissertation or project report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

**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 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 minor dissertation, submits the dissertation and fails the examination.

### **Submission of Minor Dissertation**

- FMD9.1 A candidate intending to submit a minor dissertation 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 dissertation is to be submitted, inform the supervisor 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 of a Master of Engineering minor dissertation submitted in the hope of the award of the degree either in June or December is 30 March or 31 August respectively.
- FMD9.2 After consultation with the supervisor, a candidate shall submit two copies of his/her minor dissertation in temporary binding and a CD ROM in specified format to the supervisor who is responsible for appointing an internal and external examiner of the minor dissertation. 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 minor dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Master's degree in the Faculty of Engineering & the Built Environment.

### **Publication**

- FMD10 When presenting his or her minor 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.

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

- FMD11.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the dissertation be 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)**

- FMD12 The Senate may on the recommendation of the Faculty and the candidate's supervisor upgrade a candidate's registration to MSc(Eng) 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. To be discontinued from 2015.

## **Master of Geotechnical Engineering**

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

*The Degree of Master of Geotechnical Engineering is offered by the Faculty through the Department of Civil Engineering*

**Minimum Admission Requirements**

- FMD1 A person shall not be admitted as a candidate for the degree unless he or she:
- (a) holds a four year bachelor's 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 135 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**

- 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 rules 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 135 credits and a project report to the value of 45 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 and Ethics Clearance**

- FMD7.1 A candidate for the degree shall complete prescribed courses to the value of 135 credits and a project report on the subject to a value of 45 credits.

## 50 MASTER'S DEGREES

- FMD7.2 A candidate shall not be permitted to submit his/her research project report for examination more than twice.
- FMD7.3 A candidate may be required to take an oral examination on the research project, or an essay assignment.
- FMD7.4 No dissertation or project report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### 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.
- No project report or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Master's degree in the Faculty of Engineering & the Built Environment.
- FMD10 The degree will be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and at least 75% for the 45 credit project report.

## Master of Landscape Architecture

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

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

### Minimum Admission Requirements

- FMG1 A person shall not be admitted as a candidate for the degree Master of Landscape Architecture unless he or she is proficient in English and
- (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 Bachelor's 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.

### **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 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).

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

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;

## 52 MASTER'S DEGREES

- (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 and Ethics Clearance

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.

FMG9.3 No dissertation or project report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

## 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 is proficient in English and

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

**Selection**

FMH2 Selection is based on an applicant's academic record and the availability of a suitable supervisor. Submission of a 100 word statement of research interest and a letter of motivation are required. 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 three 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 or built environment project to a specification involving advanced concepts and theoretical principles;
  - a theoretical and/or practical research project of an inter-disciplinary nature;
  - a critical review of a specified topic based on a comprehensive search of the literature or available data of an inter-disciplinary nature; and
  - 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 may require more) and a dissertation (120 credits) which may incorporate any or all of the elements referred to in sub-paragraph (i) above; or
- (iii) by completing coursework of a minimum value of 120 credits and a minor dissertation of 60 credits.

**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 minor dissertation 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 and Ethics Clearance**

- 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 credits and a dissertation (120 credits) on the subject of the research project;
  - (c) if proceeding by coursework and research, prescribed courses of a minimum credits and a minor dissertation of 60 credits on the subject of the research to
- FMH7.2 A candidate shall not be permitted to submit his/her dissertation for examination more than twice.
- FMH7.3 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### **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 120 or 180 credit 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 120 or 180 credit 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, one unbound copy 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 of a 120 or 180 credit research dissertation 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 master's 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 with Distinction**

- FMH12.1 Distinctions are awarded as follows for the Master of Philosophy:

The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be awarded with distinction.

The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework; and a recommendation from both external examiners that the 120 credit dissertation be awarded with distinction; *or* the dissertation may be awarded with distinction if the candidate obtains an average of at least 50-74% for all coursework; and a recommendation from both external examiners that the 120 credit dissertation be awarded with distinction.

The degree may be awarded with distinction if both external examiners recommend that the 180 credit dissertation be 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 specialising in Conservation of the Built Environment**

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this 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 is proficient in English and

- (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 minor dissertation 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 and Ethics Clearance**

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

FMHA8.2 A candidate may be required to present himself or herself for an oral examination on the subject of the research report.

FMHA8.3 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

FMHA8.4 A candidate intending to submit a 60 credit 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 HOD 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 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.

**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).

## 58 MASTER'S DEGREES

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.

### 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 studio work 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.

### Method of Assessment

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 with Distinction

FMHA13.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be 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 specialising in Engineering Management

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

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

### Minimum Admission Requirements

FMHB1 A person shall not be admitted as a candidate for the degree unless he or she is proficient in English and

- (a) is a graduate of the University with a four-year bachelor level or honours degree in a related field; 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**

FMHB2 Selection is based on an applicant's academic record and experience.

**Duration**

FMHB3 A candidate must be registered for the degree for at least two academic years.

**Registration Requirements**

FMHB4.1 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.

FMHB4.2 A candidate must register or reregister by not later than 28 February if taking only second semester courses.

FMHB4.3 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

FMHB4.4 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**

FMHB5 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**

FMHB6 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 minor dissertation of a minimum value of 60 credits.

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

FMHB7.1 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.

FMHB7.2 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 and Ethics Clearance**

- FMHB8.1 A candidate shall complete prescribed courses to the value of 120 credits and a research report on the subject of the minor dissertation to a value of 60 credits.
- FMHB8.2 A candidate may be required to present himself or herself for an oral examination on the subject of the research report.
- FMHB8.3 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMHB8.4 A candidate intending to submit a 60 credit 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 Hod 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 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.

### **Progress Report**

- FMHB9 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**

- FMHB10.1 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).
- FMHB10.2 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.

### **Method of Assessment**

- FMHB11.1 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.
- FMHB11.2 A DP certificate may be withheld unless: all parts of each studio work 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.
- FMHB11.3 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**

- FMHB12.1 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.
- FMHB12.2 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 with Distinction**

- FMHB13.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be awarded with distinction.
- FMHB13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

**Master of Philosophy specialising in Nuclear Power**

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

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

**Minimum Admission Requirements**

- FMP1 A person shall not be admitted as a candidate for the degree unless he or she is proficient in English and
  - (a) is a graduate of the University with a four-year bachelor level or honours degree in a related field; 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**

- FMP2 Selection is based on an applicant's academic record and experience.

**Registration Requirements**

- FMP3.1 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.
- FMP3.2 A candidate must register or reregister by not later than 28 February if taking only second semester courses.
- FMP3.3 Except with the permission of the Senate, a candidate may not withdraw from a course which he or she is repeating.

### **Minimum Number of Courses**

FMP4 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**

FMP5 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 minor dissertation of a minimum value of 60 credits.

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

FMP6.1 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.

FMP6.2 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 and Ethics Clearance**

FMP7.1 A candidate shall complete prescribed courses to the value of 120 credits and a research report on the subject of the minor dissertation to a value of 60 credits.

FMP7.2 A candidate may be required to present himself or herself for an oral examination on the subject of the research report.

FMP7.3 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

FMP7.4 A candidate intending to submit a 60 credit 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 Hod 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 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.

### **Progress Report**

FMP8 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**

FMP9.1 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).

- FMP9.2 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.

**Method of Assessment**

- FMP10.1 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.
- FMP10.2 A DP certificate may be withheld unless: all parts of each studio work 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.
- FMHA10.3 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**

- FMP11.1 When presenting his or her minor 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.
- FMP11.2 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 with Distinction**

- FMP12.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners recommend that the 60 credit dissertation be awarded with distinction.
- FMP12.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

**Master of Philosophy specialising in Transport Studies**

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

*The Degree of MPhil specialising in Transport Studies is offered by the Faculty through 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 is proficient in English and
- (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 no 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 120-credit dissertation or the 60-credit minor dissertation, 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 minor dissertation of a minimum value of 60 credits; or
- (b) by completing advanced study by coursework of a minimum value of 60 credits and a dissertation (120 credits); or
- (c) by completing a dissertation (180 credits).

**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 and Ethics Clearance**

FMI8.1 A candidate shall complete

- (a) prescribed courses to the value of 60 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 minor dissertation 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 for examination more than twice.

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

FMI8.4 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

**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 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 minor dissertation, submits the dissertation and fails the examination.

**Submission of Minor Dissertation**

FMI10.1 After consultation with the supervisor, a candidate shall submit two copies of his/her dissertation in temporary bindings, 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.

FMI10.2 No project report or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Master's'

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 minor dissertation 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, one unbound copy 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 Master's 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 with Distinction**

- FMI13.1 The degree is awarded with distinction (refer to FMH12.1).
- 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 at

the first attempt. To be discontinued in 2016.

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

*(NOTE: These rules must be read with the general rules for Master's 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 is proficient in English and
- (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**

- 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. 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 minor dissertation, 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 minor dissertation on the subject 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 and Ethics Clearance**

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

FMJ8.2 A candidate who fails the minor dissertation examination shall not be permitted to re-register for the minor dissertation.

FMJ8.3 A candidate may be required to present himself or herself for an oral examination on the subject of the minor dissertation.

FMJ8.4 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### **Progress Report**

FMJ9 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**

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 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 minor dissertation, submits the dissertation and fails the examination.

### **Submission of Minor Dissertation**

FMJ11.1 A candidate intending to submit a dissertation 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 dissertation is to be submitted, inform the supervisor 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 of the minor dissertation

submitted in the hope of the award of the degree either in June or December is 30 March or 31 August 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 dissertation to the supervisor who is responsible for appointing an internal and an external examiner of the minor dissertation. Where more than two examiners are appointed a candidate may be required to submit an appropriate number of additional bound copies.
- FMJ11.3 No minor dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Master's degree in the Faculty of Engineering & the Built Environment.

### **Publication**

- FMJ12.1 When presenting his or her minor 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.
- 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 with Distinction**

- FMJ13.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be 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 Master's 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 Master's 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*

## 70 MASTER'S DEGREES

*Architecture, Planning and Geomatics (Geomatics Division); 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 is proficient in English and
- (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 appropriate BSc(Hons) degree; or
  - (c) 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
  - (d) 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
  - (e) 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 100 word statement of research interest and a letter of motivation are required. 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 typically 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 and/or practical nature on an advanced topic belonging to the Engineering Sciences;
    - a critical review of a specified topic based upon a comprehensive search of the literature or available data, pertinent to an advanced topic belonging to the Engineering Sciences;
    - development of an item of equipment or a technique involving novel features or advanced design; and
    - 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 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 and Ethics Clearance

- 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.
- FMM8.4 No dissertation involving human (or animal) subjects, where ethics clearance has

not been obtained beforehand, will be examined.

### **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 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, one unbound copy 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 Master's 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 with Distinction**

- FMM13.1 A distinction is awarded as follows for the Master of Science:

The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework; and a recommendation from both external examiners that the 120 credit dissertation be awarded with distinction; *or* the dissertation may be awarded with distinction if the candidate obtains an average of at least 50-74% for all coursework; and a recommendation from both external examiners that the 120 credit dissertation be awarded with distinction.

The degree may be awarded with distinction if both external examiners recommend that the 180 credit dissertation be 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.
- FMM14.2 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 Master's 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 is proficient in English and
- (a) is a graduate of the University with a bachelor's 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 of senior managerial 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

## 74 MASTER'S DEGREES

- (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. Completion of the four year bachelor's or honours degree with a weighted average of at least 65% (supplementary results excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

### **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 minor dissertation 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 and Ethics Clearance**

- FMN8.1 A candidate shall complete prescribed courses to the value of 140 credits and a research report on the subject of the minor dissertation 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 him or herself for an oral examination on the research report.
- FMN8.4 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMN8.5 A candidate intending to submit a 60 credit 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 HOD 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 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.

### **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 may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be 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 Master's 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 is proficient in English and
- (a) is a graduate of the University with a bachelor's degree of a minimum duration of four year's, 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 of senior managerial 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

- FMO2 Selection is based on an applicant's academic record and experience. Completion of the four year bachelor's or honours degree with a weighted average of at least 65% (supplementary results excluded) is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

### 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 rules 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 minor dissertation 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 and Ethics Clearance**

- FMO8.1 A candidate shall complete prescribed courses to the value of 140 credits and a research report on the subject of the minor dissertation to a value of 60 credits.
- FMO8.2 A candidate who fails the Research Report examination shall not be permitted to re-register for the Research Report.
- FMO8.3 A candidate may be required to present him or herself for an oral examination on the research report.
- FMO8.4 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMO8.5 A candidate intending to submit a 60 credit 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 Hod 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 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.

**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 with Distinction**

FMO11.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and the examiners all recommend that the 60 credit dissertation be awarded with distinction.

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

### **Master of Transport Studies**

*(NOTE: These rules must be read with the general rules for Master's degrees in Handbook 3 of this series.)*

*The Degree of Master of Transport Studies is offered by the Faculty through the Department of Civil Engineering*

### **Minimum Admission Requirements**

FMP1 A person shall not be admitted as a candidate for the degree unless he or she is proficient in English and

- (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\*<sup>\*</sup>; 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\*<sup>\*</sup>; 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\*<sup>\*</sup>; 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**

FMP2 Selection is based on an applicant's academic record and experience.

### **Duration**

FMP3 A candidate must be registered for the degree for at least two academic years.

### **Registration Requirements**

FMP4.1 Subject to the provisions of the rules on Readmission, below, a candidate must register annually unless granted leave of absence by Senate.

FMP4.2 A new candidate must register by no later than the date on which his or her first course starts.

FMP4.3 A continuing candidate must reregister by not later than 28 February.

### **Minimum Number of Courses**

FMP5 A candidate must register for at least three course modules (inclusive of the two research project modules) per year, except where only one course module is required to complete the degree.

### **Obtaining the Degree**

FMP6 A candidate shall be required to complete advanced study by coursework (as prescribed) of a minimum value of 140 credits and research projects of a minimum value of 50 credits.

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

FMP7.1 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.

FMP7.2 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 and Ethics Clearance**

FMP8.1 A candidate shall complete prescribed courses to the value of 140 credits and research reports to a value of 50 credits.

FMP8.2 A candidate shall not be permitted to submit his/her research project reports for examination more than twice.

FMP8.3 A candidate may be required to present him or herself for an oral examination on a research project report, or an essay assignment.

FMP8.4 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### **Readmission**

FMP9.1 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).

FMP9.2 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 project reports, submits a report for re-examination and fails the examination.

## 80 MASTER'S DEGREES

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

- FMP11.1 The degree may be awarded with distinction if the candidate obtains an average of at least 75% for all coursework and an average of at least 75% for all research project reports.
- FMP11.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

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# DOCTORAL DEGREES

## 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 year's standing;
  - (b) holders of Master's degrees in City and Regional Planning or City Planning and Urban Design of the University, of not less than five year's standing; or
  - (c) holders of equivalent degrees from other universities recognised by the Senate for the purpose, of not less than five year's standing, provided a close and on-going 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
- 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.

## 82 DOCTORAL DEGREES

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 Administration).

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 year's standing; and
- (b) graduates in engineering or geomatics of any other university recognised by Senate for the purpose of not less than five year's 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

Qualification	Specialisation	Plan Code	ProgCode
Doctor of Philosophy	Architecture	APG01	ED001
	Architecture & Planning	APG02	
	Geomatics	APG08	
	Chemical Engineering	CHE01	
	Engineering Education	Various	
	Civil Engineering	CIV01	
	Construction Economics & Management	CON01	
	Electrical Engineering	EEE01	
	Mechanical Engineering	MEC01	
	Engineering Management	MEC02	
	Materials Engineering	MEC03	
	Energy Studies	MEC06	

*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

## ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following Postgraduate Degree Programmes:

**Architecture**  
**Geomatics**  
**Landscape Architecture**  
**City and Regional Planning**

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:

T Berlanda, Dipl Arch, *USI*, PhD (Arch & Design) *Italy*

### Professors:

I Low, BArch Cape Town MArch(Urban Design) Penn PrArch MIArch CIA

E Pieterse, BA(Hons) *UWC* MA Development Studies *ISS* PhD *LSE*

G Pirie BA BA (Hons) MA PhD (*Wits*)

V Watson, BA(Hons) *Natal* MCRP *Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

### Adjunct Associate Professor:

S Townsend, PhD *Cape Town*

### Emeritus Professors:

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

D Dewar BA(Hons) MURP PhD *Cape Town* TRP(SA) MSAPI BP Chair of Urban and Regional Planning

### Associate Professors:

A Steenkamp, B.Arch Pret M.Arch Pret PhD Delft PrArch

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

HP Comrie, BArch Pret MUD Wits PhD Greenwich Arch (SA)

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

JF Whittal, BSc(Surv) MSc(Eng) *Cape Town*, PhD *Calgary* PrL(SA) MSAGI

T Winkler, BSc(TRP) MUD *Witwatersrand* PhD *British Columbia*

### Emeritus Associate Professor:

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

### Senior Lecturers/Studio Master's:

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

C Hinds, BLA *Pret* MLArch

F Isaacs, B.Arch *Cape Town* MIP *Stuttgart*

T Katzschner, BSocSc MCRP *Cape Town*

T Sanya, BArch *Makerere* MIP *Stuttgart* PhD *Oslo*

G Sithole, BSc Surveying(Hons) *Zimbabwe* MSc IGP *ITC(NL)* PhD *TU Delft(NL)* LSZ *Zimbabwe*  
 N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand* RTPI  
 M Silverman, B.Arch *Johannesburg* MUD *Johannesburg*  
 M Fraschini, MSc(Arch) *Milan* PhD Arch and Urban Design *Milan*  
 R Govind, BSc(Surveying) *Natal* MSurvSc *New South Wales* PhD *Colorado*  
 K Fellingham, BArch (WITS), SM ArchS (MIT), PR Arch (SA), ARB (UK), RIBA (UK)  
 J Raxworthy, Assoc Dip (Applied Science) TAFE BLA(Hons) MLA *RMIT* PhD *Queensland*

**Lecturers:**

A Crowder, ND Arch (PTech) BTech (Applied Design) *CPUT* BArch *UP* MArts *BTU-Cottbus*  
 S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *UNISA* PrL(SA)  
 S Le Grange, BArch *Cape Town* M Urban Design *UC Berkeley*  
 M Louw, BArch *Pretoria* MPhil *Stellenbosch* PrArch(SA) MIArch  
 SS Papanicolaou, BArch *Cape Town*, MPhil *Cape Town*  
 S Spamer, BAS *Cape Town*, B.Arch *Cape Town*

**Part-Time Lecturers:**

R Cronwright, BA MC & RP MBA *Cape Town* TRP(SA) MSA/TRP  
 T Klitzner, BArch *Cape Town* MLA *Penn*

**Principal Technical Officer:**

D Matthee, NHD (MechEng) ND (Surveying)

**Chief Technical Officer:**

J Coetzee, NHD (Building Tech)  
 M Wells

**Departmental Manager:**

J Meyer

**Photographic Technician:**

TBC

**Administrative Officers:**

JM Thompsett  
 M Joubert

**Administrative Assistant:**

H Martin

**Senior Secretaries:**

A du Plooy  
 N Pickover  
 M Waglay

**Print Room Manager:**

T Swarts

**Departmental Assistant:**

N Stanley

**Laboratory Assistant:**

S Schroeder

**Technical Assistant:**

S Matthews

**IT Liaison:**

L Coetzee

## Postgraduate Programmes

### Honours Programmes

#### Bachelor of Architectural Studies (Honours)

[EH006APG01]

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

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).

**Studio work Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
APG4042F	Architectural Design Studio I.....	48	8
APG4043S	Architectural Design Studio II.....	48	8

**Non-Studio Courses**

The following courses are compulsory:

Course Code	Course Title	NQF Credits	HEQSF Level
APG4039F	Advanced History & Theory of Architecture .....	12	8
APG4041S	Advanced Building Technology .....	12	8
APG4044S	Professional Practice.....	12	8
APG4048S	Architecture Research Method & Project.....	12	8
	Elective core courses .....	0	0
	Total credits .....	0	0

**Elective Core Courses (select 24 credits)**

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

Course Code	Course Title	NQF Credits	HEQSF Level
APG4021F	Urban Infrastructure .....	12	8
APG4028F	Aspects of City Design .....	12	8
APG4029F	Natural Systems.....	12	8
APG5025F	History and Theory of Architecture.....	12	9
APG4049F	Aspects of History & Theory.....	12	8
	*Approved elective.....	0	0

\*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.*

## Bachelor of City Planning Honours [EH009APG03]

### Associate Professor and Programme Convener:

N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand* RTPI

The BCP(Hons) degree consist of either one year of full-time study or a two- year extended programme. The extended programme is not 'part-time' in the usual meaning of the term. Rather, it enables candidates to undertake the Honours degree 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 one year full-time and the two-year extended programme is precisely the same. The curriculum comprises of 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 BCP(Hons) and MCRP 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.

### Studio work Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG4022F</b>	Planning Project A .....	32	8
<b>APG4026S</b>	Planning Project B.....	32	8

### Non-Studio Courses

The following courses are compulsory:

Course Code	Course Title	NQF Credits	HEQSF Level
First Semester			
<b>APG4020F</b>	Planning Theory & Practice .....	8	8
<b>APG4021F</b>	Urban Infrastructure .....	12	8
<b>APG4028F</b>	Aspects of City Design.....	12	8
<b>APG4029F</b>	Natural Systems.....	12	8
<b>APG4035F</b>	Planning Techniques I.....	12	8
	.....	0	0
Second Semester			
<b>APG4023S</b>	Urban Economic Development Processes.....	12	8
<b>APG4024S</b>	Planning & Governmental Systems.....	12	8
<b>APG4025S</b>	Regulatory & Legal Framework.....	12	5
<b>APG4038S</b>	Planning Techniques II.....	12	8
	Total credits.....	0	0

## BSc(Hons) in Geographical Information Systems

[EH001APG07]

### Associate Professor and Programme Convener:

JL Smit B.Sc(Surv) PhD *Cape Town*

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.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
APG2018X	GIS Camp.....	4	6
APG3012S	Geomatics III.....	24	7
APG4050W	Geo-Informatics Project.....	40	8
APG4007F	Introductory GIS.....	24	8
APG4008S	Advanced GIS.....	24	8
APG4009F	Computing for GIS.....	18	8
APG4012S	Geomatics Management & Professionalism.....	24	8
	Total credits per year.....	158	

## Master's Programmes

### Master of Architecture

[EM006APG01]

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

### Master of Architecture (Professional)

[EM021APG01]

### Associate Professor and Programme Convener:

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

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 Master's degrees in Handbook 3 of this series.*

### **Design Dissertation - Year Course**

Studio work Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5079W</b>	Dissertation Design .....	120	9

### **Non-Studio Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5059F</b>	Advanced Theory Research.....	30	9
<b>APG5057F</b>	Advanced Technology Research .....	30	9
	Total credits.....	0	0

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

The MCRP degree 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 the programmes comprises of 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 degree programme 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 programme 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 the second year of the degree, MCRP 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.

*Note: The structure of the degree is changing in 2016. The current structure is valid for repeat and existing students only.*

## Master of City and Regional Planning

[EM007APG03]

### Programme Convener:

N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand* RTPI

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, totaling 168 credits in the first year and 180 credits in the second year.

### First Year: first semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG4020F	Planning Theory & Practice.....	8	8
APG4021F	Urban Infrastructure .....	12	8
APG4022F	Planning Project A.....	32	8
APG4028F	Aspects of City Design .....	12	8
APG4029F	Natural Systems.....	12	8
APG4035F	Planning Techniques I.....	12	8

### First Year: second semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG4023S	Urban Economic Development Processes .....	12	8
APG4024S	Planning & Governmental Systems.....	12	8
APG4025S	Regulatory & Legal Framework.....	12	5
APG4026S	Planning Project B.....	32	8
APG4038S	Planning Techniques II.....	12	8
	Total first year credits.....	0	0

### Second Year: first semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG5020F	Regional Planning Project .....	32	9
APG5023F	Regional Planning Theory.....	20	9

### Second Year: second semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG5024S	Planning Techniques III.....	12	9
APG5051Z	Dissertation MCRP.....	120	9
	Total second year credits.....	0	0
	Total credits.....	0	0

## Master of City Planning and Urban Design

[EM008APG04]

*Please note, the MCPUD will not be on offer in 2016, but will be offered in a new format in 2017.*

### Associate Professor and Programme Convener:

H Comrie BArch *Pret MUD Wits* PhD *Greenwich Arch* (SA)

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**

Course Code	Course Title	NQF Credits	HEQSF Level
APG4020F	Planning Theory and Practice.....	8	8
APG4021F	Urban Infrastructure .....	12	8
APG4022F	Planning Project A .....	32	8
APG4028F	Aspects of City Design.....	12	8
APG4029F	Natural Systems.....	12	8
APG4035F	Planning Techniques I.....	12	8

**First Year: second semester**

Course Code	Course Title	NQF Credits	HEQSF Level
APG4023S	Urban Economic Development Processes.....	12	8
APG4024S	Planning & Governmental Systems.....	12	8
APG4025S	Regulatory & Legal Framework.....	12	5
APG4026S	Planning Project B.....	32	8
APG4038S	Planning Techniques II.....	12	8
	Total first year credits.....	0	0

**Second Year: first semester**

Course Code	Course Title	NQF Credits	HEQSF Level
APG5055F	Urban Design Projects.....	35	9
APG5056F	Urban Design Theory .....	25	9

**Second Year: second semester**

Course Code	Course Title	NQF Credits	HEQSF Level
APG5024S	Planning Techniques III .....	12	9
APG5050Z	Dissertation MCPUD .....	120	9
	Total second year credits.....	192	
	Total credits.....	360	

**Master of Landscape Architecture Conversion Course**

[EZ002APG02]

**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 appropriate and relevant 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.

Course Code	Course Title	NQF Credits	HEQSF Level
APG2021W	Technology II (major course).....	24	6
APG1020W	Design & Theory Studio I (major course).....	72	5
APG1021W	Representation I.....	24	5
APG2000F	History & Theory of Architecture III.....	8	6
APG2003S	History & Theory of Architecture IV.....	8	6

## Master of Landscape Architecture [EM015APG06]

**Senior Lecturer and Programme Convener:**  
C Hindes, BLA *Pret* MLArch

### Studio work Courses

Studio work, 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 Studio work 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 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

Course Code	Course Title	NQF Credits	HEQSF Level
APG4028F	Aspects of City Design .....	12	8
APG4054F	Landscape Systems .....	8	12
APG4031F	Landscape Representation .....	12	8
APG4034F	Terrain Analysis .....	12	8
APG4036F	Landscape Architecture Studio I .....	32	8

### First Year: second semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG4025S	Regulatory & Legal Framework .....	12	5
APG4030S	History & Theory of Landscape Architecture .....	12	8
APG4032S	Constructing Landscape Systems .....	12	8
APG4033S	Landscape Techniques II .....	8	8
APG4037S	Landscape Architecture Studio II .....	32	8
APG4047S	Plants & Design .....	12	8
APG4055S	Environmental Planning and Management Processes .....	8	8
	Total first year credits .....	0	0

### Second Year: first semester

Course Code	Course Title	NQF Credits	HEQSF Level
APG5025F	Contemporary Theories of Landscape Architecture .....	12	9
APG5026F	Detail Landscape Design and Documentation .....	24	9
APG5029F	Advanced Landscape Architecture Studio .....	32	9

**Second Year: second semester**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5052S</b>	Dissertation MLA.....	120	9
	Total second year credits.....	188	
	Total credits.....	<b>364</b>	

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

[EM027APG05]

**Programme Convener:**S Townsend, PhD *Cape Town*

*Note: The Master of Philosophy specialising in Conservation of the Built Environment is offered over two years.*

The primary aim of the M Phil specialising 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.

**First Year: first semester**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5073F</b>	Law of Conservation & Development.....	12	9
<b>APG5074F</b>	Conservation Disciplines & Practice.....	8	9
<b>APG5080F</b>	History of Conservation.....	20	9

**First Year: second semester**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5081S</b>	Researching & Assessing Heritage Resources.....	20	9
<b>AXL5203S</b>	Critical Issues in Heritage.....	24	9
	Total first year credits.....	<b>84</b>	

**Second Year: first semester**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5077F</b>	Conservation, Development & Impact Assessment.....	20	9
<b>APG5078F</b>	Research Methodologies.....	20	9

**Second Year: second semester**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5071S</b>	Minor Dissertation Design.....	60	9
	Total second year credits.....	100	
	Total credits.....	<b>184</b>	

## Master of Philosophy in Engineering specialising in Geomatics

[EM025APG08]

EM025 MPhil in Engineering specializing in Geomatics is a Research Degree.

### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5000W</b>	Dissertation .....	180	9
<b>APG5050X</b>	Master's journal paper .....	0	09

## MSc in Engineering specialising in Geomatics

[EM023APG08]

EM023 MSc in Engineering specializing in Geomatics is a Research Degree.

### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG5000W</b>	Dissertation .....	180	9
<b>APG5050X</b>	Master's journal paper .....	0	09

Doctoral Programmes

## Doctor of Philosophy

[ED001APG01,APG02,APG08]

**ED001 Doctor of Philosophy is a Research Degree**

### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>APG6000W</b>	Thesis (Geomatics) .....	360	10
<b>APG8000W</b>	Thesis (Architecture & Planning) .....	360	10

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

## Course Outlines

### **APG4007F** INTRODUCTORY GIS

24 NQF credits at HEQSF level 8

**Convener:** S Hull

**Co-requisites:** APG4003Z, APG4008F, APG4009F

#### **Course outline:**

This course aims to provide the knowledge and skills in the fundamental concepts of Geographical Information Systems for scientists, especially in the fields of natural, earth and computer sciences. Instruction will take the form of formal lectures, seminars, practicals, assignments and self-study using internet resources and GIS software. Course content: GIS concepts, spatial relationships, topology, spatial and non-spatial data structures and algorithms, vector databases, raster data structures, data capture for raster GIS, spatial analysis using the raster data model, relational database management systems, data modelling, data display and presentation, theory of map projections.

**Lecture times:** 4<sup>th</sup> period Mon-Fri. Practicals once a week Fri 14h00-17h00

**DP requirements:** Completion of practical assignments with a minimum average of 50% and to the satisfaction of the course convener, a minimum test average of 40% and an 80% attendance record.

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

### **APG4008S** ADVANCED GIS

24 NQF credits at HEQSF level 8

**Convener:** Associate Professor J Smit

**Course entry requirements:** BSc(Geomatics) students: MAM100W, or MAM1018F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F; BSc(Hons) in GIS students: APG2018X, APG4007F, APG4009F

**Course outline:**

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) and an 80% attendance record.

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

### **APG4009F** COMPUTING FOR GIS

18 NQF credits at HEQSF level 8

**Convener:** Dr G Sithole

**Co-requisites:** APG4007F, APG4003Z

**Course outline:**

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) and an 80% attendance record.

**Assessment:** Tests, practical assignments.

### **APG4020F** PLANNING THEORY & PRACTICE

8 NQF credits at HEQSF level 8

**Convener:** Assoc Prof T Winkler

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of the evolution of the planning discipline; and changing values, concerns, methods, outcomes and plan forms over the last century.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 75% of the final result is based on the submission and assessment of a term paper, 25% based on group work.

### **APG4021F** URBAN INFRASTRUCTURE

*Elective for students in BAS(Hons)*

12 NQF credits at HEQSF level 8

**Convener:** Dr N Odendaal

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

The focus of this course is infrastructure and human settlements as structuring elements in the on-going development and evolution of cities. The central purpose of the course is to introduce students to a range of factors which effect the growth and development of settlement space. The spatial scope ranges from regional systems of settlements to the organisation or structure of individual settlements. The emphasis is on breadth rather than the depth. Students examine how different actors influence urban systems and the role of infrastructure in enabling urban transition.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 80% on submission and assessment of term paper; 20% on presentation, submission and assessment of group seminar paper.

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**APG4022F PLANNING PROJECT A**

32 NQF credits at HEQSF level 8

**Convener:** Assoc Prof T Winkler

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course 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.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on project work. Students are required to pass the individual component of the project.

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**APG4023S URBAN ECONOMIC DEVELOPMENT PROCESSES**

12 NQF credits at HEQSF level 8

**Convener:** Professor V Watson

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of the economic (formal and informal) drives of contemporary urban development processes; relevant actors and institutions, the role of planning in the urban economic growth and change. Land/property-related factors shaping urban development are also covered.

**Lecture times:** Tuesdays & Thursdays 1<sup>st</sup> & 2<sup>nd</sup> periods

**DP requirements:** None

**Assessment:** The final result is based on 30% of the group product and 70% on an individual term paper.

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**APG4024S PLANNING AND GOVERNMENTAL SYSTEMS**

12 NQF credits at HEQSF level 8

**Convener:** Dr N Odendaal

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of 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; and plan monitoring and evaluation.

**Lecture times:** Tuesdays and Thursdays 4<sup>th</sup> & 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of a term paper.

### **APG4025S REGULATORY & LEGAL FRAMEWORK**

12 NQF credits at HEQSF level 5

**Convener:** F Ogle

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of the regulatory and legal framework. Topics include: planning law; introduction to South African law; administrative law; environmental law; current legislative framework for planning; development control; and options for a new planning framework.

**Lecture times:** Tuesdays & Thursdays 8<sup>th</sup> & 9<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 3- hour written examination counts 100%.

### **APG4026S PLANNING PROJECT B**

32 NQF credits at HEQSF level 8

**Convener:** Dr N Odendaal

**Course entry requirements:** APG4022F

**Co-requisites:** None

**Course outline:**

The project focuses on planning within the large metropolitan context and on plan implementation.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** Phase one is based on group work and counts 20% , phase two is based on group work and counts 40%, and phase three is based on individual work and counts 40%.

### **APG4028F ASPECTS OF CITY DESIGN**

*Elective for students in BAS(Hons)*

12 NQF credits at HEQSF level 8

**Convener:** Associate Professor H Comrie

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

The course focuses on historically conceptualised concepts of urban structure and performance at the local area scale. It includes an 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.

**Lecture times:** Tuesdays and Thursdays 1<sup>st</sup> & 2<sup>nd</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of a term paper.

### **APG4029F NATURAL SYSTEMS**

*Elective for students BAS(Hons).*

12 NQF credits at HEQSF level 8

**Convener:** T Katzschner

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This 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.

**Lecture times:** Tuesdays & Thursdays 4<sup>th</sup> & 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of a term paper.

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**APG4030S HISTORY & THEORY OF LANDSCAPE ARCHITECTURE**

12 NQF credits at HEQSF level 8

**Convener:** C Hinds

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course 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.

**Lecture times:** Thursdays 6<sup>th</sup> & 7<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of assignments.

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**APG4031F LANDSCAPE REPRESENTATION**

12 NQF credits at HEQSF level 8

**Convener:** J McLachlan

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers landscape techniques and includes landscape graphics; map reading; air-photo interpretation and an introduction to GIS.

**Lecture times:** Refer to departmental timetable for further detail.

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final project.

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**APG4032S CONSTRUCTING LANDSCAPE SYSTEMS**

12 NQF credits at HEQSF level 8

**Convener:** C Hinds

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers 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.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of assignments, practicals and projects.

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**APG4033S LANDSCAPE TECHNIQUES II**

8 NQF credits at HEQSF level 8

**Convener:** Dr J Raxworthy

**Course entry requirements:** APG4031F or permission of course convener.

**Co-requisites:** None

**Course outline:**

The course covers the tools and routines in computer applications related to landscape planning work, including CAD and image manipulation programmes.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final project.

#### **APG4034F TERRAIN ANALYSIS**

12 NQF credits at HEQSF level 8

**Convener:** S Masson

**Course entry requirements:** APG4029F or permission of course convener.

**Co-requisites:** None

**Course outline:**

This course covers 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.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of assignments, practicals and projects.

#### **APG4035F PLANNING TECHNIQUES I**

12 NQF credits at HEQSF level 8

**Convener:** J McLachlan

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers map work and cartographic/aerial photography interpretation; techniques of graphic presentation and communication, introduction to geographical information systems, and report writing.

**Lecture times:** Refer to departmental timetable for further detail.

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final project.

#### **APG4036F LANDSCAPE ARCHITECTURE STUDIO I**

32 NQF credits at HEQSF level 8

**Convener:** C Hindes

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers the 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); and elaboration of the implications for implementation.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods.

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final portfolio review.

#### **APG4037S LANDSCAPE ARCHITECTURE STUDIO II**

32 NQF credits at HEQSF level 8

**Convener:** C Hindes

**Course entry requirements:** APG4036F

**Co-requisites:** APG4034F or permission of course convener.

**Course outline:**

Urban context and natural processes; site planning and concept design for a 'brownfield' site, including implementation strategies.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods.

## 100 DEPARTMENTS IN THE FACULTY

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final portfolio review.

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### **APG4038S PLANNING TECHNIQUES II**

12 NQF credits at HEQSF level 8

**Convener:** Assoc Prof T Winkler and A Rhodes

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers quantitative methods, topics include: Scales of measurement, descriptive statistical methods, data summaries, introduction to statistical inference, tests of association, measures of correlation, simple linear regression. Qualitative methods: introduction to qualitative research methods (including case study methods; ethnographic methods; participatory action research (PAR); and oral histories and other qualitative methods).

**Lecture times:** Stats component: Mondays, Wednesdays & Fridays 8<sup>th</sup> & 9<sup>th</sup> periods. Lecture component: 6<sup>th</sup> & 7<sup>th</sup> periods. Refer to departmental timetable for further detail.

**DP requirements:** None

**Assessment:** 65% of the final result is based on a STATS computer-based examination (with a sub-minimum requirement of 50%) and 35% on an assignment on the qualitative methods and proposal development.

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### **APG4039F ADVANCED HISTORY & THEORY OF ARCHITECTURE**

12 NQF credits at HEQSF level 8

**Convener:** M Frascini

**Course entry requirements:** None

**Co-requisites:** None

**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.

**Lecture times:** Refer to departmental timetable

**DP requirements:** 80% attendance; 100% of all hand-ins and participation in discussion.

**Assessment:** 50% Research paper 20% visual diary, 15% exercises, 15% seminar presentation and participation. Examination counts 50%, year mark 50%.

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### **APG4041S ADVANCED BUILDING TECHNOLOGY**

12 NQF credits at HEQSF level 8

**Convener:** F. Carter

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to prepare students to understand the structural, constructional and material consequences and constraints on design decision-making. It investigates 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.

**Lecture times:** Wednesdays 6<sup>th</sup> & 7<sup>th</sup> periods.

**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Case study drawings and research reports 90%, seminar participation 10%.

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**APG4042F ARCH DESIGN STUDIO I**

48 NQF credits at HEQSF level 8

**Convener:** F Carter

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers 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.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**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 at HEQSF level 8

**Convener:** F Carter

**Course entry requirements:** APG4042F

**Co-requisites:** None

**Course outline:**

This course covers 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.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods.

**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 at HEQSF level 8

**Convener:** T Boxall

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course is 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.

**Lecture times:** Mondays 6<sup>th</sup> & 7<sup>th</sup> periods

**DP requirements:** 80% attendance; 100% of all hand-ins, participation and discussions.

**Assessment:** Written examination.

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**APG4047S PLANTS & DESIGN**

12 NQF credits at HEQSF level 8

**Convener:** C Hindes

**Course entry requirements:** None

**Co-requisites:** None

## 102 DEPARTMENTS IN THE FACULTY

### **Course outline:**

This course aims to develop an understanding of plants and design. It covers vegetation types of Southern Africa and its limiting factors, and includes identification and utilisation of plant material, principles of permaculture and horticulture; planting plans, schedules and specifications.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of practicals.

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### **APG4048S ARCHITECTURE RESEARCH METHOD**

12 NQF credits at HEQSF level 8

**Convener:** Professor I Low

**Course entry requirements:** Bachelor of Architectural Studies

**Co-requisites:** APG4043S, APG4044S, APG4041S.

#### **Course outline:**

This course is 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 research proposal writing, case study analysis and the application of mapping, programming and siting studies in relation to architectural inquiry. It prepares students to undertake academic and design research in a critical and structured manner.

**Lecture times:** Tuesdays 6<sup>th</sup> & 7<sup>th</sup> periods

**DP requirements:** 80% attendance and 100% submission of assignments

**Assessment:** Is based on 100% of submission and assessment of coursework assignments.

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### **APG4049F ASPECTS OF HISTORY & THEORY**

12 NQF credits at HEQSF level 8

**Convener:** Associate Professor N Coetzler

**Course entry requirements:** None

**Co-requisites:** None

#### **Course outline:**

Within the broad area of History and Theory of Architecture an architectural elective is offered each year of which the content and the coordinators vary depending on visiting lectures, research interests of staff and topical issues. Detailed contents will be published each year.

**Lecture times:** Tuesdays & Wednesdays 6<sup>th</sup> & 7<sup>th</sup> periods

**DP requirements:** 80% attendance and 100% submission of all assignments

**Assessment:** By submission and review of term paper or equivalent research project.

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### **APG4050W GEO-INFORMATICS PROJECT**

40 NQF credits at HEQSF level 8

**Convener:** Associate Professor Julian Smit

**Course entry requirements:** None

**Co-requisites:** None

#### **Course outline:**

This project aims to provide an opportunity to demonstrate ability to design, execute and report on a Geo-Information Science (GISc) problem. Students will start a GISc project at the beginning of the year, and will submit a planning and proposal document before the end of the first term. Students shall then perform their project plan and report their results and conclusions in a main project report, poster and oral presentation of their work in the second semester. Course Content: Presentation of the project plan and proposal, execution of the project, presentation of the results in written, poster and oral form.

**DP requirements:** None

**Assessment:** Project report ; poster presentation ; and may include an oral presentation

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**APG4051Z** SELECTED TOPICS IN APPLIED SCIENCE

0 NQF credits at HEQSF level 8

**Course outline:**

Only for students who have been granted credit and exemption for courses taken elsewhere.

**Lecture times:** None**DP requirements:** None**Assessment:** None

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**APG4054F** LANDSCAPE SYSTEMS

8 NQF credits at HEQSF level 12

**Convener:** TBA**Course entry requirements:** None**Course outline:**

This course aims to create an understanding of the physical context of landscape architectural interventions through the study of various attributes which form the physical structure of the landscape at the district and metropolitan scales. An understanding of the physical structure of the landscape and the ability to identify and evaluate the attributes thereof which are relevant to landscape architectural planning and design.

**DP requirements:** The DP requirements for this course are based on 80% attendance and 100% submission of all assignments and projects.

**Assessment:** The formal assessment of this course is based 100% on an examination of the final portfolio by oral presentation and review.

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**APG4055S** ENVIRONMENTAL PLANNING AND MANAGEMENT PROCESSES

8 NQF credits at HEQSF level 8

**Convener:** Ms Tania Katzschner**Course entry requirements:** None**Co-requisites:** None**Course outline:**

This course aims to provide students with experience in evaluating the environmental consequences of policies, programmes, plans and projects. Included are the need and desirability for evaluating environmental consequences, current and future environmental assessment tools, environmental impact assessment, strategic environmental assessment, sustainability assessment, public participation in environmental governance, biodiversity in impact assessment, social impact assessment, and environmental management planning.

**DP requirements:** None

**Assessment:** Based on paper submission of assessment, which counts 55% and a group work assignment which counts 45%.

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**APG5000W** MASTERS DISSERTATION GEOMATICS

180 NQF credits at HEQSF level 9

**Convener:** TBA**Course entry requirements:** None**Co-requisites:** None**Course outline:**

A research project of a theoretical or practical nature, a critical review of a specified topic based on 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.

**Lecture times:** None**DP requirements:** None**Assessment:** Submission of dissertation (100%).

**APG5001W** DISSERTATION: GEOMATICS 120

120 NQF credits at HEQSF level 9

**Convener:** TBA

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**APG5001Z** MASTERS DISSERTATION GEOMATICS

120 NQF credits at HEQSF level 9

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**APG5020F** REGIONAL PLANNING PROJECT

32 NQF credits at HEQSF level 9

**Convener:** T Katzschner and Professor V Watson.

**Co-requisites:** APG5023F

**Course outline:**

This advanced course focuses on regional planning issues at a regional scale and involves the development of descriptive, explanatory, evaluative and interventive skills, using a particular local region as a project site.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** The final result is based on several phases of project work, 50% individual and 50% group work.

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**APG5023F** REGIONAL PLANNING THEORY

20 NQF credits at HEQSF level 9

**Convener:** T Katzschner and Professor V Watson.

**Course entry requirements:** None

**Co-requisites:** APG5020F

**Course outline:**

This advanced course aims to develop an understanding of the natural landscape framework of regional planning. Topics include: conceptual exploration of landscape processes and patterns; methods of regional landscape analysis and synthesis; and landscape management frameworks. The course then explores the regional economic development framework. Topics include: models of regional economic development; issues and debates; and SA national and regional economic development policies. The course concludes with the settlement and services framework of regional planning: processes of settlement formation. Topics include: resultant settlement patterns (size and spatial); major issues and debates relating to service provision.

**Lecture times:** Tuesdays & Thursdays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of two term papers.

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**APG5024S** PLANNING TECHNIQUES III

12 NQF credits at HEQSF level 9

**Convener:** T Katzschner

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

The aim of this course is to provide students with experience in evaluating the environmental consequences of policies, programmes, plans and projects. Topics 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, and environmental management plans.

**Lecture times:** Runs as a block week in the second week of the second semester.

**DP requirements:** None

**Assessment:** Based on a paper submission of assessment which counts 55% and a group work assignment which counts 45%.

### **APG5025F** CONTEMPORARY THEORIES OF LANDSCAPE ARCHITECTURE

*Elective for students in BAS(Hons)*

12 NQF credits at HEQSF level 9

**Convener:** Dr J Raxworthy

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of contemporary landscape architecture, spanning the 20th Century, to the present day, by exploring a range of issues and themes related to landscape theory and practice.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of assignments.

### **APG5026F** DETAIL LANDSCAPE DESIGN & DOCUMENTATION

24 NQF credits at HEQSF level 9

**Convener:** B Robinson

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course covers the principles of grading, drainage, storm water management, vehicular and pedestrian circulation, and road alignment design, client-architect relationship, contract documentation and administration, procurement systems, and legislation guiding professional conduct of landscape architects (CBE and SACLAP).

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on a series of assignments and projects.

### **APG5029F** ADVANCED LANDSCAPE ARCHITECTURE STUDIO

32 NQF credits at HEQSF level 9

**Convener:** Dr J Raxworthy

**Course entry requirements:** APG4032S, APG4037S or permission of course convener.

**Co-requisites:** APG5026F, APG5053F or permission of course convener.

**Course outline:**

This course covers 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.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final portfolio review.

### **APG5044F** WEB GIS

18 NQF credits at HEQSF level 9; 20 hours on GIS software and application development..

**Convener:** TBA

**Course outline:**

This course covers computer networks in relation to web GIS. Topics include: 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, and internet GIS software.

**DP requirements:** None

**Assessment:** 3 hour examination (55%) and assignments and tests (45%).

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**APG5045S GIS FOR URBAN & REGIONAL PLANNING**

18 NQF credits at HEQSF level 9; 40 hours of directed reading and research..

**Convener:** TBA

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

The course covers three main areas:

GIS in Property and Land Valuations: Property modelling using GIS. Spatial Urban Management Systems. Spatial Multi-criteria systems in evaluation.

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.

**Lecture times:** TBA

**DP requirements:** None

**Assessment:** Seminar(s) (40%), term paper (60%).

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**APG5046S ENVIRONMENTAL MANAGEMENT**

18 NQF credits at HEQSF level 9; 40 hours of directed reading and research..

**Convener:** TBA

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an advanced understanding of environmental management. Topics include: 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, and environmental data acquisition techniques.

**DP requirements:** None

**Assessment:** Seminar(s) (40%), term paper (60%).

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**APG5047S GEO-INFORMATICS**

18 NQF credits at HEQSF level 9; 40 hours of directed reading and research..

**Convener:** TBA

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course in geo-informatics covers advanced database systems, spatial indexing, hierarchical structures, 3-D modelling systems and virtual reality, advanced systems development, and advanced GIS application development.

**DP requirements:** None

**Assessment:** Seminar(s) (40%), term paper (60%).

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**APG5050Z MCPUD DISSERTATION**

*Available in 2016 to repeat students only.*

120 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Comrie

**Course entry requirements:** APG5055F

**Co-requisites:** None

**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.

**Lecture times:** None

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of the dissertation.

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### **APG5051Z MCRP MINOR DISSERTATION**

120 NQF credits at HEQSF level 9

**Convener:** Professor V Watson and T Katzschner

**Course entry requirements:** APG5020F

**Co-requisites:** None

**Course outline:**

This course consists of a supervised dissertation on an approved subject usually chosen by the student.

**Lecture times:** None

**DP requirements:** None

**Assessment:** 80% of the final result is based on the submission and examination of a thesis document and 20% is based on a presentation of the final dissertation to a review panel.

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### **APG5052S MLA DISSERTATION**

120 NQF credits at HEQSF level 9

**Convener:** Dr J Raxworthy

**Course entry requirements:** APG5029F

**Co-requisites:** None

**Course outline:**

This course consists of a major landscape architecture design project of the student's choice undertaken under staff guidance.

**Lecture times:** None

**DP requirements:** None

**Assessment:** 100% of the final result is based on the final dissertation review.

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### **APG5055F URBAN DESIGN PROJECT**

*Available in 2016 to repeat students only.*

35 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Comrie

**Course entry requirements:** APG4026S

**Co-requisites:** None

**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.

**Lecture times:** Mondays, Wednesdays & Fridays 2<sup>nd</sup> to 5<sup>th</sup> periods

**DP requirements:** None

**Assessment:** Based upon Project work and a comprehensive Studio work Examination. Project marks count 80% of final result Studio work Examination counts 20% of final result.

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### **APG5056F URBAN DESIGN THEORY**

*Available in 2016 to repeat students only.*

25 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Comrie

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course develops an advanced understanding of the theories in urban design. Topics include: urban design pioneers and their ideas; selected theorists and practitioners; and a review of the state of the art. The course also covers urban design policy and topics include: antecedents of urban design as government activity, urban design control frameworks, economics of urban design, contemporary urban design controls and techniques, and policy arenas of urban design.

**Lecture times:** Refer to departmental timetable

**DP requirements:** None

**Assessment:** 100% of the final result is based on the submission and assessment of three term papers.

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**APG5057F ADVANCED TECHNOLOGY RESEARCH**

30 NQF credits at HEQSF level 9

**Convener:** M Silverman & Assoc Prof N Coetzer

**Course entry requirements:** None

**Co-requisites:** APG5079W; APG5059F

**Course outline:**

This course is a self-initiated and self-motivated research project on technology of architecture, produced under supervision.

**DP requirements:** 80% attendance and 100% submission of assignments

**Assessment:** Research paper (100%).

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**APG5059F ADVANCED THEORY RESEARCH**

30 NQF credits at HEQSF level 9

**Convener:** Associate Professor N Coetzer

**Course entry requirements:** None

**Co-requisites:** APG5079W; APG5057F

**Course outline:**

This course is a self-initiated and self-motivated research project on architectural theory, produced under supervision.

**DP requirements:** 80% attendance and 100% submission of assignments

**Assessment:** Research paper (100%).

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**APG5061Z DISSERTATION PREPARATION**

0 NQF credits at HEQSF level 9

**Convener:** TBA

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

The aim of this course is to allow the student to undertake preparatory work for the master's 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.

**DP requirements:** None

**Assessment:** None

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**APG5071S RESEARCH PROJECT**

60 NQF credits at HEQSF level 9

**Convener:** Associate Professor S Townsend

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

Candidates will undertake a dissertation in which they will design, develop or review a conservation-related topic/subject. The dissertation must include primary research into the history of the building, place or environment and its composition or current state. The dissertation will require approximately 600 hours of work; and the dissertation may need to be defended orally at an examination.

**DP requirements:** Satisfactory completion of all coursework

**Assessment:** 100% by examination of the dissertation

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**APG5073F LAW OF CONSERVATION & DEVELOPMENT**

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor S Townsend

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of the law of conservation and development. Topics include: introduction to South African law; administrative law; heritage resources law; and current legislative framework for planning and development control.

**Lecture times:** Runs on a block-release system

**DP requirements:** 80% attendance of lectures and seminars and 100% submission of assignments.

**Assessment:** 50% of the examination result plus 50% of the year mark would make up the final grade.

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**APG5074F CONSERVATION DISCIPLINES & PRACTICE**

8 NQF credits at HEQSF level 9

**Convener:** Associate Professor S Townsend

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This 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 town and urban conservation, and conservation of the cultural landscape.

**Lecture times:** Course runs on a block release system

**DP requirements:** 80% attendance of lectures and seminars and 100% submission of assignments.

**Assessment:** The year mark counts 100% of the final grade.

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**APG5076S CONSERVATION DEVELOPMENT & IMPACT ASSESSMENT I**

*Available to repeat students only*

8 NQF credits at HEQSF level 9

**Convener:** TBA

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**APG5077F CONSERV DEV & IMPACT ASSESS II**

20 NQF credits at HEQSF level 9

**Convener:** Emeritus Professor F Todeschini

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This studio work course, following the Part I course, further integrates and develops the knowledge gained through the courses in the earlier part of the programme; it focuses on the historical process leading to the current composition of the environment and assessments of heritage resources, it develops the student's ability to assess the impacts of development on the environment 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-dissertation.

**Lecture times:** Course runs on a block release system

**DP requirements:** 90% attendance of lectures and seminars and 100% submission of assignments.

**Assessment:** The year mark counts 100% of the final grade.

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**APG5078F RESEARCH METHODOLOGIES**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor A van Graan

**Course entry requirements:** None

**Co-requisites:** None

**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 current issues in conservation and heritage resource management.

**Lecture times:** Course runs on a block release system

**DP requirements:** 80% attendance of lectures and seminars and 100% submission of assignments

**Assessment:** The year mark counts 100% of the final grade.

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**APG5079W DESIGN DISSERTATION**

120 NQF credits at HEQSF level 9

**Convener:** Associate Professor N Coetzer

**Course entry requirements:** BAS(Hons)

**Co-requisites:** APG5059F; APG5057F

**Course outline:**

A design dissertation which integrates self-initiated, self-motivated architectural major design project produced under 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.

**Lecture times:** Monday & Wednesday & Friday, 2<sup>nd</sup> – 5<sup>th</sup> period

**DP requirements:** None

**Assessment:** 100% on presentation and examination of design dissertation

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**APG5080F HISTORY OF CONSERVATION**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor S Townsend

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course reviews the origins from the earliest times and the development of the ideas and practices of conservation and restoration of architecture, or towns, of the cultural landscape, and of archaeology.

**Lecture times:** Course runs on a block release system

**DP requirements:** 80% attendance of lectures and seminars and 100% submission of assignments

**Assessment:** 50% of the examination result plus 50% of the year mark would make up the final grade.

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**APG5081S RESEARCHING & ASSESSING HERITAGE RESOURCES**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor S Townsend

**Course entry requirements:** None

**Co-requisites:** None

**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.

**Lecture times:** Course runs on a block release system

**DP requirements:** 80% attendance of lectures and 100% completion of assignments.

**Assessment:** By examination of an assignment (100%).

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**APG5086S URBAN DESIGN RESEARCH PROJECT**

60 NQF credits at HEQSF level 9

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**APG6000W PHD IN GEOMATICS**

360 NQF credits at HEQSF level 10

**Convener:** TBA

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**Lecture times:** None

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**APG7000W MASTERS DISSERTATION ARCHITECTURE & PLANNING**

180 NQF credits at HEQSF level 9

**Convener:** TBA

**Course entry requirements:** Hons

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**APG7001W DISSERTATION ARCHITECTURE & PLANNING**

120 NQF credits at HEQSF level 9

**Convener:** TBA

**Course entry requirements:** Hons

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**APG7001Z MASTERS ARCH & PLANNING DISS**

120 NQF credits at HEQSF level 9

**Convener:** TBA

**Course entry requirements:** Hons

**Co-requisites:** None

**DP requirements:** None

**Assessment:** 100% submission of dissertation

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**APG8000W PHD IN ARCHITECTURE & PLANNING**

360 NQF credits at HEQSF level 10

**Convener:** TBA

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**Lecture times:** None

**DP requirements:** None

**Assessment:** Written work counts 100%

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## CHEMICAL ENGINEERING

The Department offers the following Postgraduate programmes in coursework, in addition to MSc and PhD programmes:

Bioprocess Engineering  
Catalysis and Catalytic Processing  
Hydrometallurgical Engineering  
Minerals Beneficiation

### Research Entities:

Centre for Bioprocess Engineering Research  
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  
Minerals to Metals  
National Hydrogen Catalysis Competence Centre

The Department of Chemical Engineering is situated in the New Chemical Engineering Building, which is on Upper Campus. Access to the Building is from South Lane, off Mandela Circle.

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

## Staff

### Professor and Head of Department:

E van Steen, MSc(Eng) *Eindhoven* Dr.Ing. *Karlsruhe* FSAICHe FSAAE AFICHEM

### Professors:

JM Case, BSc(Hons) *Stell* HDE MSc *Cape Town* MEd *Leeds* MSc *Cape Town* PhD *Monash* MASSAf  
M Claeys, Dipl.Ing (Chem Eng) Dr. –Ing. *Karlsruhe*  
DA Deglon, BSc(Eng) *Witwatersrand* MBA PhD *Cape Town* MSAIMM  
JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE  
STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHe SASM FSAIMM FSAAE ASSAf FWISA  
A Mainza, BSc(Eng)Chem *UNZA* PhD *Cape Town*  
KP Möller, BSc(Eng)Chem PhD *Cape Town*  
J Petersen, BSc(Eng)Chem *Witwatersrand* PhD *Cape Town* MSAIMM (Director of Postgraduate Studies)  
HB von Blottnitz, PrEng BSc(Eng)Chem *Cape Town* BSc(Hons) UNISA MSc(Eng) *Cape Town* Dr.-Ing. *RWTHAachen* MSAICHe

### Emeritus Professors:

CT O'Connor, PrEng BSc *UNISA* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM FSAICHe FSAAE FRSSAf

### Honorary Professor:

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

## 114 DEPARTMENTS IN THE FACULTY

### Adjunct Professor:

P Dempsey, BSc *UNISA*, NHD Metallurgy *Wits Technicon*; MDP *UNISA*  
AS Lambert, BSc(Hons) Extractive Metallurgy *Glasgow*, FSAIMM  
JW Mann, BSc(Eng) Extractive Metallurgy *Witwatersrand* MBL *UNISA*  
DW Wright, BSc(Eng)Chem *Natal* MSAiChE FSAAE  
WA van Dyk, BEng (Chemical, Extractive Metallurgy) PhD *Stellenbosch*

### Adjunct Associate Professor:

PJ Notten, BSc (Eng)Chem PhD ( Eng)Chem *Cape Town*

### Senior Lecturers:

L Bbosa, BSc (Eng) Elec-Mech MSc(Chem Eng) PhD *Cape Town* MSAIMM  
MA Fagan-Endres, BSc(Eng)Chem *Cape Town* PhD *Cantab*  
HR Heydenrych, BSc(Eng)Chem MSc(Eng) *Cape Town*  
A Isafiade, BSc(Hons) *Ilorin* MSc(ChemEng) *Ife* PhD *Cape Town* AMiChemE  
PBJ Levecque, MSc(Eng) PhD *Leuven* (Director of Undergraduate Studies)  
T Rampai, BSc(Hons) MSc(Materials Engineering) *Cape Town*  
S Tai, BSc(Hons) *UMIST* MSc PhD *Delft*

### Contract Lecturers

N Abbas, BSc(Hon) MSc(Eng) *Cape Town*  
A Mabentsela, BSc(Eng)Chem *Cape Town*

### Honorary Research Associates:

MJ Griffiths, BSc(Med) (Hons)MSc PhD *Cape Town*  
MA Petersen, BSc MSc *Cape Town* PhD *Cantab*  
RP van Hille, BSc MSc PhD *Rhodes*

### Chief Research Officers:

JL Broadhurst, BSc(Hons) MSc *Port Elizabeth* PhD *Cape Town*  
MC Harris, BSc(Eng)Chem MSc(Eng) *Cape Town*

### Senior Research Officers:

M Becker, BSc(Hons) MSc Geology *Cape Town* PhD *Pret*  
R Brosius, BSc(Eng) (RUC Antwerpen) MSc( Eng) PhD *Leuven*  
KC Corin, BSc(Hons) PhD *Cape Town*  
NF Fischer, Dipl.-Ing.(Chem Eng) *Karlsruhe* PhD *Cape Town*  
BJ McFadzean BSc(Hons) MSc *Port Elizabeth* PhD *NMMU*  
JA Sweet, BSc(Eng)Chem MSc *Cape Town*  
APP van der Westhuizen, BEng *Stell* MSc *Cape Town*

### Research Officers:

PA Bepswa, BSc Chem Eng *Zimbabwe*  
CJ Fenner, BSc(Hon) PhD *Cape Town*  
RJ Huddy BSc(Hons) PhD *Cape Town*  
N Hussain BSc(Eng)Chem MSc *Cape Town*  
M Johnstone-Robertson, BSc(Eng)Chem PhD *Cape Town*  
NTJ Luchters, BTech *Leiden*  
JG Wiese NatDip *CPUT* MSc *Cape Town*

### Principal Technical Officer

P Dobias

**Chief Technical Officers:**

K Hauslaib BSc(Eng)Mechatronics *Cape Town*  
 HJ Macke, Dip Mechanical Engineering Technician, *Germany*  
 M Wüst, BTech(Electrical) *Cape Technikon*

**Senior Technical Officers:**

G de la Cruz

**Technical Officers:**

DJ Bramble  
 RB Cupido, BTech(Chem Eng), MTech *CPUT*  
 G Kaufmann, BTech *CPUT* MTech *NMMU*  
 WP Koorts, BTech(Chem Eng) *CPUT*  
 CA Le Roux, BTech(Chem Eng) *UNISA*

**Senior Scientific Officers:**

Z Le Riche, ND(Analytical Chemistry) *CPUT*  
 AS Geldenhuys, BEng(Chem) *Stell*  
 M Lisso, BSc(Eng)Chem MSc *Cape Town*  
 GC Edwards, BSc(Eng)Chem *Cape Town*  
 GA Yorath, BSc(Hons) Mineral Processing Technology *Cornwall*

**Scientific Officers:**

RE Van Schalkwyk, BTech(Chem Eng) *CPUT*

**Analytical Laboratory Manager:**

S La Grange, BTech (Chemistry) *CPUT*

**Department Laboratory Manager:**

A Mentoer, BSc(Hons) MSc *Stell*

**Department Manager**

SI Pillay

**Building Supervisor:**

E Matthews

**Administrative Staff:**

J Broadley (Administrative Assistant)  
 N Dili (Receptionist)  
 B Cloete (Undergraduate Administrator)  
 B Davids (Postgraduate Administrator)  
 N Davids (Finance Assistant)  
 A Warrin (Finance Assistant)

The Department offers both undergraduate and postgraduate programmes in Chemical Engineering. The undergraduate programme draws top school leavers from South Africa and further afield, with an annual intake of approximately 140 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 centered on:

- Biological leaching of mineral ores, with work concentrated on the fundamental processes involved;

- Bioprocess engineering focused on biotransformation, bioreactor design, process kinetics, novel bioprocesses and the recovery of biological products;
- Catalysis research aimed at synthesis, characterisation and modelling of heterogeneous catalysts and their application in a variety of reactions and reactor types;
- Crystallization and precipitation research focusing on metal recovery in mineral processing and metal removal for environmental protection and crystallization for water treatment;
- Educational research aimed at improving the quality of undergraduate teaching and learning;
- Environmental process engineering, both at a conceptual and a practical level;
- Hydrogen and fuel cell technologies focusing on fuel processing catalysis and devices, electrodes development and fuel cell and stack development;
- Hydrometallurgy for metal extraction;
- Minerals processing research focused on milling, classification and flotation of ores;
- Process modelling and optimization; and
- Process synthesis featuring the application of pinch technology to heat and mass transfer systems as well as the control of process systems.

## Postgraduate Programmes

### Master's Programmes

#### MSc in Engineering specialising in Bioprocess Engineering

[EM024CHE01]

##### Professor and Convener:

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHe SASM FSAAE ASSAf

##### Core Courses for Engineering Graduates

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002W</b>	Dissertation Chemical Engineering .....	120	9
<b>CHE5051Z</b>	Microbial Physiology & Dynamics#1 .....	8	9
<b>CHE5052Z</b>	Molecular Biology & Catalysis#1 .....	8	9

##### Core Courses for Life Science Graduates

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002W</b>	Dissertation Chemical Engineering .....	120	9
<b>CHE5049Z</b>	Chemical Engineering Topics for Scientists#2.....	16	9
<b>CHE5054Z</b>	Biotechnology Laboratory .....	8	9
<b>CHE5055Z</b>	Research Communication & Methodology .....	16	9

#1 core courses for engineering graduates.

#2 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 #1 and #2, dependent on their previous studies.

## MSc in Engineering specialising in Catalysis and Catalytic Processing [EM024CHE01]

### Professor and Convener:

N Fischer Diplom Ingenieur *Karlsruhe PhD Cape Town*

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002W</b>	Dissertation Chemical Engineering .....	120	9
<b>CHE5022Z</b>	Introduction to Catalysis .....	16	9
<b>CHE5088Z</b>	Introduction to Heterogeneous Catalysis Research .....	8	9
<b>CHE5089Z</b>	Characterisation Techniques for Catalysis Research .....	12	9
<b>CHE5055Z</b>	Research Communication & Methodology .....	16	9
<b>CHE5082Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Optional courses .....	8	09
	Minimum total credits .....	<b>180</b>	

## MSc in Engineering specialising in Hydrometallurgical Engineering [EM024CHE01]

### Associate Professor and Convener:

J Petersen, BSc (Eng) Chem *Wits PhD Cape Town MSAIMMs*

A candidate for the Master's in Hydrometallurgical Engineering programme shall complete coursework to the minimum of 60 credits, which includes all core courses and at least one of the elective core courses, listed below.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002W</b>	Dissertation Chemical Engineering .....	120	9
<b>CHE5055Z</b>	Research Communication & Methodology .....	16	9
<b>CHE5057Z</b>	Fundamentals of Hydrometallurgy .....	12	9
<b>CHE5058Z</b>	Leaching Hydrometallurgy .....	12	9
<b>CHE5059Z</b>	Hydrometallurgical Separation Processes .....	12	9
<b>CHE5082Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9

### Elective Core Course (select one course)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5056Z</b>	Bioleaching of Sulphide Minerals .....	8	9
<b>CHE5060Z</b>	Solvent Extraction .....	8	9
<b>CHE5062Z</b>	Electrowinning/Refining: Practice, Modelling & Control .....	8	9
<b>CHE5063Z</b>	Advanced Topics in Adsorption & Ion Exchange .....	8	9
	Total credits .....	0	0

## Minerals Beneficiation [em\_che\_minerals\_beneficiation]

A candidate for the MEng in Minerals Beneficiation 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.**

**MEng specialising in Minerals Beneficiation**

[EM017CHE02]

**Professor and Programme Convener:**J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town PhD Open MSAiChE MSAiMM***Core Courses Stream A (Concentrators)**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002W</b>	Minor Dissertation .....	120	9
<b>CHE4029Z</b>	Professional Communication Studies .....	8	8
<b>CHE5073Z</b>	Essential Technical Tools .....	16	9
<b>CHE5074Z</b>	Advanced Comminution I .....	16	9
<b>CHE5075Z</b>	Advanced Comminution II .....	16	9
<b>CHE5076Z</b>	Conceptual Framework of Minerals Beneficiation .....	8	9
<b>CHE5077Z</b>	Introduction to Hydrometallurgy .....	8	9
<b>CHE5080Z</b>	Advanced Flotation I .....	16	9
<b>CHE5081Z</b>	Advanced Flotation II .....	16	9
	Optional courses .....	0	0
	Total credits per year .....	0	0

**Core Courses Stream B (Hydrometallurgy)**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5084Z</b>	Minor Dissertation .....	60	9
<b>CHE5057Z</b>	Fundamentals of Hydrometallurgy .....	12	9
<b>CHE5058Z</b>	Leaching Hydrometallurgy .....	12	9
<b>CHE5059Z</b>	Hydrometallurgical Separation Processes .....	12	9
<b>CHE5060Z</b>	Solvent Extraction .....	8	9
<b>CHE5062Z</b>	Electrowinning/Refining: Practice, Modelling and Control .....	8	9
<b>CHE5063Z</b>	Advanced Topics in Adsorption & Ion Exchange .....	8	9
<b>CHE5073Z</b>	Essential Technical Tools .....	16	9
<b>CHE5074Z</b>	Advanced Comminution I .....	16	9
<b>CHE5076Z</b>	Conceptual Framework of Minerals Beneficiation .....	8	9
<b>CHE5077Z</b>	Introduction to Hydrometallurgy .....	8	9
<b>CHE5079Z</b>	Integrated Analysis of Mineral Beneficiation Systems .....	16	9
<b>CHE5080Z</b>	Advanced Flotation I .....	16	9
	Total credits per year .....	0	0

**Master of Philosophy specialising in Sustainable Mineral Resource Development**

[EM026CHE05]

**Professor and Convener:**J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town PhD Open MSAiChE MSAiMM*

Mining in Africa, as in the rest of the world, has changed from simply balancing production targets with cost control to a complex set of interrelationships including safety, health, the environment, sustainable development and proactive stakeholder management. This programme is aimed at providing an interdisciplinary postgraduate qualification that highlights the critical factors of sustainable development in the context of mining and minerals processing in Africa; including an understanding of, and a sensitivity and progressive approach to, managing and interacting with communities, environmental challenges, safety cultures, health-related issues and regulatory frameworks.

This trans-disciplinary Master of Philosophy (MPhil) Degree is offered through the Minerals to Metals Research Initiative within the Department of Chemical Engineering at UCT.

Students will complete the research component of the degree at UCT under supervision, and complete course work at UCT (including the UCT Graduate School of Business), the University of Stellenbosch and the University of Zambia. Credit and exemption will be granted for courses taken at other institutions, as shown below.

A candidate for the Master's specialising in Sustainable Mineral Resource Development shall complete coursework to the minimum of 60 credits, which includes all core courses listed below, and a 120 credit dissertation.

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5002Z</b>	Master's Dissertation: Chemical Engineering .....	120	9
<b>CHE5087Z</b>	Research Methodology .....	16	9
<b>CHE5082Z</b>	Dissertation Preparation.....	0	9
<b>END5050X</b>	Master's Journal Paper.....	0	9
<b>CHE4054Z*</b>	Environmental Stewardship in Mining & Minerals Beneficiation	12	8
<b>CHE4055X</b>	Practical Training in Sustainable Development.....	0	8
<b>CHE4056Z*</b>	Special Topics in Sustainable Development.....	16	8
<b>GSB4264Z</b>	Strategic Engagement Practice .....	16	8
	Total credits .....	0	0

\* indicates core courses offered elsewhere for which credit and exemption will be granted.

#### University of Zambia (School of Mines)

'Environmental Stewardship in Mining & Minerals Beneficiation' (credit and exemption CHE4054Z)

#### University of Stellenbosch (Sustainability Institute)

'Advanced Introduction to Sustainable Development' (credit and exemption CHE4056Z)

## Optional Courses for all Postgraduate Programmes

[em\_che\_optional\_courses]

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.

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5027Z</b>	Advanced Reaction Kinetics in Heterogeneous Systems .....	8	09
<b>CHE5030Z</b>	Advanced Engineering Statistics I.....	8	9
<b>CHE5040Z</b>	Fuels & Chemicals from Oil .....	12	9
<b>CHE5041Z</b>	Instrumental Analysis Part A - General Measurement .....	4	9
<b>CHE5042Z</b>	Instrumental Analysis Part B - Chromatography .....	4	9
<b>CHE5043Z</b>	Instrumental Analysis Part C - Spectroscopy .....	4	9
<b>CHE5045Z</b>	Fuels & Chemicals from Coal & Syngas .....	12	9
<b>CHE5047Z</b>	Molecular Modelling .....	8	9
<b>CHE5048Z</b>	Crystallization and Precipitation .....	12	9
<b>CHE5056Z</b>	Bioleaching of Sulphide Minerals .....	8	9
<b>CHE5051Z</b>	Microbial Physiology and Dynamics .....	8	9
<b>CHE5052Z</b>	Molecular Biology and Biocatalysis .....	8	9
<b>CHE5054Z</b>	Biotechnology Laboratory.....	8	9
<b>CHE5061Z</b>	Advanced Topics in Reduction .....	8	09
<b>CHE5064Z</b>	Sustainability in Chemical Engineering .....	8	9

## 120 DEPARTMENTS IN THE FACULTY

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5069Z</b>	Advanced Thermodynamics and Separation Processes.....	8	9
<b>CHE5070Z</b>	Advanced Bioprocess Engineering.....	16	9
<b>CHE5072Z</b>	Fundamentals of Process Modelling.....	4	9
<b>CHE5078Z</b>	Advanced Numerical Methods for Engineers.....	16	9
<b>CHE5079Z</b>	Integrated Analysis of Mineral Beneficiation Systems .....	16	9
<b>CHE5083Z</b>	Translating Technology from the Laboratory to the Marketplace...8	8	9
<b>CHE5085Z</b>	Hydrogen Technology .....	8	9
<b>CHE5086Z</b>	Electrochemical Characterisation Techniques for Fuel Cells.....4	4	9
<b>CIV5101F</b>	Wastewater Treatment Part I .....	32	09
<b>EEE4103F</b>	Nuclear Power Sources.....	12	8
<b>END5049Z</b>	Research Communication & Methods.....	16	9
<b>MEC5035Z</b>	Project Management.....	20	9

## Doctoral Programmes

### Doctor of Philosophy

[ED001CHE01]

**ED001 Doctor of Philosophy is a Research Degree**

#### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE6000W</b>	Thesis.....	360	10

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

## Course Outlines

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### **CHE4054Z ENVIRONMENTAL STEWARDSHIP IN MINING & MINERALS BENEFICIATION**

12 NQF credits at HEQSF level 8

**Convener:** Professor H von Blottnitz

#### **Course outline:**

Mining in Africa, as in the rest of the world has an adverse impact on the environment. Understanding environmental challenges relevant to the mineral industry, with emphasis on the relationship between mining and minerals beneficiation activities and environmental impact categories is cardinal. In this course students will be introduced to environmental issues related to mining industries as well as environmental legislation, guidelines and best practices. It will provide exposure to the mining world and will offer students the opportunity to conduct case studies on real mine sites.

**DP requirements:** None

**Assessment:** Group assignments (20%), individual case-study (20%), individual assignment (60%).  
*Entrance is limited to the MPhil specialising in Sustainable Mineral Resource Development*

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### **CHE4055X PRACTICAL TRAINING IN SUSTAINABLE DEVELOPMENT**

0 NQF credits at HEQSF level 8

**Convener:** Professor H von Blottnitz

#### **Course outline:**

This course is grounded in the realizations that sustainable development requires professionals to be able to negotiate disciplinary truth boundaries so as to minimize externalization of costs and damages to 3rd parties or future generations; and requires an understanding of the complexity of

coupled social-ecological systems, which can only partly be learnt in the classroom. This course aims to ground learning not just in theory but also in the evolving practice of sustainable development in Africa. Students are requested to register for a practical training period of two weeks or more, with an accredited host, resulting in a reflective report.

**DP requirements:** None

**Assessment:** Coursework 100% *Entrance is limited to the MPhil specialising in Sustainable Mineral Resource Development*

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#### **CHE4056Z** SPECIAL TOPICS IN SUSTAINABLE DEVELOPMENT

16 NQF credits at HEQSF level 8

**Convener:** Professor S Harrison

**Course outline:**

This course focuses on the rise to global prominence of the challenge of sustainability in general and sustainable development in particular. Course topics include: the meaning of sustainability and sustainable development; key elements of the environmental crisis; key elements of the global economy and the nature of inequality; an introduction to deep ecology; fault lines and application.

**DP requirements:** None

**Assessment:** Coursework 100% *Entrance is limited to the MPhil specialising in Sustainable Mineral Resource Development*

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#### **CHE5000W** MASTERS DISSERTATION IN CHEMICAL ENGINEERING

180 NQF credits at HEQSF level 9

**Convener:** None

**Co-requisites:** CHE5055Z

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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#### **CHE5002W** DISSERTATION CHEMICAL ENGINEERING

120 NQF credits at HEQSF level 9

**Convener:** None

**Course entry requirements:** CHE5055Z, DP in CHE5082Z.

**Course outline:**

The dissertation should 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.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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#### **CHE5022Z** INTRODUCTION TO CATALYSIS

16 NQF credits at HEQSF level 9

**Convener:** Professor E van Steen

**Course entry requirements:** BSc (Eng) or equivalent four year BSc (Hons)

**Course outline:**

This advanced introduction to catalysis includes: basic principles in heterogeneous catalysis; diffusion and adsorption; catalyst testing (reactions, product analysis); catalyst preparation (zeolites;

## 122 DEPARTMENTS IN THE FACULTY

metal-based catalysts); acid catalysed reactions; metal catalysed reactions; bi-functional catalysis; and oxidation catalysis.

**DP requirements:** None

**Assessment:** Coursework 30%, Examination 70%

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### **CHE5030Z** ADVANCED ENGINEERING STATISTICS I

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Professor K Möller

**Course entry requirements:** BSc (Engineering) (Chemical Engineering)

**Course outline:**

This course covers advanced engineering statistics. Topics include: 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.

**DP requirements:** Submission of all projects and/or assignments with all questions/sections duly attempted

**Assessment:** 50% weighted average of all projects and assignments

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### **CHE5033Z** APPLIED MATHEMATICS & MODELING II

8 NQF credits at HEQSF level 9

**Course outline:**

This course covers applied mathematics and modelling. Topics include: 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, and examples.

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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### **CHE5047Z** INTRODUCTION TO MOLECULAR MODELING

8 NQF credits at HEQSF level 9

**Course outline:**

This course develops an advanced understanding of molecular modelling of solids and fluid-phase components of interest to catalysis and other fields. The course provides background theoretical understanding of molecular modelling as well as subject specific experience with the use of the leading commercial modelling software. Included are the building of molecular structures ab initio, the use of data libraries as well as the use of various force-field energy minimisation techniques.

**DP requirements:** None

**Assessment:** Examination 2 hours.

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### **CHE5048Z** CRYSTALLISATION AND PRECIPITATION

*Course not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Professor AE Lewis

**Course outline:**

Crystallisation and precipitation are both purification and separation processes, and takes place through a solid phase being created from a liquid phase. The course covers crystallization 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.

**DP requirements:** None

**Assessment:** Assignments and Projects

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**CHE5049Z** CHEMICAL ENGINEERING TOPICS FOR SCIENTISTS

*Not offered to Chemical Engineering graduates*

16 NQF credits at HEQSF level 9

**Course outline:**

This course is designed for graduates from disciplines other than chemical engineering. Topics include: material and energy balances; reactor configuration; reaction kinetics; fluid flow in pipe reactors and particulate systems. Solid-liquid separations; and basic mass transfer.

**DP requirements:** None

**Assessment:** Examination 3 hours, assignments.

---

**CHE5051Z** MICROBIAL PHYSIOLOGY AND DYNAMICS

8 NQF credits at HEQSF level 9

**Convener:** Professor STL Harrison

**Course entry requirements:** BSc(Eng) or equivalent four year BSc(Hons) degree.

**Course outline:**

This course in microbial physiology and dynamics covers: fundamentals of microbiology, macromolecules and metabolism; metabolic engineering; microbial media and culture maintenance; and gene expression and control.

**DP requirements:** None

**Assessment:** Examination 3 hours, assignments.

---

**CHE5052Z** MOLECULAR BIOLOGY AND BIOCATALYSIS

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Dr CJ Fenner

**Course entry requirements:** BSc (Eng) or BSc (Hons) degree or equivalent

**Course outline:**

This course in molecular biology and biocatalysis covers: 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; and 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 at HEQSF level 9

**Convener:** Dr RP van Hille

**Course entry requirements:** BSc (Eng) or BSc (Hons) degree or equivalent

**Course outline:**

This course aims to develop an understanding of basic microbiology, bioreactor technology, brewing, protein extraction and electrophoresis, DNA extraction, PCR, fluorescence microscopy, enzyme kinetics, and biotransformations.

**DP requirements:** None

**Assessment:** Assignments and practical examination.

---

**CHE5055Z** RESEARCH COMMUNICATION & METHODOLOGY

16 NQF credits at HEQSF level 9; 1 Final report..

**Convener:** Professor STL Harrison

**Course entry requirements:** BSc (Eng) or BSc (Hons) degree or equivalent

**Course outline:**

The aim of this 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 (100%).

**Assessment:** Assignments and final report.

---

**CHE5056Z BIOLEACHING OF SULFIDE MATERIALS**

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Associate Professor J. Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course in bioleaching of sulphide minerals covers: the 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; and current research activities and developmental challenges.

**DP requirements:** None

**Assessment:** Examination (100%).

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**CHE5057Z FUNDAMENTALS OF HYDROMETALLURGY**

*Course not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor J. Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course in the fundamentals of hydrometallurgy develops an advanced understanding of aqueous thermodynamics; kinetics of heterogeneous reactions; and material and energy balances in hydrometallurgy.

**DP requirements:** None

**Assessment:** Examination 50% and year mark 50%.

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**CHE5058Z LEACHING HYDROMETALLURGY**

*Course not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor J. Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course develops an understanding of advanced topics in leaching and includes the theory and applications in leaching practice.

**DP requirements:** None

**Assessment:** Examination 50% and year mark 50%.

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**CHE5059Z** HYDROMETALLURGICAL SEPARATION PROCESSES

*Course not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor J Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course in hydrometallurgical separation processes covers: introduction to principles and applications of solvent extraction, precipitation, electrowinning adsorption and solid-liquid separation in hydrometallurgical processes.

**DP requirements:** None

**Assessment:** Examination 50% and year mark 50%.

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**CHE5060Z** SOLVENT EXTRACTION

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Associate Professor J Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This advanced course in solvent extraction develops an advanced understanding of practice and engineering; modelling.

**DP requirements:** None

**Assessment:** Examination and year mark.

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**CHE5062Z** ELECTROWINNING/REFINING: PRACTICE, MODELING & CONTROL

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Associate Professor J Petersen

**Course entry requirements:** BSc(Eng) or BSc (Hons) or equivalent

**Course outline:**

This advanced course in electrowinning and –refining covers: chemical process design, engineering and operation; chemical process modelling; and process control.

**Assessment:** Examination 50% and year mark 50%.

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**CHE5063Z** ADVANCED TOPICS IN ADSORPTION AND ION EXCHANGE

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Associate Professor J Petersen

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course includes advanced topics in adsorption and ion exchange. Topics include: scope of adsorption and ion exchange and their historical development; theory: adsorption and ion exchange process systems engineering; industrial applications: and modelling and control.

**DP requirements:** None

**Assessment:** Examination 50% and year mark 50%.

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**CHE5064Z** SUSTAINABILITY IN CHEMICAL ENGINEERING

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Convener:** Professor STL Harrison

**Course entry requirements:** BSc (Eng) or BSc (Hons) degree or equivalent

### **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.

**DP requirements:** None

**Assessment:** Examination and assignments.

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### **CHE5069Z ADVANCED THERMODYNAMICS AND SEPARATION**

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

**Course entry requirements:** BSc(Eng).

#### **Course outline:**

This course aims to develop an understanding of advanced thermodynamics & separation processes. Topics include: 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.

**DP requirements:** None

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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### **CHE5070Z ADVANCED BIOPROCESS ENGINEERING**

16 NQF credits at HEQSF level 9

**Convener:** Professor STL Harrison

**Course entry requirements:** BSc(Eng) or equivalent four year BSc(Hons) degree.

#### **Course outline:**

This course is an advanced introduction to bioprocess design. Topics include: 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. Environmental impact of bioprocesses.

**DP requirements:** Satisfactory completion of all projects and assignments.

**Assessment:** Examination 3 hours, projects and assignments.

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### **CHE5071Z APPLIED NUMERICAL ANALYSIS IN BIOCHEMICAL SYSTEMS**

*Course not offered in 2016*

8 NQF credits at HEQSF level 9

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### **CHE5072Z FUNDAMENTALS OF PROCESS MODELING**

*Course not offered in 2016*

4 NQF credits at HEQSF level 9

#### **Course outline:**

This advanced course covers the fundamentals of process modelling. Topics include: 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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**CHE5078Z** NUMERICAL METHODS FOR ENGINEERS

*Course not offered in 2016*

16 NQF credits at HEQSF level 9

**Course entry requirements:** BSc(Eng), BSc(Hons) with applied mathematics major.

**Course outline:**

This course in advanced numerical methods for engineers covers: computer arithmetic, linear equations (transformations, SVD), non-linear equations (quasi-newton's methods, continuation), ODEs (explicit, implicit, BDF, implicit Runge-Kutta), BVPs (collocation, finite differences, shooting method, finite elements), DAEs (index, implicit solvers), PDEs (collocation, finite differences, finite elements, iterative methods), model regression (least squares, variance, bootstrap, parameter estimation), and parametric sensitivity analysis (transient, steady state).

**DP requirements:** None

**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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**CHE5082Z** DISSERTATION PREPARATION

*DP requirement for entry to CHE5002W.*

0 NQF credits at HEQSF level 9

**Co-requisites:** CHE5055Z

**Course outline:**

The aim of this course is to allow a student to undertake preparatory work for the 120 credit dissertation (CHE5002W). 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.

**DP requirements:** None

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**CHE5083Z** TRANSLATING TECHNOLOGY FROM THE LABORATORY TO THE MARKETPLACE

8 NQF credits at HEQSF level 9

**Convener:** Professor STL Harrison

**Course entry requirements:** BSc (Eng) or BSc (Hons) or equivalent

**Course outline:**

This course aims to develop an understanding of how to translate technology from the laboratory to the marketplace. 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; and market research.

**DP requirements:** Satisfactory completion of 80% assignments

**Assessment:** Year mark.

---

**CHE5086Z** ELECTROCHEM CHARACTERISATION TECHNIQUES FOR FUEL CELLS

4 NQF credits at HEQSF level 9; block release.

**Convener:** P Levecque

**Course entry requirements:** BSc (Eng) or equivalent four years BSc (Hons)

**Course outline:**

Basics of electrochemistry: electrode reactions, electron transfer, double layer, design of experiment. Platinum as electrocatalyst: behaviour in bulk and as nanoparticle. The role of carbon and other supports for fuel cell catalysts. Theoretical and practical aspects of cyclic voltammetry, electrochemical impedance spectroscopy, rotation disk electrode, polarisation curve, current

## 128 DEPARTMENTS IN THE FACULTY

interrupt and linear sweep voltammetry. Overview of selected physical/chemical characterisation techniques and their application in fuel cell research.

**DP requirements:** None

**Assessment:** Coursework 30%, Examination 70%

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### **CHE5087Z RESEARCH METHODOLOGY**

16 NQF credits at HEQSF level 9; block release.

**Convener:** Prof S Harrison

**Course outline:**

This course aims to provide postgraduate students with competency to execute meaningful research in a structured way, to critically analyse the results of this research and to communicate these results effectively. To achieve this, the course topics include research philosophy; research planning, hypothesis development and research methodology; literature review skills; research ethics; research communication and related technical skills; structuring, writing and presentation of research outputs.

Entrance is limited to students registered for the M Phil specialising in Sustainable Mineral Resource Development offered by the University of Cape Town and the equivalent Master of Mineral Science Degree in Sustainable Mineral Resources Development, offered by the University of Zambia.

**DP requirements:** None

**Assessment:** Coursework 100%

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### **CHE5088Z INTRODUCTION TO HETEROGENEOUS CATALYSIS RESEARCH**

8 NQF credits at HEQSF level 9

**Convener:** Dr Nico Fischer

**Course entry requirements:** BSc Honours in Science or BSc (Eng) or equivalent.

**Co-requisites:** None

**Course outline:**

This course aims to facilitate the connection between high level theory and practical application, for new MSc students in the field of heterogeneous catalysis research. Included are safety aspects specific to laboratories in the Centre for Catalysis Research, the design of test units (including material section, valve design, and temperature/pressure control), and the preparation of various types of heterogeneous catalysts.

**DP requirements:** Pass presentation on experimental plan for heterogeneous catalysis preparation practical (pass/fail principle, no grades).

**Assessment:** Written report on heterogeneous catalyst preparation practical (40%); Written exam on course including safety aspects, planning/design/operation of rigs and heterogeneous catalysis preparation (60%).

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### **CHE5089Z CHARACTERIZATION TECHNIQUES FOR CATALYSIS RESEARCH**

12 NQF credits at HEQSF level 9

**Convener:** Dr Nico Fischer

**Course entry requirements:** BSc Honours in Science or BSc (Eng) or equivalent.

**Co-requisites:** None

**Course outline:**

This course aims to facilitate the connection between high level theory and practical application for new MSc students in the field of heterogeneous catalysis characterization techniques. It includes common techniques available in or associated with the laboratories in the Centre for Catalysis Research such as temperature programmed techniques, elemental analysis methods, electron microscopy, X-ray and light based techniques (i.e. Raman and infra-red spectroscopy), gas chromatography and the introduction of more specialized methods such as X-ray absorption, solid state NMR and surface science techniques.

**DP requirements:** None

**Assessment:** Written reports on different practicals (each 10%, total 40%); Written exam on course covering all introduced characterization techniques, both in theoretical background as well as data collection and analysis (60%).

### **CHE6000W** PHD IN CHEMICAL ENGINEERING

360 NQF credits at HEQSF level 10

**Co-requisites:** CHE5055Z

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate

**DP requirements:** None

**Assessment:** Written work counts 100%.

### **CHE6001W** PHD IN ENGINEERING EDUCATION

360 NQF credits at HEQSF level 10

**Convener:** Professor J Case

**Co-requisites:** CHE5055Z

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None

**Assessment:** Written work counts 100%.

### **CHE9003Z** INTERNATIONAL AFFILIATE 6-12 M

0 NQF credits at HEQSF level 0

### **END5049Z** RESEARCH COMMUNICATION & METHODOLOGY

*Administered by the Department of Chemical Engineering.*

16 NQF credits at HEQSF level 9; 1 Final Report.

**Course outline:**

The aim of this course is to provide postgraduate students with the competency to execute meaningful research in a structured way, 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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## CIVIL ENGINEERING

The Department offers the following Postgraduate Degree Programmes:

Civil Infrastructure Management and Maintenance  
Geotechnical Engineering  
Structural Engineering and Materials  
Transport Studies  
Urban Infrastructure Design and Management  
Water Quality Engineering

### Research Entities:

Centre for Transport Studies  
Concrete Materials and Structural Integrity Research Unit  
Geotechnical Engineering  
Structural Engineering and Mechanics  
Urban Water Management Research Unit  
Water Quality Engineering

The Department of Civil Engineering is housed in the New Engineering Building, situated on the top terrace of the Upper Campus. This brand new facility is shared with the Department of Chemical Engineering and the Faculty Office.

## Staff

### Professor and Head of Department:

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### Emeritus Professor:

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### Emeritus Associate Professors:

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S Skatulla, Dipl-Ing *Karlsruhe* PhD *Adelaide*

**Academic Development Senior Lecturer:**

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**Principal Technical Officer:**

C J Nicholas

**Laboratory Manager/Principal Scientific Officer:**

N Hassen

**Water Quality Laboratory Manager:**

Vacant

**Chief Technical Officer:**

A Rule

**Senior Technical Officer:**

Tahir Mukaddam, ND Civil Eng *CPUT*

**Departmental Manager:**

AB Dalwai, BSocSc *Cape Town*

**Administrative Officer - Postgraduate:**

R Geswindt

**Administrative Assistant - Undergraduate:**

I Ncube

**Research Administrative Staff:**

R Joseph  
F Seragie  
W van der Ross

G Verster

**Purchaser:**

A Courie

**Senior Secretary:**

C Wright

**Departmental Assistants:**

L Adams

H Mafungwa

C May

E Witbooi

**Workshop Assistant:**

M Swayiza

## Postgraduate Programmes

### Postgraduate Diploma and Master's Programmes

#### MSc in Engineering specialising in Civil Engineering [CIV01]

The Department prepares candidates for the Master of Science in Engineering in Civil Engineering and for the Doctor of Philosophy. 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.

The Master of Science in Engineering can be either by dissertation only [EM023] or by coursework (approved by your supervisor) and dissertation [EM024].

#### EM023 Research Master's by dissertation

[EM023CIV01]

**Core Course**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000W</b>	Dissertation Civil Engineering .....	180	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Total credits .....	<b>180</b>	

#### EM024 Research Master's by coursework and dissertation

[EM024CIV01]

**Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000Z</b>	Dissertation Civil Engineering .....	120	9
	Elective courses approved by supervisor .....	60	9
<b>CIV5109Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Total credits .....	<b>180</b>	

## Civil Infrastructure Maintenance and Management [CIV07]

### Professor and Programme Convener:

P Moyo, PrEng BSc(Eng) Zimbabwe MSc(Eng) Newcastle-upon-Tyne PhD Nanyang MSAICE  
MIABSE

The primary aim of the MEng and MSc(Eng) specialising in Civil Infrastructure Management & Maintenance is to produce graduates with the necessary knowledge and skills to engage effectively in structural and materials engineering with respect to maintenance, rehabilitation and management of civil infrastructure. The broad areas of interest are deterioration science, assessment technologies, renewal engineering and project management.

## Master of Engineering specialising in Civil Infrastructure Management and Maintenance

[EM017CIV07]

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5017Z</b>	Minor Dissertation.....	60	9
<b>CIV5067Z</b>	Advanced Infrastructure Management .....	20	9
<b>CIV5116Z</b>	Durability & Condition Assessment of Concrete Structures.....	20	9
<b>CIV5120Z</b>	Repair & Rehabilitation of Concrete Structures.....	20	9
<b>CONS016Z</b>	Project Planning & Implementation .....	20	9
	Elective courses.....	40	9
	Total credits.....	<b>180</b>	

### Elective Courses (minimum of 16 credits)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5002Z</b>	Structural Concrete Properties & Practice.....	16	9
<b>CIV5113Z</b>	Structural Dynamics with Applications.....	16	9
<b>CIV5115Z</b>	Bridge Management & Maintenance.....	20	9
<b>CIV5118Z</b>	Safety of Special Structures .....	20	9
<b>CIV5119Z</b>	Structural Performance Assessment & Monitoring.....	20	9
	Approved elective.....	16	9

## MSc in Engineering specialising in Civil Infrastructure Management and Maintenance

[EM023CIV07]

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000W</b>	Dissertation.....	180	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	0	0

## MSc in Engineering specialising in Civil Infrastructure Management & Maintenance

[EM024CIV07]

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000Z</b>	Dissertation.....	120	9
<b>CIV5109Z</b>	Dissertation Preparation .....	0	9
<b>CIV5067Z</b>	Advanced Infrastructure Management .....	20	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Elective courses.....	40	09

## 134 DEPARTMENTS IN THE FACULTY

Course Code	Course Title	NQF Credits	HEQSF Level
	Total credits .....	<b>180</b>	

### Elective Courses (minimum of 40 credits)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5115Z</b>	Bridge Management & Maintenance .....	20	9
<b>CIV5116Z</b>	Durability & Condition Assessment of Concrete Structures .....	20	9
<b>CIV5118Z</b>	Safety of Special Structures .....	20	9
<b>CIV5119Z</b>	Structural Performance Assessment & Monitoring .....	20	9
<b>CIV5120Z</b>	Repair & Rehabilitation of Concrete Structures .....	20	9
<b>CON5016Z</b>	Project Planning & Implementation .....	20	9
	Approved elective .....	40	09

## MSc in Engineering specialising in Geotechnical Engineering [EM024CIV08]

### Senior Lecturer and Programme Convener:

Dr D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*

The master's programme with a specialisation in Geotechnical Engineering is intended to support high level training and enhance both the technical skills of recent graduates or experienced personnel who work in, or aspire to a career in civil engineering construction, consulting, environmental and related industries. The primary purpose of the programme is to provide advanced conceptual understanding, detailed factual geotechnical knowledge and specialist technical skills appropriate for postgraduates who wish to widen their professional scope and work towards a career in the field of geotechnical engineering.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000Z</b>	Dissertation .....	120	9
<b>CIV5109Z</b>	Dissertation Preparation .....	0	9
<b>CIV5110Z</b>	Laboratory and Field Techniques .....	16	9
<b>CIV5114Z</b>	Foundation Design .....	16	9
<b>CIV5122Z</b>	Advanced Soil Mechanics .....	16	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Elective courses .....	12	9
	Minimum total credits .....	<b>180</b>	

### Elective Courses (minimum of 12 credits)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5111Z</b>	Ground Improvement Techniques .....	16	9
<b>CIV5123Z</b>	Contaminated Land and Remediation .....	16	9
<b>CIV5124Z</b>	Geosynthetics Engineering .....	16	9
<b>CIV5125Z</b>	Lateral Earth Supports .....	16	9
<b>CIV5126Z</b>	Slope Stability .....	16	9

### Enrichment courses (compulsory for MScEng)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5055Z</b>	Research Communication and Methodology .....	16	9

## Master of Geotechnical Engineering [EM028CIV08]

### Senior Lecturer and Programme Convener:

Dr D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*

The Master of Geotechnical Engineering (MGeotech) programme is a coursework and project oriented degree that is intended to provide graduate civil engineers and technical professionals an opportunity to acquire specialized expertise that is essential in the rapidly changing business, government, and industrial environment. This professional master's degree programme is designed to aid in the development of graduates in their careers as geotechnical engineers through courses that offer-in-depth understanding of the principles of geotechnical engineering as well as the necessary knowledge and skills to engage effectively in providing solutions to engineering challenges involving the ground control and ground stability in civil engineering construction projects.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5129W</b>	Geotechnical Engineering Project.....	45	9
<b>CIV5110Z</b>	Laboratory and Field Techniques.....	16	9
<b>CIV5114Z</b>	Foundation Design .....	16	9
<b>CIV5125Z</b>	Lateral Earth Supports.....	16	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Elective courses.....	90	9
	Minimum total credits .....	<b>180</b>	

### Elective Courses (minimum of 12 credits)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5111Z</b>	Ground Improvement Techniques.....	16	9
<b>CIV5122Z</b>	Advanced Soil Mechanics .....	16	9
<b>CIV5123Z</b>	Contaminated Land and Remediation .....	16	9
<b>CIV5124Z</b>	Geosynthetics Engineering.....	16	9
<b>CIV5126Z</b>	Slope Stability .....	16	9

### Enrichment courses (compulsory for MScEng)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5055Z</b>	Research Communication and Methodology .....	16	9

## Structural Engineering and Materials [CIV04]

### Senior Lecturer and Programme Convener:

Dr S Skatulla Dipl-Ing *Karlsruhe* PhD *Adelaide*

The programme offers high level training in structural design, structural analysis and structural materials by providing sound theoretical background and encouraging critical and innovative thinking. Students benefit from expertise in concrete technology, concrete durability, structural performance and design, computational mechanics and finite element analysis. The programme is supported by excellent laboratory and computing facilities and draws from cutting edge research outputs.

All programmes can be completed in two years full-time or over a maximum of five years on a part-time basis.

## Master of Engineering specialising in Structural Engineering

[EM017CIV04]

All programmes can be completed in two years full-time or over a maximum period of five years on a part-time basis.

A candidate for the MEng in Structural Engineering and Materials [EM017CIV04] is required to complete 120 credits coursework and a 60 credit minor dissertation.

### Core Courses (compulsory for EM017)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5108Z</b>	Advanced Mechanics of Materials .....	16	9
<b>MEC5063Z</b>	An introduction to Finite Elements.....	12	9
<b>CIV5113S</b>	Structural Dynamics with Applications.....	16	9
<b>CIV5006Z</b>	Advanced Structural Concrete Engineering .....	16	9
<b>CIV1085S</b>	Advanced Structural Steel Engineering.....	16	9
<b>CIV5002Z</b>	Structural Concrete Properties and Practice .....	16	9
<b>CIV5100F</b>	Plate and Shell Structures .....	16	9
<b>CIV5119Z</b>	Structural Performance Assessment & Monitoring .....	20	9
<b>MEC5064Z</b>	Finite Element Analysis.....	12	9
<b>CIV5120Z</b>	Repair and Rehabilitation of Concrete Structures .....	20	9
<b>CIV5116Z</b>	Durability & Condition Assessment of Concrete Structures .....	20	9
<b>CIV5041Z</b>	Bridge Analysis and Design .....	16	9

Additional courses can be selected from the postgraduate programme of the University of Stellenbosch or from CERECAM at UCT or from the postgraduate programme of Geotechnical Engineering.

## Master of Science specialising in Structural Engineering

[EM024]

A candidate for the MSc Eng [EM024] is required to complete prescribed courses of a minimum value of 60 credits and a 120 credit dissertation.

### Core Courses

*Select at least two of the following courses:*

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5108Z</b>	Advanced Mechanics of Materials .....	16	9
<b>MEC5063Z</b>	An introduction to Finite Elements.....	12	9
<b>CIV5113S</b>	Structural Dynamics with Applications.....	16	9

### Elective Core Courses (biennial)

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5006Z</b>	Advanced Structural Concrete Engineering .....	16	9
<b>CIV5112Z</b>	Stability and Design of Steel Structures .....	16	9

### Elective Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5002Z</b>	Structural Concrete Properties and Practice .....	16	9
<b>CIV5100F</b>	Plate and Shell Structures .....	16	9
<b>CIV5119Z</b>	Structural Performance Assessment & Monitoring .....	20	9
<b>MEC5064Z</b>	Finite Element Analysis.....	12	9
<b>CIV5120Z</b>	Repair and Rehabilitation of Concrete Structures .....	20	9
<b>CIV5116Z</b>	Durability & Condition Assessment of Concrete Structures .....	20	9
<b>CIV5041Z</b>	Bridge Analysis and Design .....	16	9

**Enrichment Courses***Compulsory for MSc Eng:*

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CHE5055Z</b>	Research Communication and Methodology .....	16	9

**Transport Studies [CIV06]****Associate Professor and Programme Convenor:**R Behrens, Pr Pln BA MCRP PhD *Cape Town*

The programme offers degrees specialising in transport studies, with a specific focus on the planning and management of urban passenger transport systems. The primary aim is to produce graduates from a range of postgraduate disciplines 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, and to contribute to the implementation of new and demanding policy directives. Curriculum content 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 minor dissertation) 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 minor dissertation) plus approved elective courses totalling a minimum of 60 credits, and to comply with the prescribed curriculum. The MPhil in Transport Studies can also be completed through a 120 credit or 180 credit dissertation. No new applications for the Postgraduate Diploma in Transport Studies will be considered in 2016. (<http://www.cfts.uct.ac.za>)

**Postgraduate Diploma in Transport Studies (discontinued in 2017)****[EG009CIV06]****Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>END5035Z</b>	Management of Transport Supply and Demand.....	20	9
<b>END5038Z</b>	Integrated Land Use-Transport Planning .....	20	9
<b>END5071Z</b>	Public Transport System Design and Operations Management ....	20	9
<b>END5047Z</b>	Transport Demand Analysis and Project Assessment .....	20	9
<b>END5048Z</b>	Transport Modelling.....	20	9
	Approved elective courses.....	20	9
	<b>Total credits.....</b>	<b>120</b>	

**Master of Engineering specialising in Transport Studies****[EM017CIV06]****Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5017Z</b>	Minor Dissertation.....	60	9
<b>END5047Z</b>	Transport Demand Analysis and Project Assessment .....	20	9
<b>END5048Z</b>	Transport Modelling.....	20	9
<b>END5071Z</b>	Public Transport System Design and Operations Management ....	20	9
	Approved elective courses.....	60	9

## 138 DEPARTMENTS IN THE FACULTY

Course Code	Course Title	NQF Credits	HEQSF Level
	Total credits .....	<b>180</b>	

### Master of Philosophy specialising in Transport Studies

[EM026CIV06]

Subject to approval by the Programme Convenor, 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 regard.

#### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
END5037Z	Minor Dissertation .....	60	9
END5035Z	Management of Transport Supply and Demand .....	20	9
END5038Z	Integrated Land Use-Transport Planning .....	20	9
END5047Z	Transport Demand Analysis and Project Assessment .....	20	9

#### Elective Courses (minimum of 60 credits)

Course Code	Course Title	NQF Credits	HEQSF Level
END5036Z	Local Area Transport Planning Management and Design (not offered in 2016) .....	20	9
END5039Z	Non-motorised Transportation .....	20	9
END5048Z	Transport Modelling .....	20	9
END5070Z	Public Transport Policy and Regulation .....	20	9
END5071Z	Public Transport System Design and Operations Management .....	20	9
END5127Z	Discrete Choice Modelling and Stated Choice Survey Design (not offered in 2016) .....	20	9
	Total credits .....	0	0

### Master of Transport Studies

[EM029CIV06]

A candidate for the Master of Transport Studies is required to complete core courses totalling not less than 65 credits, approved elective courses totalling a minimum of 75 credits, research projects totalling a minimum of 50 credits, and to comply with the prescribed curriculum

#### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
END5072W	Research Project 1: Transport planning and engineering methods .....	25	9
END5073W	Research Project 2: Transport policy and planning case study .....	25	9
END5035Z	Management of Transport Supply and Demand .....	20	9
END5038Z	Integrated Land Use-Transport Planning .....	20	9
END5047Z	Transport Demand Analysis and Project Assessment .....	20	9

Course Code	Course Title	NQF Credits	HEQSF Level
END5036Z	Local Area Transport Planning, Management and Design .....	20	9
END5039Z	Non-motorised Transportation .....	20	9
END5048Z	Transport Modelling .....	20	9
END5070Z	Public Transport Policy and Regulation .....	20	9
END5071Z	Public Transport System Design and Operations Management .....	20	9
END5127Z	Choice Modelling and Stated Choice Survey Design .....	20	9
	Total credits .....	0	0

### Urban Infrastructure Design & Management

**Associate Professor and Programme Convener:**

MB van Ryneveld, PrEng CEng BSc(Eng) Cape Town PhD Wits FSAICE MICE MIWA MWISA  
MSASEE

The primary aim of the MPhil specialising in Urban Infrastructure Design and Management is to produce graduates with the necessary knowledge and skills to engage effectively with infrastructure design and management in developing cities. Topics include: Issues and strategies; community development, urban renewal, sustainable urban systems, advanced infrastructure management and information technology and other planning and management topics.

## Master of Philosophy specialising in Urban Infrastructure Design & Management [EM027CIV03]

*The programme is closed to 2016 new applicants. The course modules will however be offered to returning students and those students registering for the courses as electives.*

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 Master's programme, leading to an MPhil in Urban Infrastructure Design and Management, is aimed at building capacity among those in government and the private sector that 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 modules, two electives and the minor dissertation. The MPhil in Urban Infrastructure Design and Management can also be completed through a 120 credit dissertation plus approved 60 credits coursework or 180 credit dissertation. ([www.africancentreforcities.net/programme/mphil-in-urban-infrastructure](http://www.africancentreforcities.net/programme/mphil-in-urban-infrastructure))

Topics for END5037Z: Minor Dissertation may be restricted to fields of interest indicated on a list held by the Programme Convener. If a student wishes to carry out research in any other topic, s/he will have to identify an able and willing supervisor prior to registration for END5037Z.

**Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>END5037Z</b>	Minor Dissertation.....	60	9
<b>CIV5064Z</b>	Urban Transitions in the Global South.....	20	9
<b>CIV5065Z</b>	Urban Renewal.....	20	9
<b>END5042Z</b>	Sustainable Urban Systems.....	20	9
<b>END5043Z</b>	Community Development.....	20	9

**Elective Courses (select 40 credits)**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5067Z</b>	Advanced Infrastructure Management.....	20	9
<b>CIV5107Z</b>	Integrated Urban Water Management.....	20	9
<b>CON5016Z</b>	Project Implementation and Management.....	20	9
<b>END5036Z</b>	Local Area Transport Planning, Management & Design.....	20	9
<b>END5038Z</b>	Integrated Land-Use & Transport Planning.....	20	9
	Total credits.....	<b>180</b>	

**Water Quality Engineering [CIV02]**

**Professor and Programme Convener:**

GA Ekama, BSc(Eng) PhD Cape Town SFWISA FRSSAf FSAAE MASSAf MWEF MIWA

The primary aim of the MEng and MScEng specialising in Water Quality Engineering is to produce graduates with the necessary knowledge and skills to engage effectively in theory, design, modelling and operation of biological and chemical wastewater and sludge treatment systems.

To protect surface water quality and prevent the de-oxygenation and eutrophication, municipal wastewater treatment is required. In South Africa (and many other countries in the world) the preferred technology for this is the biological nutrient (N&P) removal (BNR) activated sludge system. The primary objective of the PGDipl, MEng and MSc (Eng) specialising in Water Quality Engineering is to produce engineers and scientists with high-level and in-depth knowledge and understanding of bioprocess engineering so that they can competently and effectively use steady state and dynamic simulation models for the design and operation of municipal wastewater treatment plants comprising primary treatment, BNR activated sludge, secondary settling tanks, flotation thickening and stabilisation of waste sludge by aerobic and/or anaerobic digestion unit operations in a plant wide integrated way. The steady state and dynamic WWTP unit operation models are based on bioprocess engineering and mathematical modelling principles with supporting information from several scientific disciplines such as chemistry, microbiology and biochemistry. Upon completion of this curriculum the modern approach of modelling and simulation to wastewater treatment plant design and operation can be embraced with deeper insight, advanced knowledge and greater confidence.

## Master of Engineering specialising in Water Quality Engineering

[EM017CIV02]

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5017Z</b>	Minor Dissertation.....	60	9
<b>CIV5032Z</b>	Introduction to Wastewater Treatment .....	4	9
<b>CIV5045Z</b>	The Activated Sludge System.....	10	9
<b>CIV5046Z</b>	Sedimentation in Water Treatment.....	8	9
<b>CIV5047Z</b>	Sewage Sludge Treatment .....	8	9
<b>CIV5048Z</b>	Design of Biological Nutrient Removal Systems .....	20	9
<b>CIV5050Z</b>	Integrated Wastewater Treatment Plant Design .....	20	9
	Pre-approved elective credits.....	50	9
	Total credits .....	<b>180</b>	

## MSc in Engineering specialising in Water Quality Engineering

[EM023CIV02]

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000W</b>	Dissertation .....	180	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Total credits .....	0	0

## MSc in Engineering specialising in Water Quality Engineering

[EM024CIV02]

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV5000Z</b>	Dissertation.....	120	9
<b>CIV5032Z</b>	Introduction to Wastewater Treatment.....	4	9
<b>CIV5045Z</b>	The Activated Sludge System .....	10	9
<b>CIV5046Z</b>	Sedimentation in Water Treatment.....	8	9
<b>CIV5047Z</b>	Sewage Sludge Treatment.....	8	9
<b>CIV5048Z</b>	Design of Biological Nutrient Removal Systems.....	20	9
<b>CIV5050Z</b>	Integrated Wastewater Treatment Plant Design .....	20	9
<b>CIV5109Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	0	0

## Doctoral Programmes

### Doctor of Philosophy

[ED001CIV01]

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CIV6000W</b>	Thesis .....	360	10

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

## Course Outlines

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### **CIV5000W** MASTERS IN CIVIL ENGINEERING DISSERTATION

180 NQF credits at HEQSF level 9

#### Course outline:

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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### **CIV5000Z** MASTERS IN CIVIL ENG - DISSERT PART

120 NQF credits at HEQSF level 9

**Course entry requirements:** CIV5109Z

#### Course outline:

The dissertation should 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, or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%

**CIV5001Z CIVIL ENGINEERING REPORT**

*This course is only offered to candidates for the Postgraduate Diploma in Engineering.*

40 NQF credits at HEQSF level 9

**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 dissertation, which will be examined by two examiners.

**DP requirements:** None

**Assessment:** Project report(s).

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**CIV5002Z STRUCTURAL CONCRETE PROPERTIES & PRACTICE**

16 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** BScEng

**Course outline:**

The aims of the course are to provide structural engineers with fundamental and practical knowledge in concrete materials technology, to establish an understanding on modelling and designing concrete properties relevant to structural design, and to create awareness on chemical and physical material characteristics of cementitious construction materials. The topics covered in this course include: constituent materials (cements, admixtures, cement extenders, aggregates); desirable properties for concrete (plastic and hardened properties, including strength, creep, shrinkage, elastic modulus, durability); concrete mix design; prediction and modelling of concrete structural properties; concrete failure and fracture; concrete quality control; deterioration mechanisms; special concretes such as high strength concrete, self compacting concrete and fibre reinforced concrete. The course includes lectures, industrial visits, seminars, projects, and laboratory sessions.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** Attendance of lectures and practicals; submission of assignments and project reports.

**Assessment:** Research paper 15%, research oral presentation 10%, laboratory report 15%; final examination 60% (closed book)

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**CIV5006Z ADVANCED STRUCTURAL CONCRETE ENGINEERING**

16 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** BScEng; CIV3035S (or equivalent), CIV4031F (or equivalent)

**Course outline:**

The aims of this course are to provide structural engineers with an understanding of structural failure mechanisms of reinforced concrete slabs, to present analysis and design methods for reinforced concrete slabs at the ultimate limit state, and to introduce design principles for composite concrete-to-concrete structures. The course contents include: yield line analysis and design of reinforced concrete slabs (yield line patterns, failure mechanisms, internal and external work done, detection of the critical bending moment, unusual slab geometries, optimization of reinforcement arrangements, etc.); Hillerborg strip method of analysis and design of concrete slabs (principles and theory of analysis and design, design optimization, bending moment redistribution, optimization of reinforcement layout); and composite structural systems (ultimate limit state analysis and design principles, practical considerations).

**DP requirements:** Attendance of lectures; an average assignment mark of 50%.

**Assessment:** Assignments 40%, final exam 60% (closed book)

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**CIV5017Z MINOR DISSERTATION**

60 NQF credits at HEQSF level 9

**Convener:** As per programme requirement

**Course entry requirements:** Core MEng courses to be completed

**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.

**DP requirements:** None

**Assessment:** Written work 100%

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**CIV5025F CONTRACT LAW**

*Not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** Suitable undergraduate degree

**Course outline:**

The course aims to review 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.

**DP requirements:** None

**Assessment:** Assignments 50%; final examination 50%

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**CIV5030Z CIVIL ENGINEERING PROJECT**

20 NQF credits at HEQSF level 9

**Convener:** As per programme requirement

**Course entry requirements:** 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.

**DP requirements:** None

**Assessment:** Written project 100%

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**CIV5032Z PRINCIPLES OF WASTEWATER TREATMENT & WASTEWATER CHARACTERISATION**

4 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course outline:**

This advanced course on the principles of wastewater treatment and wastewater characterisation includes: objectives of wastewater treatment; wastewater chemical and physical characterization; measurement of energy, nitrogen and phosphorus in municipal wastewater; effect of settlement and filtration. Also covered are: characterisation of primary sludge for anaerobic digestion, and an overview of unit operations in wastewater treatment.

**DP requirements:** None

**Assessment:** Examination 100%

**CIV5041Z BRIDGE ANALYSIS & DESIGN**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** BScEng

**Course outline:**

This course aims to develop an advanced understanding of conceptual and structural analysis and design of concrete bridges. Topics include: conceptual design of bridges (design objectives and basis of design, design procedures, examples of good design, load bearing systems); preliminary structural design (load models, normative guidelines, analytical models); modelling of concrete bridges (typical finite element models, movable loads, dynamic loading); construction technology (principles and application of various construction methods); prestressing of concrete bridges (design principles, tendon layouts, methods of prestressing, prestress losses, etc.); concrete technology aspects (suitable concrete types, special design requirements for bridges, durability aspects); structural condition assessment (principles of non-destructive dynamic testing and verification of load-bearing capacity).

**DP requirements:** Attendance of lectures and an average assignment mark of 50%

**Assessment:** Assignments and projects 50%, final examination 50%

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**CIV5045Z THE ACTIVATED SLUDGE SYSTEM**

10 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course entry requirements:** CIV5032Z

**Course outline:**

This course aims to develop an advanced understanding of the activated sludge system. Topics include: 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. Aeration is also covered.

**DP requirements:** None

**Assessment:** Examination 100%

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**CIV5046Z SEDIMENTATION IN WATER & WASTEWATER TREATMENT**

8 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course entry requirements:** CIV5032Z

**Course outline:**

This advanced course in sedimentation in water and wastewater treatment includes: 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; and computational fluid dynamics modelling of settling tanks.

**DP requirements:** None

**Assessment:** Examination 100%

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**CIV5047Z SEWAGE SLUDGE TREATMENT**

8 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course entry requirements:** CIV5032Z, CIV5046Z

**Course outline:**

This advanced course in sewage sludge treatment includes: an 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, and nutrient (N and P) reduction in sludge treatment liquors.

**DP requirements:** None

**Assessment:** Examination 100%

### **CIV5048Z** STEADY STATE DESIGN OF BIOLOGICAL NUTRIENT REMOVAL SYSTEMS

20 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course entry requirements:** CIV5045Z

**Course outline:**

This advanced course in steady state design of biological nutrient removal systems includes: 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.

**DP requirements:** None

**Assessment:** Examination 100%

### **CIV5049Z** MODELLING & SIMULATION OF WASTEWATER TREATMENT SYSTEMS

*Not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama

**Course entry requirements:** CIV5048Z

**Course outline:**

This advanced course in the modelling and simulation of wastewater treatment systems includes: kinetics of the readily biodegradable (RBCOD) and slowly biodegradable (SBCOD) organics utilization by ordinary heterotrophic organisms (HOs), 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 PAOs; 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; and causes and control of filamentous organism proliferation in BNR systems.

**DP requirements:** None

**Assessment:** Examination 100%

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**CIV5050Z INTEGRATED WASTEWATER TREATMENT PLANT DESIGN**

20 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama**Course entry requirements:** CIV5045Z, CIV5046Z, CIV5047Z**Course outline:**

This advanced course in integrated wastewater treatment plant design includes: 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, and environmental and economic objectives.

**DP requirements:** None**Assessment:** Major project 100%

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**CIV5051Z AQUATIC CHEMISTRY PART A***Not offered in 2016*

14 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama**Course entry requirements:** None**Course outline:**

This advanced course in aquatic chemistry covers: 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; and terrestrial and ground water stabilization.

**DP requirements:** None**Assessment:** Examination 100%

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**CIV5052Z AQUATIC CHEMISTRY PART B***Not offered in 2016*

14 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama**Course entry requirements:** CIV5051Z**Course outline:**

This advanced course in aquatic chemistry covers: 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; and applications to physico-chemical treatment processes.

**DP requirements:** None**Assessment:** Examination 100%

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**CIV5054Z ADVANCED CHEMICAL, PHYSICAL & BIOLOGICAL PROCESSES MODELLING***Not offered in 2016*

10 NQF credits at HEQSF level 9

**Convener:** Professor G Ekama**Course entry requirements:** CIV5049Z, CIV5051Z, CIV5052Z**Course outline:**

This advanced course in chemical, physical and biological processes modelling includes: 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.

**DP requirements:** None

**Assessment:** Examination 100%

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### **CIV5064Z** URBAN TRANSITIONS IN THE GLOBAL SOUTH

20 NQF credits at HEQSF level 9

**Convener:** Professor E Pieterse

**Course entry requirements:** Any suitable four-year degree

**Course outline:**

The aim of this course is to provide students with a wide-ranging introduction to the dynamics of differential urbanization processes in the global South with an eye on understanding the role of infrastructure in advancing more sustainable urban forms and patterns. The overarching learning objectives of the module are to understand the nature, drivers and consequences of the second urban transition from a sustainability perspective, as well as to make connections between urbanisation and long-term sustainability outcomes in different contexts, settings and scales. Topics covered include problems and issues of developing cities, poverty, exclusion, informality, livelihoods, economic development, governance and infrastructure.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** Complete all assignments

**Assessment:** Coursework 35%, take home paper 65%

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### **CIV5065Z** URBAN RENEWAL

20 NQF credits at HEQSF level 9

**Convener:** Professor E Pieterse

**Course entry requirements:** Any suitable four-year degree

**Course outline:**

This course aims to develop an advanced understanding of urban renewal context and policy. Urban transformation is an international phenomenon caused by a range of factors including urbanisation, migration trends, globalisation and poverty. The process of urban change does not affect all cities equally or in the same manner, but the overall trend is towards greater polarisation and lack of balance between concentrations of wealth and poverty within and between cities. The ability of government to respond to this process is impacted upon by broader debates on the role of government in general and the relationship between local government, the private sector and civil society in particular. Topics include: informal settlement upgrading, 'township' revitalisation, city centre regeneration, municipal engineering services, community services and housing.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Take home paper 65%, assignments 35%

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### **CIV5100F** PLATE & SHELL STRUCTURES PART A

16 NQF credits at HEQSF level 9

**Convener:** Professor A Zingoni

**Course entry requirements:** BScEng

**Course outline:**

This course aims 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 part A 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; the membrane theory of axisymmetrically loaded shells of revolution.

**DP requirements:** None

**Assessment:** Examination 100%

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**CIV5104S PLATE & SHELL STRUCTURES PART B**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Professor A Zingoni

**Course entry requirements:** CIV5100F

**Course outline:**

This course aims 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; the membrane theory of axisymmetrically loaded shells of revolution.

**DP requirements:** None

**Assessment:** Examination 100%

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**CIV5106Z TOPICS IN ADVANCED CONCRETE MATERIALS**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**DP requirements:** None

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**CIV5107Z INTEGRATED URBAN WATER MANAGEMENT**

20 NQF credits at HEQSF level 9; .

**Convener:** Professor NP Armitage

**Course entry requirements:** Any suitable four-year degree

**Course outline:**

The aim of this course is to introduce students to integrated urban water management (IUWM). This includes: social imperatives; environmental considerations; politics and water service delivery. Planning for water in the City of Cape Town; servicing the informal settlements of Cape Town. Water supply: key considerations for water reticulation systems; water supply options; household management of water; water demand management; public health considerations. Sanitation: options; managing sanitation in informal settlements. Stormwater: managing stormwater in the City of Cape Town; rehabilitating urban rivers; groundwater issues; Sustainable Drainage Systems (SuDS); catchment litter management. Water Sensitive Urban Design (WSUD); water management systems; sustainability indicators.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** Complete all assignments

**Assessment:** Oral presentations 20%, two major assignments 80%

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**CIV5108Z ADV MECH OF MATERIALS**

16 NQF credits at HEQSF level 9

**Convener:** Dr S Skatulla

**Course entry requirements:** BScEng or equivalent

**Course outline:**

This advanced course in the mechanics of materials aims to introduce students to the following topics: physical mechanisms of deformation of common construction materials; continuum mechanics and its main mathematical tool, tensor analysis; non-linear continuum material behaviour, including visco-elasticity, plasticity, and modelling; failure and fracture characteristics and modelling of these effects. An introduction to computational mechanics is also included.

**DP requirements:** 40% Subminimum in class tests

**Assessment:** Examination 60%, year mark 40%

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### **CIV5109Z** DISSERTATION PREPARATION

*Prerequisite for CIV5000Z and END5041W*

0 NQF credits at HEQSF level 9

**Convener:** As per programme requirement

**Course outline:**

The aim of this course is to allow a student to undertake preparatory work for the master's 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.

**DP requirements:** None

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### **CIV5110Z** LABORATORY & FIELD TECHNIQUES

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field

**Course outline:**

This course aims to develop an advanced understanding of laboratory and field techniques. Topics include: Laboratory methods: role and scope of laboratory tests; fundamentals of stress-strain and strength measurements; stresses, pore pressures and strains; transducers and control systems; practical applications. The theoretical and practical aspects of in situ tests in geotechnical engineering. Tests discussed include: dynamic cone penetrometer standard penetration test, field vane, piezocone, dilatometer, pressuremeter etc. Geophysical methods are also included. Emphasis on use of in situ test results for determining engineering properties of soil for design. Field instrumentation; settlement gauges; extensometers; inclinometers; piezometers; geotechnical data correlation charts; measurements of in-situ stresses and permeability's; etc. are also covered.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Coursework 100% (Laboratory report)

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### **CIV5111Z** GROUND IMPROVEMENT TECHNIQUES

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field

**Course outline:**

This course aims to introduce participants to the concepts underpinning a range of ground improvements and soil remediation techniques and an appreciation of how these techniques are applied in practice. It covers important design and construction aspects associated with ground improvement techniques including: mechanical methods (compaction, explosives, vibroflotation, vibrorplacement); hydraulic methods (groundwater lowering, preloading, electro-osmosis); physical/chemical methods (admixtures, grouting, freezing); and inclusions.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

**CIV5112Z STABILITY & DESIGN OF STEEL STRUCTURES**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Dr S Skutulla

**Course entry requirements:** BScEng

**Course outline:**

This course aims to treat advanced topics in constructional steel work. The topics include elastic and inelastic buckling behaviour; plate buckling; non-linear instability behaviour of thin-walled structures, design for fatigue, design of steel-concrete composites, hybrid steel structures, steel connections plate girders, and the behaviour of steel structures under fire. Applications in industrial buildings and crane supporting structures are also addressed.

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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**CIV5113Z STRUCTURAL DYNAMICS WITH APPLICATIONS**

16 NQF credits at HEQSF level 9

**Convener:** Professor P Moyo

**Course entry requirements:** BScEng

**Course outline:**

This course aims to introduce the concepts of structural dynamics and its applications in structural engineering. Topics covered include dynamic equilibrium of structures. Response of a single degree of freedom system to dynamic excitation: free vibration, harmonic loads, impulse loading and general loading. Response of multi-degree-of-freedom systems. Free vibrations: mass, damping, and stiffness matrices. Rayleigh damping. Forced vibrations: modal superposition and step by step methods. Continuous systems. Applications to seismic design of structures, blast and impact effects on structures and wind engineering.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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**CIV5114Z FOUNDATION DESIGN**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to furnish participants with the necessary knowledge and design skills required to ensure stability of both the ground, and any structure built in or on the ground. It will introduce participants to the application of theories of soil mechanics, applied mathematics and physics to provide solutions to the serviceability and ultimate limit states of geotechnical structures. Topics include: review of soil mechanics; working stress approach, limit state design; analysis and design of shallow and deep foundations; determination of settlement of structures; use of foundation design standards such as Eurocodes, SANS 10160; etc.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

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**CIV5115Z BRIDGE MANAGEMENT & MAINTENANCE**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Professor P Moyo

**Course entry requirements:** BScEng

**Course outline:**

This course aims to introduce the principles of bridge management and maintenance. The focus is on both highway bridges and railway bridges. The course provides the basic philosophies behind bridge management systems, the structure of a bridge management system, and the implementation of bridge management system. Life cycle cost analysis of bridges are introduced. Linkages between bridge management, maintenance and rehabilitation of bridges is discussed. Key to this course are practical bridge inspections and case studies.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5116Z DURABILITY & CONDITION ASSESSMENT OF CONCRETE STRUCTURES**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** BScEng

**Course outline:**

This advanced course aims to develop an understanding of durability aspects, service life design, and non-destructive testing of concrete structures. Topics include: concrete deterioration mechanisms (physical, mechanical and chemical deterioration); reinforcement corrosion (principles, mechanisms, modelling, assessment, prevention); prevention of concrete deterioration through material selection, mix design and construction; service-life modelling (principles, deterioration models, service life models, normative guidelines); fire damage to structures; impact of loads on concrete structures; on-site evaluation techniques and non-destructive testing (principles, planning and execution of assessments, test methods (types, application and limitations, interpretation of results, case studies); diagnostic investigations and laboratory testing. The course is based on lectures and projects and may include case studies, laboratory sessions, and site visits.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** Attendance of lectures and an average assignment and project mark of 50%

**Assessment:** Assignments and projects (50%), final examination (50%)

### **CIV5118Z SAFETY OF SPECIAL STRUCTURES**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Professor P Moyo

**Course entry requirements:** BScEng

**Course outline:**

The course introduces students to the governance and management of special structures. The procedures employed for safety evaluation are generally not specified in codes of practice. Probabilistic based risk analysis and surveillance techniques for the evaluation of loading and consequences of failure will be introduced. Case studies are used to demonstrate the principles.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5119Z STRUCTURAL PERFORMANCE ASSESSMENT & MONITORING**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Professor P Moyo

**Course entry requirements:** CIV5113Z

**Course outline:**

This aims to introduce concepts of structural health monitoring of civil infrastructure. The course covers: 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, and estimation of remaining life.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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**CIV5120Z REPAIR & REHABILITATION OF CONCRETE STRUCTURES**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Beushausen

**Course entry requirements:** BScEng

**Course outline:**

This course deals with the repair and rehabilitation of concrete structures and covers the following topics: 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. Strengthening systems; FRP design and application are also covered.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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**CIV5121Z DESIGN & MODELLING OF WATER DISTRIBUTION SYSTEMS**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Professor JE Van Zyl

**Course entry requirements:** None

**Course outline:**

The aim of this course is to provide a structured and practical introduction to the design and modelling of water distribution systems. Topics include: Components of water transport and distribution systems. Water Demand: categories, patterns, calculation, forecasting. Hydraulics of Pipe Flow: basic equations, single pipe calculation, branched and looped networks, system-and pump characteristics and pressure dependent demand. Hydraulics of storage and pumps. Main components of Hydraulic Design: design parameters, choice of supply scheme and network layouts. Engineering design: choice of pipe materials, valves and other equipment. Pumps: review of pump types and their applications, design of pumping stations, power requirements and energy consumption, auxiliary equipment. Hydraulic modelling of distribution systems.

**DP requirements:** None

**Assessment:** Design assignment 100%

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**CIV5122Z ADVANCED SOIL MECHANICS**

*Not offered in 2016*

16 NQF credits at HEQSF level 9

**Convener:** FC Chebet

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to provide extensive insight and depth to students' understanding of the theoretical background involved in the design of geotechnical systems in order to facilitate critical thinking in geotechnical analyses. It covers advanced concepts and theories in soil mechanics fundamental to geotechnical engineering such as; shear strength of soils; stress-strain behaviour; drained and undrained shear strength; stress paths; critical state soil mechanics, failure criteria; constitutive models soil deformation analysis; stress distribution in soil; settlement of soil; and consolidation theory.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

**CIV5123Z CONTAMINATED LAND AND REMEDIATION**

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to create awareness of the occurrence of and risks posed by contaminants in contaminated sites and remediation issues, and to develop basic engineering skills and knowledge required to identify appropriate remediation methods for contaminated land and waste disposal activities. It covers the problems associated with contaminated lands that arise from the unmanaged release of contaminants into the environment. Selected topics include: contaminated land definition; legal framework governing contaminated lands; contaminant types and transportation mechanisms, risk assessment procedures related to contaminated lands, site investigation and monitoring related to contaminated lands and remediation, and waste disposal methods.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

**CIV5124Z GEOSYNTHETICS ENGINEERING**

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to introduce advanced students to geosynthetics and their applications in the built environment and covers important considerations in the use of geosynthetics to solve civil engineering problems. It includes methods of analysis, design, construction and field monitoring of structures constructed with geosynthetics. Topics include the behaviour and interaction of these materials in filtration, drainage, separation, reinforcement, erosion control and barrier functions.

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

**CIV5125Z LATERAL EARTH SUPPORTS**

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to introduce students to the analysis of lateral earth pressures, various earth retention systems and its applicability, limitations and design. The course provides knowledge and tools for design and analyses of earth structures and earth retention systems. The selection, design

## 154 DEPARTMENTS IN THE FACULTY

and performance of earth retention structures used for support of fills and excavations will be covered as well as theory related to earth pressures and soil reinforcement.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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### **CIV5126Z** SLOPE STABILITY

16 NQF credits at HEQSF level 9

**Convener:** Dr D Kalumba

**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.

**Course outline:**

This course aims to demonstrate the application of concepts, principles and theories of slopes and to understand the different slope stabilization techniques and its applicability and limitations. The course focuses on stability of natural slopes and stability considerations related to man-made cuts and fills. Emphasis will be on the conditions up to and until the slip is initiated. Students will be introduced to different slide mechanisms, the conditions of their occurrence, and the theories and principles governing stability of slopes. The course will also include other important aspects such as: field investigations to obtain input for slope stability analysis; slope stability analysis programmes; slope monitoring techniques and slope stabilisation methods.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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### **CIV5128Z** PRESSURE MANAGEMENT IN WATER DISTRIBUTION SYSTEMS

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Professor K van Zyl

**Course outline:**

This course aims to develop an advanced understanding of the theory and application of pressure management in water distribution systems. Topics include: water loss components and methods, pressure and leakage, impact of pressure on other network parameters, soil-leak interaction, pressure management zones, pressure control, night flow analysis and pressure-leakage parameter estimation.

**DP requirements:** Attend all contact activities and submit all assignments on time.

**Assessment:** Coursework 50%, Examination 50%

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### **CIV5129W** GEOTECHNICAL ENGINEERING PROJECT

*Not offered in 2016*

45 NQF credits at HEQSF level 9

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### **CIV5130Z** LOSS MANAGEMENT IN WATER DISTRIBUTION

20 NQF credits at HEQSF level 9

**Convener:** Professor K van Zyl

**Objective:** The aim of the course is to teach theory and practice of loss management in water distribution systems.

**Course outline:**

This aim of the course is to teach theory and practice of loss management in water distribution systems. The course focuses on the International overview of water losses; water loss components; benchmarking; water loss strategy development; water metering; leak detection; leak repair; pipe refurbishment; pressure management; water demand management; water loss modelling; water efficiency programmes and water loss and policy.

**Lecture times:** 40 hours (1 week block lectures)

**DP requirements:** Attend all contact activities and submit all assignments on time.

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**CIV5131Z RESEARCH DESIGN AND METHODOLOGY FOR CIVIL ENGINEERS**

16 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Zuidgeest

**Course outline:**

This course aims to develop conceptual skills for conducting research at the master's level. Topics include: the scientific method, induction and deduction, inference, statistical thinking and ethics, as well as technical skills which include technical writing, searching and interpretation of scientific literature, proper use of citations, and communication of research outputs.

**Assessment:** Coursework 100%

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**CIV6000W PHD IN CIVIL ENGINEERING**

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**CIV9000Z INTERNATIONAL AFFILIATE 2 MONTHS**

0 NQF credits at HEQSF level 0

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**CIV9001Z INTERNATIONAL AFFILIATE 2-4 MONTHS**

0 NQF credits at HEQSF level 0

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**CIV9002Z INTERNATIONAL AFFILIATE 4-6 MONTHS**

0 NQF credits at HEQSF level 0

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**CIV9003Z INTERNATIONAL AFFILIATE 6-12 MONTHS**

0 NQF credits at HEQSF level 0

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**CIV9004Z POSTDOCTORAL FELLOW**

0 NQF credits at HEQSF level 0

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**END5035Z MANAGEMENT OF TRANSPORT SUPPLY & DEMAND**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor R Behrens

**Course entry requirements:** None

**Course outline:**

This course aims to develop an advanced understanding of transport systems management. Topics include: the rationale for the management of transport systems through alternatives to large scale infrastructure provision; transport impact assessment and access management as a means of managing the impacts of new land use development on transport systems; 'road space management' as a means of prioritising public transport vehicles; 'transport system management' as a means of managing transport supply; 'travel demand management' as a means of managing travel behaviour; and the use of 'intelligent transport systems' in supply and demand management.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and class test 25%.

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**END5036Z LOCAL AREA TRANSPORT PLANNING, MANAGEMENT AND DESIGN**

*Not offered in 2016*

20 NQF credits at HEQSF level 9; (block contact time over one week)..

**Convener:** Associate Professor R Behrens

**Course outline:**

This advanced course in local area transport planning, management and design includes: 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; and accommodating pedestrians, bicycles and persons with movement disabilities in local area movement networks.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and class test 25%.

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**END5037Z (EWA) MINOR DISSERTATION**

*(For MPhil candidates only)*

60 NQF credits at HEQSF level 9

**Course entry requirements:** As per programme requirement

**Course outline:**

This minor dissertation course includes the selection of an approved research problem/topic; the preparation of research project/proposal; conducting a literature review; conducting research, including information/data acquisition and analysis, and the preparation of minor dissertation for examination (a word length of 15 000 words should not normally be exceeded).The project will require approximately 600 hours of work.

**Assessment:** Written work counts 100%.

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**END5038Z INTEGRATED LAND USE TRANSPORT PLANNING**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor R Behrens

**Course entry requirements:** None

**Course outline:**

This course aims to develop an advanced understanding of the integration of land use planning and transport planning process. Topics include: 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 and local and international case studies and experiences.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and class test 25%.

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**END5039Z NON-MOTORISED TRANSPORTATION**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Vanderschuren

**Course entry requirements:** None

**Course outline:**

This course aims to develop an advanced understanding of planning and design of non-motorised transportation infrastructure. Topics include: 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 and pedestrian and bicycle crossing facilities.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and class test 25%.

### **END5040W MASTERS DISSERTATION: TRANSPORT STUDIES**

180 NQF credits at HEQSF level 9

**Course outline:**

The dissertation should incorporate any or all of the following: 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

### **END5041W MASTERS DISSERTATION: TRANSPORT STUDIES**

120 NQF credits at HEQSF level 9

**Course entry requirements:** CIV5109Z

**Course outline:**

The dissertation should incorporate any or all of the following: 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Dissertation report 100%.

### **END5042Z SUSTAINABLE URBAN SYSTEMS**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor H Von Blottnitz

**Course entry requirements:** Ordinarily a four-year degree; - registered honours students may be accepted subject to approval by the Coue Convener.

**Course outline:**

The quest for sustainable development has a significant urban component. A fundamental condition for achieving this is restructuring the processes of production consumption and waste generation within urban/industrial complexes. This transdisciplinary course aims to explore the need for, and ways of, undertaking 'restructuring', including the following: the imperative of sustainable development; general systems theory with respect to the interactions between industrial/urban systems and ecological systems; physical constraints based on energy and mass balances and thermodynamics; the concept of urban metabolism; case studies of industrial and urban systems restructuring in practice; and insight from the literature on disciplinary specialisation and interaction as it relates to sustainable development.

**DP requirements:** None

**Assessment:** Essay 35%, group work project 35% and individual submission 30%.

### **END5043Z COMMUNITY DEVELOPMENT**

20 NQF credits at HEQSF level 9

**Convener:** Dr M Brown-Luthango

**Course entry requirements:** None

**Course outline:**

This course aims to explore the involvement of community groups in the provision of infrastructure in the context of a withdrawal of the State from infrastructure development in many cities of the South. The main thrust of this module is to track how current international community development themes shape practice to provide a context for community development as an ideal. Various themes, including governance and livelihoods, the relationship between infrastructure and development, community-driven processes in the context of the “Right to the City” and data-collection techniques, including participatory tools for getting and analyzing information are dealt with at length in this module.

**DP requirements:** None

**Assessment:** Group work 10%, assignments 90%

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**END5047Z TRANSPORT DEMAND ANALYSIS & PROJECT ASSESSMENT**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Vanderschuren

**Course entry requirements:** None

**Course outline:**

This course aims to develop an understanding of transport demand analysis and project assessment. Topics include: 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; and techniques for the assessment and evaluation of urban transport proposals.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%; group assignment 10% ; major assignment 50% and course test 25%.

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**END5048Z TRANSPORT MODELLING**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Zuidgeest

**Course entry requirements:** First year course in statistical methods or mathematics.

**Course outline:**

This course aims to develop an advanced understanding of transport modelling principles and skills in working with these models. Topics include: transport modelling types and scales; theory of travel demand modelling, including the four-step transport model (i.e. trip generation, trip distribution, mode choice and traffic assignment); output analysis; land use – transport interaction models, as well as theory of traffic flow dynamics, including capacity assessment, LOS assessment, shockwave analysis, dynamic traffic management and elementary traffic control design. The course ends with a discussion about the link between models and the analytical questions raised by different policy environments.

**DP requirements:** Students are required to pass class exercises during the course week.

**Assessment:** Preparatory assignment 15%; group assignment 10% ; major assignment 50% and course test 25%.

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**END5050X MASTERS JOURNAL PAPER REQUIREMENT**

0 NQF credits at HEQSF level 9

**Course outline:**

The aim of submitting a research paper for the masters’ degree is to develop an understanding of what is required for the publication of research findings. To this end a 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 a Panel of Assessors. This is a requirement for candidates submitting either a 180 or 120 credit dissertation for the following degrees: MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc in Property Studies. Refer to the appropriate degree rules.

**DP requirements:** None

### **END5070Z PUBLIC TRANSPORT POLICY AND REGULATION**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor R Behrens

**Course entry requirements:** None

**Course outline:**

This course aims to develop an understanding of public passenger transport system policy analysis and regulation. Topics include: Legislative and planning frameworks: institutional, legislative, financing and planning frameworks for integrated public transport infrastructure provision and service operation. Public transport policy: policy debates on subsidisation and competition regulation; mode alternatives analysis; international case studies of public transport system reform. Paratransit reform: operator consolidation and transition; fleet renewal; service upgrade; integration with scheduled services. Public transport system regulation and competition: industry structures; approaches to regulation and competition; licensing and contracting. Quality of service: quality-of-service measurement; passenger satisfaction measurement; passenger information systems and wayfinding.

**DP requirements:** None

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and course test 25%

### **END5071Z PUBLIC TRANSPORT SYSTEM DESIGN AND MANAGEMENT**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Zuidgeest

**Course entry requirements:** None

**Course outline:**

This course aims to develop an advanced understanding of public passenger transport system design and operations management. Topics include: Public transport system concepts: basic bus and rail system concepts; alternative technologies and operating characteristics. Public transport system design: route network planning; service planning; road and rail right-of-way design and vehicle prioritisation; signalling systems; station and interchange design; demand estimation; passenger capacity analysis. Public transport system operations management: service quality assessment, scheduling and rostering; train movement control systems; reliability, disruption and incident management; performance assessment; ridership measurement. Integrated fare structures: integrated ticketing systems; fare structures; fare setting. System maintenance: asset management; vehicle fleet and rolling stock maintenance and refurbishment.

**DP requirements:** Students are required to pass class exercises during the course week.

**Assessment:** Preparatory assignment 15%, group assignment 10%, major assignment 50% and course test 25%.

### **END5072W TRANSPORT PLANNING AND ENGINEERING METHODS PROJECT**

25 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Zuidgeest

**Course outline:**

This course aims to offer students an opportunity to undertake a research project in which students are able to develop and enhance skills in a selected area of professional practice. The research would involve undertaking a critical investigation of the origins, rationale, and debates surrounding the particular professional practice, and the necessary activities associated with applying the practice and reflecting on how it might be improved.

**DP requirements:** None

**Assessment:** Project report 100%

**END5073W** TRANSPORT POLICY AND PLANNING CASE STUDY

*Research Project 2*

25 NQF credits at HEQSF level 9

**Convener:** Associate Professor R Behrens

**Course outline:**

The aim of this course is to offer students an opportunity to undertake a case study research project in which they are able to develop or deepen skills in transport policy and planning processes. The research would involve undertaking a critical investigation of the requirement for, the process of preparing and implementing, the content and the impacts of a selected transport policy, plan, strategy or project.

**DP requirements:** None

**Assessment:** Project Report 100%

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**END5127Z** DISCRETE CHOICE MODELLING AND STATED CHOICE SURVEY DESIGN

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Zuidgeest

**Course entry requirements:** No prior knowledge of discrete choice models is needed. Basic topics are covered early in the week, while more advanced topics are covered later. It is however assumed that participants have a basic knowledge of statistical methods, including linear regression models. Hence, first year university mathematics and statistics will be required.

**Course outline:**

This course will study the specification, estimation, and application of discrete choice models as well as the design of stated choice experiments. Day 1: Introduction to choice modelling and multinomial logit, Data & estimation, Analysis of results and specification testing, Estimation of logit models (Exercise). Day 2: Nested logit & other GEV models, Estimation of GEV models (Exercise), Latent class, mixed logit & simulation based estimation, Estimation of latent class & mixed logit (Exercise). Day 3: Model applications: sampling, forecasting and appraisal, Model fitting exercise (Exercise), Alternative models and examples, Case studies in South Africa I. Day 4: Stated choice surveys, Generating a design (Exercise), Drawbacks of orthogonal designs. Day 5: Efficient designs, Generating efficient designs (Exercise), Case studies in South Africa II.

**DP requirements:** None

**Assessment:** Coursework 100%

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## CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following Postgraduate degree programmes:

Construction Management  
Quantity Surveying  
Property Studies  
Project Management

The Department is housed on Level 5 of the Snape Building, opposite Engineering Mall, off Madiba Circle, Upper Campus.

### 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 PrValuer

#### Associate Professors:

KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MSAFMA  
F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS  
A Windapo, BSc(Building) *IfE* MSc(Construction Management) PhD *Lagos* FNIQB 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

#### Senior Lecturers:

E Edwardes, BSc BSc(QS) MSc(Project Management) *Pret* PrQS PMAQS  
K Evans, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS  
CI Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA* PMP(PMI)  
K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS  
MW Massyn, BSc(Building) *UPE* FCIQB  
RPT McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*  
MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*  
N-T Tuan, BSc(Eng) *Chung Cheng Institute of Technology* MEng *Pret* PhD *Cape Town* INFORMS *Taiwan Chapter*

#### Lecturers:

SD Nurick, BCom BSc(Hons)(Property Studies), MPhil *Cape Town* MRICS  
U Ordor BSc(Architecture) *Jos* MSc (Architecture) *Jos* MNIA MSc (Property Studies) *Cape Town*

#### Academic Development Lecturer:

A Street BSc (QS)(Hons) *Cape Town* PrQS PMAQS

**Departmental Manager:**

TBA

**Administrative Officer:**

M Fagodien (Postgraduate)

**Administrative Assistants:**

A Haddon (Undergraduate and Honours)

J Breda (Finance)

**Reception and General Administration:**

V Daries

**Departmental Assistant:**

M Neutt

## 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 Master’s level courses with a CON course code.

## Honours Programmes

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

[EH002CON02]

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**

Course Code	Course Title	NQF Credits	HEQSF Level
ACC2022S	Management Accounting I .....	18	6
CON4030F	Property Studies II .....	16	8
CON4033W	Applied Contract Law II .....	16	8
CON4038F	Advanced Construction Management.....	16	8
CON4039S	Integrated Management Project .....	16	8
CON4047W	Research Project .....	32	8
CON4049S	Construction Innovation .....	16	8
STA1000F	Statistics 1000.....	18	5
CON4035X	Practical training.....	0	8

Course Code	Course Title	NQF Credits	HEQSF Level
	Approved elective .....	0	0
	Total credits.....	0	0

### Elective Core Courses (minimum of 12 credits)

Courses totalling a minimum of 12 credits must be chosen of which at least 8 credits shall be at HEQSF level 08:

Course Code	Course Title	NQF Credits	HEQSF Level
CON4032F	Measurement & Design Appraisal III .....	12	8
CON4034W	Professional Practice .....	20	8
CON4037S	Civil Engineering Measurement.....	16	8
CON4045F	Housing Development & Management I T .....	16	8

## Bachelor of Science (Honours) in Quantity Surveying [EH004CON05]

### Professor and Programme Convener::

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

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

Course Code	Course Title	NQF Credits	HEQSF Level
ACC2022S	Management Accounting I .....	18	6
CON4030F	Property Studies II.....	16	8
CON4032F	Measurement & Design Appraisal III .....	12	8
CON4033W	Applied Contract Law II .....	16	8
CON4034W	Professional Practice .....	20	8
CON4047W	Research Project.....	32	8
CON4037S	Civil Engineering Measurement.....	16	8
STA1000F	Statistics 1000 .....	18	5
CON4035X	Practical Training .....	0	8
	Approved electives.....	0	0
	Total minimum credits .....	0	0

### Elective Core Courses

Courses totalling a minimum of 16 credits must be chosen of which at least 8 credits shall be at HEQSF level 8:

Course Code	Course Title	NQF Credits	HEQSF Level
CON4038F	Advanced Construction Management .....	16	8
CON4045F	Housing Development & Management I T .....	16	8
CON4049S	Construction Innovation.....	16	8

## Bachelor of Science (Honours) in Property Studies

[EH003CON03]

### Professor and Programme Convener:

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

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

Course Code	Course Title	NQF Credits	HEQSF Level
CON4041S	Advanced Property Studies A.....	16	8
CON4042H	Advanced Property Studies B.....	16	8
CON4043S	Applied Property Law .....	16	8
CON4045F	Housing Development & Management IT .....	16	8
CON4047W	Research Project .....	32	8
CON4048S	Advanced Property Studies C.....	16	8
	Approved electives .....	0	0
	Total credits per year .....	112	

## Postgraduate Diploma and Master's Programmes

### Property Studies (PGDip and Masters)

#### Postgraduate Diploma in Property Studies

[EG007CON03]

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.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CON5006Z	Property Development .....	20	9
CON5007Z	Property Law .....	20	9
CON5008Z	Urban Land Economics .....	20	9
CON5009Z	Property Finance .....	20	9
CON5021Z	Property Portfolio Management .....	20	9
CON5036Z	Introduction to Research .....	4	9
CON5041Z	Principles of Applied Statistics.....	4	9
CON5043Z	Property Valuation Theory & Practice .....	20	9
	Sub-total credits .....	0	0

**Elective Core Courses**

To achieve registration with SACPVP (South African Council for Property Valuers' Profession) a student, in addition to the core courses, will have to complete the following core elective.

Course Code	Course Title	NQF Credits	HEQSF Level
CON5044Z	Advanced Property Valuation .....	20	9

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.

Course Code	Course Title	NQF Credits	HEQSF Level
CON5045Z	Corporate Real Estate Portfolio Management .....	20	9

**Master of Science in Property Studies**

[EM013CON03]

**Senior Lecturer and Programme Convener:**

MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*

The primary aim of the Postgraduate Diploma and MSc in Property Studies programmes is to 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.

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**

Course Code	Course Title	NQF Credits	HEQSF Level
CON5010Z	Minor Dissertation Property Studies .....	60	9
CON5006Z	Property Development.....	20	9
CON5007Z	Property Law .....	20	9
CON5008Z	Urban Land Economics .....	20	9
CON5009Z	Property Finance .....	20	9
CON5021Z	Property Portfolio Management .....	20	9
CON5036Z	Introduction to Research .....	4	9
CON5037Z	Research Methodology.....	6	9
CON5041Z	Principles of Applied Statistics .....	4	9
CON5042Z	Advanced Principles of Applied Statistics .....	6	9
CON5043Z	Property Valuation Theory & Practice .....	20	9
	Sub-total credits.....	0	0

**Elective Core Courses**

To achieve registration with SACPVP (South African Council for Property Valuers' Profession) a student, in addition to the core courses, will have to complete the following core elective.

Course Code	Course Title	NQF Credits	HEQSF Level
CON5044Z	Advanced Property Valuation .....	20	9

## 166 DEPARTMENTS IN THE FACULTY

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.

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CON5045Z</b>	Corporate Real Estate Portfolio Management .....	20	9

### Project Management (PGDip and Masters)

#### Programme Convener:

CI Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA* PMP(PMI)

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.

### Postgraduate Diploma in Project Management

[EG008CON06]

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.

#### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CON5014Z</b>	Project Management & Systems Theory .....	20	9
<b>CON5016Z</b>	Project Planning & Implementation .....	20	9
<b>CON5018Z</b>	Human Resource Management and Interpersonal Communication	20	9
<b>CON5022Z</b>	Total Quality Management in a Project Environment .....	20	9
<b>CON5029Z</b>	Project Risk Management.....	20	9
<b>CON5036Z</b>	Introduction to Research.....	4	9
<b>CON5041Z</b>	Principles of Applied Statistics.....	4	9
	Approved elective.....	0	0
	Total credits per year .....	<b>108</b>	

### Master of Science in Project Management

[EM014CON06]

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

Course Code	Course Title	NQF Credits	HEQSF Level
<b>CON5023Z</b>	Minor Dissertation Project Management.....	60	9
<b>CON5014Z</b>	Project Management & Systems Theory .....	20	9
<b>CON5016Z</b>	Project Planning & Implementation .....	20	9
<b>CON5018Z</b>	Human Resource Management and Interpersonal Communication	20	9
<b>CON5022Z</b>	Total Quality Management in a Project Environment .....	20	9
<b>CON5029Z</b>	Project Risk Management.....	20	9
<b>CON5036Z</b>	Introduction to Research.....	4	9
<b>CON5037Z</b>	Research Methodology .....	6	9
<b>CON5041Z</b>	Principles of Applied Statistics.....	4	9
<b>CON5042Z</b>	Advanced Principles of Applied Statistics.....	6	9

**Elective Courses**

Students must select one approved Master's level 20-credit course, or combination of courses totalling 20 credits, offered by the University.

**Elective Course (select 20 credits)**

Course Code	Course Title	NQF Credits	HEQSF Level
CON5030Z	Project Finance & Procurement.....	20	9
	Approved elective.....	0	0
	Total credits.....	0	0

**Doctoral Programmes****Doctor of Philosophy**

[ED001CON01]

**ED001 Doctor of Philosophy is a Research Degree****Core Course**

Course Code	Course Title	NQF Credits	HEQSF Level
CON6009W	Thesis .....	360	10

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

**Course Outlines****CON4030F PROPERTY STUDIES II**

16 NQF credits at HEQSF level 8; 4 lectures per week, project(s), seminars, tutorials.

**Convener:** K Evans

**Course entry requirements:** CON3033F

**Course outline:**

This course in property studies aims to develop an understanding of feasibility studies; risk assessment techniques; capital budgeting and sources of finance; the property development process; whole life appraisal; maintenance management; and property valuation methods.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 50%; June examination 2 hours 50%.

**CON4032F MEASUREMENT & DESIGN APPRAISAL III**

*No additional assessment.*

12 NQF credits at HEQSF level 8; 4 lectures per week, project(s), seminars, tutorials.

**Convener:** K Le Jeune

**Course entry requirements:** CON3012W, CON3031W

**Course outline:**

This course in measurement and design appraisal covers: Design appraisal, measurement and preparation of tender documentation for 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.

## 168 DEPARTMENTS IN THE FACULTY

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 80% (2 tests 20% each; major assignment); June oral examination (20%) 30 minutes.

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### CON4033W APPLIED CONTRACT LAW II

16 NQF credits at HEQSF level 8; 2 lectures per week, seminar(s).

**Convener:** T Boxall

**Course entry requirements:** CML1002F or CML1001F or CML1006S, CON3032W

**Course outline:**

This course aims to develop an understanding of applied contract law. Topics include: the Insolvency Act; case studies of construction and building disputes; alternative dispute resolution; government and new engineering forms of contract; and common international contracts.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** Year mark 50% (2 tests 10% each; assignments 30%); November examination 2 hours 50%.

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### CON4034W PROFESSIONAL PRACTICE

*No additional assessment.*

20 NQF credits at HEQSF level 8; First Semester: 4 lectures per week, seminars, tutorials, studio sessions. Second Semester: Simulated Office Project, studio sessions as required..

**Convener:** K Le Jeune

**Course entry requirements:** CON3031W

**Co-requisites:** CON4032F

**Course outline:**

This course in professional practice covers: 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, reconciliation 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:** Year mark 65% (assignments 25%; Simulated Office project 40%; June oral examination (35%) 30 minutes, (24% oral examination, 11% portfolio submission).

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### CON4035X PRACTICAL TRAINING

0 NQF credits at HEQSF level 8

**Convener:** K Le Jeune

**Course outline:**

This opportunity to gain practical experience includes 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:** None

**Assessment:** Complete practical training and complete report.

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### CON4037S CIVIL ENGINEERING MEASUREMENT

16 NQF credits at HEQSF level 8; 2 lectures per week, 1 studio session as required.

**Convener:** K Le Jeune

**Course entry requirements:** CON3012W, CON4032F

**Course outline:**

This course aims to develop an understanding of 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:** Year mark 50% (test 10%; Simulated Office project 10%; 3 assignments 10% each); November examination 3 hours 50%.

**CON4038F ADVANCED CONSTRUCTION MANAGEMENT**

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, tutorials, field trip(s)..

**Convener:** M Massyn

**Course entry requirements:** CON3012W, CON3038W

**Course outline:**

This advanced course in construction management covers: 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; and health and safety requirements.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 50% (test 20%; 3 assignments 10% each); June examination 2 hours 50%.

**CON4039S INTEGRATED MANAGEMENT PROJECT**

*This course is not eligible for additional assessment.*

16 NQF credits at HEQSF level 8; 2 lectures per week, field trips, tutorials, seminars.

**Convener:** M Massyn

**Course entry requirements:** CON4038F, CON3031W

**Course outline:**

This integrated management project uses the documents for an actual construction project to, 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:** None

**Assessment:** Portfolio (70%), oral examination (November) 30% (1 hour).

**CON4041S ADVANCED PROPERTY STUDIES A**

16 NQF credits at HEQSF level 8; 4 lectures per week, tutorials.

**Convener:** Dr M Mooya

**Course entry requirements:** CON3034F, CON3035S, CON3041F

**Course outline:**

This advanced course in property studies covers: 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; and properties subject to particular legislation.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 50% (2 tests 20%; assignment 10%); November examination 2 hours 50%.

**CON4042H ADVANCED PROPERTY STUDIES B**

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, field trips.

**Convener:** Associate Professor K Michell/D Owen

**Course entry requirements:** CON3034F/S, CON3035S, CON3036W

**Course outline:**

This course provides an introduction to facilities management. Topics include:

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; 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; and space allocation to individuals and user-groups.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Assignment 65% (percentage of the assignment mark: essay 10% (of 65% in total); personal journal 20% (of 65% in total); final assignment presentation (of 65% in total); assignment presentation class participation 10% (of 65% in total); final assignment document 50% (of 65% in total); 75% if the mark above is for the document (all group members get this mark); peer review 25%; November examination 2 hours 35%.

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**CON4043S APPLIED PROPERTY LAW**

16 NQF credits at HEQSF level 8; 4 lectures per week, tutorials.

**Convener:** T Boxall

**Course entry requirements:** CML2011S (or equivalent).

**Course outline:**

This course in applied contract law covers: A detailed study of the statutes and ordinances affecting property development and valuation. A 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; and method of valuation.

**DP requirements:** 40% subminimum in both course work and examination.

**Assessment:** Year mark 50% (test 20%; individual assignment 20%; group assignment 10%); November examination 2 hours 50%.

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**CON4045F HOUSING DEVELOPMENT & MANAGEMENT I T**

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, tutorials.

**Convener:** R McGaffin

**Course outline:**

This course aims to conceptualise housing as a multi-dimensional asset. Students will be guided to: define the housing problem and assess various policy intervention undertaken internationally and locally to date; based on the problem statement propose sound interventions drawing on theory and evidence, and undertake a financial viability study of a housing project.

**DP requirements:** 40% subminimum in both course work and examination; Attendance and satisfactory participation in all contact sessions; Satisfactory participation in all group work; Submission of all assignments as per due dates.

**Assessment:** Year mark 50% (assignments 50%); June examination 2 hours 50%.

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**CON4047W RESEARCH REPORT**

*This course is not eligible for additional assessment.*

32 NQF credits at HEQSF level 8; Seminar(s).

**Convener:** Professor PA Bowen/Associate Professor KA Michell

**Course entry requirements:** CON1019F, STA1000S

**Course outline:**

This course aims to provide an understanding of the research process. Topics include: selection of research problem; preparation of the research proposal; conducting empirical research; analysis of findings; drawing conclusions; making recommendations; and presentation of a research report.

**DP requirements:** Submission of a satisfactory research proposal

**Assessment:** November examination - Research report 100%.

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**CON4048F ADVANCED PROPERTY STUDIES C**

16 NQF credits at HEQSF level 8; 4 lectures or tutorials per week.

**Convener:** K Evans

**Course entry requirements:** CON3034F/S, CON3035S, CON3041S

**Course outline:**

This advanced course in property studies covers: 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; and quantitative techniques for analysis of market data.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 50%. (3 assignments 20%, 5% 25% respectively); November examination 2 hours 50%.

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**CON5021Z PROPERTY PORTFOLIO MANAGEMENT**

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** Associate Professor F Viruly

**Course outline:**

This course in property portfolio management covers: 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; and outsourcing.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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**CON4049S CONSTRUCTION INNOVATION**

16 NQF credits at HEQSF level 8; 2 lectures per week, field trip(s), tutorials, seminars.

**Convener:** Associate Professor A Windapo

**Course entry requirements:** CON3038W, CON3012W

**Course outline:**

This course aims to develop an understanding of innovation in construction. Topics include: 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, and entrepreneurship.

**DP requirements:** 40% subminimum in both course work and examination.

## 172 DEPARTMENTS IN THE FACULTY

**Assessment:** Year mark 50% (essay 10%; group project 20%; class test 10%; tutorial and exercise 10%); November examination 2 hours 50%.

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### **CON5006Z** PROPERTY DEVELOPMENT

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** Associate Professor F Viruly

**Course outline:**

This course in property development covers: 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%.

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### **CON5007Z** PROPERTY LAW

20 NQF credits at HEQSF level 9; one week block lectures..

**Convener:** T Boxall

**Course outline:**

This course aims to develop an understanding of property law. Topics include: 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; and case studies.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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### **CON5008Z** URBAN LAND ECONOMICS

20 NQF credits at HEQSF level 9; one week block lectures..

**Convener:** Associate Professor F Viruly

**Course outline:**

This course in urban land economics covers: urban economics and urban problems; the urbanization process; the urban hierarchy; urban rent; theories of urban spatial structure; location theory; and problems in developing countries.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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### **CON5009Z** PROPERTY FINANCE

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** K Evans

**Course outline:**

This course in property finance is an application of business finance theory to property. Topics include: 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%.

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### **CON5010Z** MINOR DISSERTATION PROPERTY STUDIES

60 NQF credits at HEQSF level 9

**Convener:** Associate Professor KA Michell

**Course entry requirements:** CON5037Z and CON5042Z.

**Course outline:**

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a minor dissertation.

**DP requirements:** None

**Assessment:** Research Report

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**CON5014Z PROJECT MANAGEMENT & SYSTEMS THEORY**

20 NQF credits at HEQSF level 9; one week block lectures..

**Convener:** M Massyn

**Course outline:**

This course is 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 are investigated. 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 is also covered.

**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 at HEQSF level 9; one week block lectures.

**Convener:** M Massyn

**Course outline:**

This course in project planning and implementation covers: the need for planning which includes the rules for planning and control; scope management, project strategy, project methodology; project scheduling techniques; and change management and project integration.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

---

**CON5018Z HUMAN RESOURCE MANAGEMENT & INTERPERSONAL COMMUNICATION**

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** I Jay

**Course outline:**

This course aims to develop an understanding of 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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**CON5022Z TOTAL QUALITY MANAGEMENT IN A PROJECT ENVIRONMENT**

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** Dr N Tuan

**Course outline:**

This course aims to develop an understanding of total quality management in a project environment and includes: Total Quality Management as a set of management processes and systems and the application of TQM in project environments; new product development, value engineering, safety, and health and welfare.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination at end of module 50%, assignments 50%.

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**CON5023Z MINOR DISSERTATION PROJECT MANAGEMENT**

60 NQF credits at HEQSF level 9

**Convener:** Dr N Tuan

**Course entry requirements:** CON5037Z and CON5042Z

**Course outline:**

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a minor dissertation.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**CON5024W DISSERTATION CONSTRUCTION ECONOMICS & MANAGEMENT**

180 NQF credits at HEQSF level 9

**Convener:** TBA

**Course outline:**

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a dissertation.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**CON5025W DISSERTATION CONSTRUCTION ECONOMICS & MANAGEMENT**

120 NQF credits at HEQSF level 9

**Convener:** TBA

**Course entry requirements:** CON5040Z DP

**DP requirements:** None

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**CON5029Z PROJECT RISK MANAGEMENT**

20 NQF credits at HEQSF level 9; one week block release lectures.

**Convener:** Dr N Tuan

**Course outline:**

This course in project risk management covers: 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 at end of module 50%, assignments 50%.

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**CON5030Z PROJECT FINANCE & PROCUREMENT**

20 NQF credits at HEQSF level 9; one week block release lectures.

**Convener:** I Jay

**Course outline:**

This course in project finance and procurement covers: Principles of cost, and financial models, including the use of net present value, the capital asset pricing model, and real options. The development of a cost benefit analysis, and business case. Procurement, tendering, cost control, project contracts and project marketing are also included.

**DP requirements:** 50% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

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**CON5033Z** DISSERTATION PROJECT MANAGEMENT

120 NQF credits at HEQSF level 9

**Convener:** I Jay**Course entry requirements:** CON5040Z

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**CON5034Z** DISSERTATION PROPERTY STUDIES

120 NQF credits at HEQSF level 9

**Convener:** TBA**Course entry requirements:** CON5040Z

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**CON5036Z** INTRODUCTION TO RESEARCH

4 NQF credits at HEQSF level 9

**Convener:** Professor P Bowen/I Jay**Course outline:**

this course provides guidance in: research and writing skills; plagiarism; research ethics; critical analysis of literature; creating an argument; writing in an academic style; and referencing conventions.

**DP requirements:** None**Assessment:** One-and-a-half-hour examination 100%.

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**CON5037Z** RESEARCH METHODOLOGY

6 NQF credits at HEQSF level 9; half week block lectures.

**Convener:** I Jay**Course entry requirements:** CON5036Z**Course outline:**

This course aims to develop an understanding of 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; and concluding the research.

**DP requirements:** 100% attendance at lectures in block week.**Assessment:** Evaluation of Research Proposal 100%.

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**CON5038Z** PROPERTY DEVELOPMENT & FINANCE

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** TBA**Course outline:**

This course in property development and finance covers: 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.

**DP requirements:** 50% subminimum in both coursework and examination.**Assessment:** Three hour exam 50%, assignment 50%.

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**CON5039Z** PROJECT IMPLEMENTATION & MANAGEMENT

20 NQF credits at HEQSF level 9; one week block lectures.

**Convener:** TBA**Course outline:**

This course aims to develop an understanding of project implementation and management. Topics include: Programme and project management: work breakdown structures; project cycle management; budgeting and cash flows; developing indicators; monitoring and evaluation systems

## 176 DEPARTMENTS IN THE FACULTY

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.

**DP requirements:** None

**Assessment:** Three hour exam 50%; assignment 50%.

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### CON5040Z DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

**Convener:** TBA

**Course outline:**

The aim of this course is to allow a student to undertake preparatory work for the master's 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.

**DP requirements:** None

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### CON5041Z PRINCIPLES OF APPLIED STATISTICS

4 NQF credits at HEQSF level 9

**Convener:** Professor P Bowen

**Course entry requirements:** Knowledge of Excel.

**Course outline:**

This course in applied statistics covers: 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; and amortization.

**DP requirements:** None

**Assessment:** One-and-a-half-hour examination 100%.

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### CON5042Z FURTHER APPLIED STATISTICS (ADVANCED PRINCIPLES)

6 NQF credits at HEQSF level 9

**Convener:** Professor P Bowen

**Course entry requirements:** CON5041Z

**Course outline:**

This course in advanced principles of applied statistics covers: 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; and 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 at HEQSF level 9

**Convener:** K Evans/M Mooya

**Course outline:**

This course in property valuation theory and practice covers: 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% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%, assignments 50%.

### **CON5044Z ADVANCED PROPERTY VALUATION**

20 NQF credits at HEQSF level 9

**Convener:** K. Evans

**Course entry requirements:** CON5043Z

**Course outline:**

This advanced course in property evaluation covers: 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% subminimum in both course work and examination.

**Assessment:** Three hour examination 50%; assignments 50%.

### **CON5045Z CORPORATE REAL ESTATE PORTFOLIO MANAGEMENT**

20 NQF credits at HEQSF level 9

**Convener:** TBA

**Course outline:**

This course in corporate real estate portfolio management covers: Strategy and Strategic Alignment: Understanding corporate strategy drivers and their alignment to the portfolio; Defining portfolio objectives; Corporate Real Estate and competitive advantage. Corporate Real Estate Portfolio

## 178 DEPARTMENTS IN THE FACULTY

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. The Impact of Property Exposures on Corporate Financial Statements: Accounting principles; Financial reporting principles and areas of direct impact; and Impact of CRE on shareholder value.

**DP requirements:** 100% attendance of block week lectures. Submission of all assignments.

**Assessment:** A three hour examination 50% and assignments 50%.

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### **CON6009W** THESIS

360 NQF credits at HEQSF level 10

**Convener:** TBA

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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## ELECTRICAL ENGINEERING

The Department offers the following specialisations in:

Control Engineering  
 Computational Electronics  
 Image Processing and Vision Systems  
 Instrumentation  
 Machines and Power Electronics  
 Nuclear Power  
 Power Engineering  
 Remote Sensing and Radar  
 Telecommunications  
 Space Technology

The Department of Electrical Engineering is located on the 4th floor of the Menzies Building, Library Road, Upper Campus, Rondebosch.

Website: [www.ee.uct.ac.za](http://www.ee.uct.ac.za)

Email address: [eleceng@uct.ac.za](mailto:eleceng@uct.ac.za)

Telephone no.: 021 650 2811

## Staff

### Professor and Head of Department:

ES Boje, PrEng BSc(Eng) *Wits* MSc(Eng) PhD *Natal* SMSAIMC MIEEE

### Professors:

A Baghai-Wadji, MSc(Eng) PhD *Vienna* DSc *Vienna* FEMA SMIEEE  
 KA Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ SMIEEE MSAIEE  
 MR Inggs, BSc(Hons) *Rhodes* PhD *London* SMIEEE  
 P Martinez, BSc, BScHons(Mat Eng), MSc, PhD, *Cape Town* IAAA, IISL, FRAS, MSAIP

### Part-time Professor:

P Pillay, CEng BSEng *UDW* MSc(Eng) *Natal* PhD *Virginia Tech* FIET FIEEE

### Emeritus Professors:

M Braae, MSc(Eng) *Cape Town* PhD *UMIST* MIEEE  
 BJ Downing, MSc *Bradford* PhD *Sheffield*  
 G de Jager, MSc *Rhodes* PhD *Manchester* MBL *SA* MIEEE  
 CT Gaunt, PrEng BSc(Eng) *Natal* MBL *SA* PhD *Cape Town* FIET FSAIEE  
 A Petroianu, Dipl Ing *USSR* Dr Ing *Bucharest* FIEEE VDE CIGRÉ  
 KM Reineck, CEng Dip Eng *Cologne* DipEIEng *Dunelm* PhD *Newcastle* VDE FIET

### Honorary Professor:

R Prasad, BSc EEng *Sindri* MScEEng *Mesra* PhD *Mesra* PPH

### Adjunct Professor:

PJ Cilliers, PrEng BEng (Hons) *Pret* MS *George Washington* PhD *Ohio* SAIP

### Associate Professors:

P Barendse, MSc(Eng) PhD *Cape Town* MIEEE  
 ME Dlodlo, Reg Eng, BSEE BS *Geneva* MSc *Kansas State* PhD *Delft* FZweIE MIEEE

## 180 DEPARTMENTS IN THE FACULTY

OE Falowo, BEng MEng *Akure* PhD *Cape Town* SMIEEE  
RH Geschke, BEng MSc(Eng)PhD *Stellenbosch* SMIEEE  
MA Khan, MSc(Eng) PhD *Cape Town* SMIEEE  
A Mishra, BE (*REC India*) PhD *Edinburgh* SMIEEE  
F Nicolls, MSc(Eng) PhD *Cape Town*  
D O'Hagan, BEng (Hons) MSc *Ulster* PhD *UCL* MIEEE, MIET  
AJ Wilkinson, BSc(Eng) *Cape Town* PhD *London*

### **Emeritus Associate Professors:**

JR Greene, MSc(Eng) *Cape Town* MIEEE  
M Malengret, MSc(Eng), PhD *Cape Town*

### **Visiting Professors:**

F Anderson, MSc *Georgia Tech*  
C Baker, BSc(Hons) PhD *Hull*  
H Griffiths, BA *Oxon* PhD DSc *London*  
T Magedanz PhD *Berlin*  
K Woodbridge, BSc(Hons) *Sussex* Dphil

### **Senior Lecturers:**

S Chowdhury, BEE(Hons) PhD (Eng) *Kolkata* MIET SMIEEE MIE SMSAIEE  
SI Ginsberg, MSc(Eng) *Cape Town*  
M Hanif, BEng(Hons) *UK* PhD *Ireland* MIEEE, MIET  
A Murgu, MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD (Appl Math) *Jyväskylä* MIEEE  
R Smit, MSc(ScEd) *Witwatersrand*, (Academic Development Lecturer)

### **Adjunct Senior Lecturer:**

I Khan, MSc(Eng) *Cape Town* MIEEE

### **Lecturers:**

K Awodele, Reg Eng, BSc(Eng) *Ife* MSc(Eng) *Abu* PGDM MNSE MIEEE  
J Mwangama, MSc(Eng) *Cape Town*, MIEEE  
D Oyedokun, MSc(Eng) PhD *Cape Town* MIEEE SAIEE  
A Patel, MSc(Eng) PhD *Cape Town*  
MS Tsoeu, MSc(Eng) *Cape Town* MIEEE  
RA Verrinder, MSc(Eng) *Cape Town* MIEEE  
S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town*

### **Senior Scholar:**

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

### **Senior Research Officer:**

R Herman, BSc(Eng) *Cape Town* MSc(Eng) PhD(Eng) *Stell*

### **Principal Technical Officer:**

AC Wozniak, BSc(Eng) *Cape Town*

### **Chief Technical Officers:**

J Pead, BSc(Eng), MSc(Eng) *Cape Town*  
D De Maar, BEd(Hons) *Cape Town*

### **Senior Technical Officers:**

P Bizimana  
HP Daniels

P Titus

**Technical Officer:**

B Daniels

**Departmental Manager:**

J Buxey

**Administrative Officer (Undergraduate):**

M van der Westhuizen BA PGDip LISC *Cape Town*

**Finance Officer:**

C Koonin

**Administrative Assistant (Postgraduate):**

N Moodley

**Administrator (General):**

R Harris

**Receptionist:**

L Johannes

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

## Postgraduate Programmes

### Honours Programmes

#### Bachelor of Science (Honours) specialising in Nuclear Power [EH007EEE08]

**Emeritus Professor and Programme Convener::**

C.T. Gaunt, PrEng BSc(Eng) *Natal* MBL *SA* PhD *Cape Town* FIET FSAIEE

Nuclear power stations operating in over 30 countries provide approximately 13% of the world's electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Bachelor of Science (Honours) programme provides an interdisciplinary postgraduate qualification in the key aspects of nuclear power for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of nuclear power, including the policy, operating, safety and regulatory aspects.

The degree comprises coursework to the minimum of 108 credits and a 40-credit final year project.

The programme is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week blocks, with pre-

## 182 DEPARTMENTS IN THE FACULTY

contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE4106Z	Introductory nuclear physics and radiation for power supply .....	16	8
EEE4107Z	Thermodynamics for nuclear power stations.....	16	8
EEE4108Z	Electrical and mechanical equipment in nuclear power stations ...	16	8
EEE4109Z	Theory and design of nuclear reactors.....	16	8
EEE4110Z	Operation and safety of nuclear reactors .....	16	8
EEE4111Z	Regulatory standards for nuclear power .....	16	8
MEC4111Z	Nuclear manufacturing & construction engineering management	12	8
EEE4022F/S	Final year project.....	40	08
	Total credits per year .....	148	

*Please note that courses will only be offered if there are sufficient students registered for the course.*

## Master's Programmes

### Master of Engineering specialising in Nuclear Power

[EM017EEE08]

#### Emeritus Professor and Programme Convener:

CT Gaunt, PrEng BSc(Eng) *Natal* MBL SA PhD *Cape Town* FIET FSAIEE

Nuclear power stations operating in over 30 countries provide approximately 13% of the world's electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Master of Engineering (MEng) programme provides a postgraduate qualification in the key aspects of nuclear power for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of nuclear power, including the policy, operating, safety and regulatory aspects.

The degree comprises coursework to the minimum of 120 credits and a 60-credit dissertation.

The programme is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week or two-week blocks, with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation.....	60	9
EEE4106Z	Introductory nuclear physics and radiation for power supply .....	16	8
EEE4107Z	Thermodynamics for nuclear power stations.....	16	8
EEE4108Z	Electrical and mechanical equipment in nuclear power stations ...	16	8
EEE5128Z	Nuclear reactor theory and design .....	20	9
EEE5129Z	Nuclear reactor operations and safety.....	20	9
EEE5130Z	Regulatory requirements for nuclear power .....	20	9
MEC4111Z	Nuclear manufacturing & construction engineering management	12	8
	Total credits .....	0	0

*Please note that courses will only be offered if there are a sufficient number of students registered for the course.*

## Master of Philosophy specialising in Nuclear Power [EM027EEE08]

### Emeritus Professor and Convener:

CT Gaunt, PrEng BSc(Eng) *Natal* MBL SA PhD *Cape Town* FIET FSAIIE

Nuclear power stations operating in over 30 countries provide approximately 13% of the world's electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Master of Philosophy (MPhil) programme provides an interdisciplinary postgraduate qualification in the key aspects of nuclear power for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of nuclear power, including the policy, operating, safety and regulatory aspects.

The degree comprises coursework to the minimum of 120 credits and a 60-credit dissertation.

Candidates deemed to have completed equivalent coursework, or deemed to have equivalent work experience in nuclear science, power or regulation may exceptionally be permitted to register for this degree by only 60 credits of coursework, in which case the dissertation must be to the value of 120 credits.

The programme is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week or two-week blocks, with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

Course Code	Course Title	NQF Credits	HEQSF Level
END5037Z	Minor Dissertation.....	60	9
EEE4106Z	Introductory nuclear physics and radiation for power supply .....	16	8
EEE4107Z	Thermodynamics for nuclear power stations.....	16	8
EEE4108Z	Electrical and mechanical equipment in nuclear power stations ...	16	8
EEE5128Z	Nuclear reactor theory and design.....	20	9
EEE5129Z	Nuclear reactor operations and safety .....	20	9
EEE5130Z	Regulatory requirements for nuclear power .....	20	9
MEC4111Z	Nuclear manufacturing & construction engineering management	12	8
	Total credits.....	0	0

*Please note that courses will only be offered if there are a sufficient number of students registered for the course.*

## Master of Engineering specialising in Radar [EM017EEE06]

### Associate Professor and Programme Convener::

D O'Hagan, BEng(Hons) MSc *Ulster* PhD *UCL* MIEEE MIET

A candidate for the MEng in Radar is required to complete core courses totalling 120 credits and a 60 credit minor dissertation.

Each course will typically contain a lecture component of five full days, followed by weekly seminars, tasks and a written examination, over a five week period after the first, intensive lecture session. The programme is designed to support students that cannot be resident in Cape Town for the full duration to complete all courses, by using distance learning techniques during the follow up period after each course (after the one week intensive lecture period). All students will, however, have to be present in Cape Town for the one week lecture period for each course. Elements of continuous assessment (problem sets, short projects) and a written examination are utilised to assess the course.

## 184 DEPARTMENTS IN THE FACULTY

### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation.....	60	9

### Select courses to the value of 120 credits

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5105Z	Fundamentals of Radar Signal and Data Processing.....	20	9
EEE5108Z	Advanced Engineering Mathematics.....	20	9
EEE5109Z	Multitarget Multisensor Tracking and Data Fusion.....	20	9
EEE5110Z	Clutter and Detection in Clutter.....	20	9
EEE5111Z	High Resolution & Imaging Radar.....	20	9
EEE5112Z	Radar System Modelling.....	20	9
EEE5114Z	Special Topics in Radar A.....	5	9
EEE5115Z	Special Topics in Radar B.....	5	9
EEE5116Z	Special Topics in Radar C.....	5	9
EEE5117Z	Special Topics in Radar D.....	10	9
EEE5118Z	Special Topics in Radar E.....	10	9
EEE5119Z	Introduction to Radar Systems.....	20	9
EEE5120Z	Introduction to Electronic Defence.....	20	9
EEE5121Z	Microwave Components & Antennas.....	20	9
EEE5131Z	Microwave Filters.....	20	9
EEE5132Z	Special Topics in Radar F.....	20	9
	Total credits.....	0	0

\*Please note that certain courses run every alternate year and courses will only run if there are sufficient students registered for the course\*

## Master of Engineering specialising in Telecommunications

[EM017EEE09]

### Associate Professor and Programme Convener:

ME Dlodlo, Reg Eng, BSEE BS *Geneva* MSc *KansasState* PhD *Delft* FZweIE MIEEE

A candidate for the MEng in specializing Telecommunications is required to complete core courses of 120 credits and a 60 credit minor dissertation.

This programme aims to provide knowledge, skills and aptitudes for practising engineers to adapt to the rapidly changing technological landscape, turning products of research into practical solutions of developing world problems within international standards. The programme offers a selection of courses that span broad fundamental concepts that find applications in a wide range of disciplines. The approach enables students to be agile in response to new knowledge and novel developments. Core courses include Information Theory, Statistical Signal Theory and Advanced Engineering Mathematics.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation.....	60	9
EEE5108Z	Advanced Engineering Mathematics.....	20	9
EEE5135Z	Information Theory and Error-Control Coding.....	20	9
EEE5136Z	Statistical Signal Theory.....	20	9

### Select courses to the value of 60 credits

Course Code	Course Title	NQF Credits	HEQSF Level
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Course Code	Course Title	NQF Credits	HEQSF Level
EEE5032Z	Digital Communication Systems.....	20	9
EEE5033Z	Advanced Topics in Communication and Networks.....	12	9
EEE5034Z	Special Topics in Electrical Engineering.....	8	9
EEE5121Z	Microwave Components and Antennas.....	20	9
EEE5137Z	Optical Communication Systems.....	20	9
EEE5138Z	Broadband Communication Networks.....	20	9
EEE5139Z	Wireless Data Network Convergence.....	20	9
EEE5140Z	Software Defined Radio.....	20	9

\*Please note that certain courses run every alternate year and courses will only run if there are sufficient students registered for the course\*

## Master of Philosophy specialising in Space Studies [EM026EEE07]

### Programme Convener:

P Martinez, BSc, BScHons(Mat Eng), MSc, PhD, *Cape Town* IAA, IISL, FRAS, MSAIP

Space technology and space applications are used to such an extent that they are now part of the critical infrastructure of the modern information society. Space applications are also a key contributor to sustainable development in areas such as food and water security, weather prediction, climate change monitoring, environmental resource management, disaster management, search-and-rescue, financial transactions, telemedicine and tele-education. This Master of Philosophy (MPhil) programme is aimed at providing an interdisciplinary postgraduate qualification in the key aspects of space science and technology and space applications for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of space technology, as well as the policy, financial, commercial and regulatory aspects. The degree comprises coursework to the minimum of 60 credits and a 120-credit dissertation. The coursework comprises 45 credits of compulsory core courses in: Space mission analysis and design; Space applications for sustainable development; and Space and society. The candidate is required to complete a further minimum of 15 credits of approved elective courses to make up a minimum of 60 credits of coursework. Candidates deemed to have completed equivalent coursework, or deemed to have equivalent work experience in the space arena, may exceptionally be permitted to register for this degree by dissertation only, in which case the dissertation must be to the value of 180 credits [EM025EEE07].

The programme is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive course periods with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5002W	Dissertation: Electrical Engineering.....	120	9
EEE5103Z	Dissertation Preparation.....	0	9
END5050X	Master's journal paper.....	0	9
EEE5124Z	Space and Society.....	15	9
EEE5125Z	Space Applications for Sustainable Development.....	15	9
EEE5126Z	Space Mission Analysis and Design.....	15	9
EEE5127Z	Special Topics in Space Technology.....	5	9
	Elective.....	0	0
	Total credits.....	0	0

Please note that certain courses run every alternate year and that certain courses will only be offered if there are sufficient students registered for the course.

## Master of Science in Engineering specialising in Electrical Engineering

The Department prepares candidates for the Master of Science in Engineering in Electrical Engineering and for the Doctor of Philosophy. 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.

The Master of Science in Engineering can be either by dissertation only [EM023] or by coursework (approved by your supervisor) and dissertation [EM024].

### Research Master's by dissertation

[EM023EEEE01]

#### EM023 Research Master's by dissertation

##### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5000W	Dissertation Electrical Engineering .....	180	9
END5050X	Master's journal paper .....	0	9
	Total credits .....	0	0

### Research Master's by coursework and dissertation

[EM024EEEE01]

#### EM024 Research Master's by coursework and dissertation

##### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE5002W	Dissertation Electrical Engineering .....	120	9
	Elective courses approved by supervisor .....	0	0
EEE5103Z	Dissertation Preparation .....	0	9
END5050X	Master's journal paper .....	0	9
	Total credits .....	0	0

## Doctoral Programmes

### Doctor of Philosophy

[ED001EEEE01]

#### ED001 Doctor of Philosophy is a Research Degree

##### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
EEE6000W	Thesis .....	360	10

It is advisable before making an online application for Masters or PhD, that you make contact via email with one of the Academic staff members listed below to discuss your research interest.

##### Research Areas

##### Bio-Inspired Robotics

A.Patel@uct.ac.za

##### Commensal Radar Research

Daniel.OHagan@uct.ac.za

##### Control Systems and Mechatronics

Edward.Boje@uct.ac.za

##### Electronic & Accelerated Computational Engineering

Alireza.Baghai-Wadji@uct.ac.za

##### Electronics

Andrew.Wilkinson@uct.ac.za

##### Electronics

Samuel.Ginsberg@uct.ac.za

**Future Internet Technologies**  
**Image Processing & Vision Systems**  
**Control & Instrumentation Engineering**  
**Machines & Power Electronics**  
**Microwave and Millimeter Wave Engineering**  
**Mobile Robotics**  
**Power & Energy Systems Protection**  
**Power Electronics**  
**Power Electronics, Drives & Machines**  
**Power System Network Studies**  
**Power Network Optimization, Control and Stability**  
**Radar and Remote Sensing**  
**Space Technology**  
**Signal Processing**  
**Software Defined Radio**  
**Telecommunications Network Management**  
**Telecommunications Networks**  
**Telecommunications Systems**  
**Renewable Energy, Geomagnetically-induced**  
**Currents, Transformers and Power System Stability**

Joyce.Mwangama@uct.ac.za  
 Fred.Nicolls@uct.ac.za  
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 Azeem.Khan@uct.ac.za  
 Riana.Geschke@uct.ac.za  
 Robyn.Verrinder@uct.ac.za  
 Sunetra.Chowdhury@uct.ac.za  
 moin.hanif@uct.ac.za  
 Paul.Barendse@uct.ac.za  
 Kehinde.Awodele@uct.ac.za  
 komla.folly@uct.ac.za  
 Michael.Inggs@uct.ac.za  
 Peter.Martinez@uct.ac.za  
 Amit.Mishra@uct.ac.za  
 Simon.Winberg@uct.ac.za  
 Alexandru.Murgu@uct.ac.za  
 Olabisi.Falowo@uct.ac.za  
 Mqhele.Dlodlo@uct.ac.za  
 David.Oyedokun@uct.ac.za

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

## Course Outlines

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### EEE4106Z INTRODUCTORY NUCLEAR PHYSICS AND RADIATION FOR POWER SUPPLY

16 NQF credits at HEQSF level 8

**Convener:** Emeritus Professor D Aschman

**Course outline:**

This advanced course aims to develop strong concepts of nuclear physics and radiation in the context of nuclear power reactors. Topics include: nuclear physics and radiation in the context of nuclear power reactors: atomic nature of matter; binding energy; radioactive decay; nuclear fission; neutron efficiency; ionising radiation; radiation detection and measurement; and effects of radiation on matter and biological systems.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE4107Z THERMODYNAMICS FOR NUCLEAR POWER STATIONS

16 NQF credits at HEQSF level 8

**Convener:** Mrs R Smit

**Course outline:**

This advanced course aims to develop strong concepts of thermodynamics as approached by different disciplines and applied in the context of nuclear power. Topics include: concepts and application of thermodynamics for power stations: ; basic energy concepts, units and properties; thermodynamic cycles; fluid dynamics; thermo-hydraulics and core thermal units

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE4108Z ELECTRICAL & MECHANICAL EQUIPMENT IN NUCLEAR POWER STATIONS

## 188 DEPARTMENTS IN THE FACULTY

16 NQF credits at HEQSF level 8

**Convener:** Associate Professor MA Khan

**Course outline:**

This course aims to develop an advanced understanding of the role of electrical and mechanical equipment in nuclear power stations, including a working knowledge of the different types, applications and operating mechanisms where applicable. Topics include: electrical and mechanical equipment used in nuclear power stations: pumps and valves; heat exchangers; compressors; transformers, motors, generators; sensors, detectors and protection systems; battery chargers, inverters and back-up supplies.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE4109Z THEORY AND DESIGN OF NUCLEAR REACTORS

16 NQF credits at HEQSF level 8

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This course aims to develop strong concepts of engineering theory and design as applied in the context of nuclear power reactors. Topics include: nuclear reactor engineering theory and design, with an emphasis on pressurised water reactors: types and generations of power reactors; neutron life cycle; reactor operation theory; reactor core design; thermal-hydraulic analysis; core power density and effect on reactor size, control and shielding; corrosion and materials properties.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE4110Z OPERATION AND SAFETY OF NUCLEAR REACTORS

16 NQF credits at HEQSF level 8

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This advanced course aims to develop strong concepts in the operation and safety of complex systems and the application in the context of nuclear power stations. Topics include: functional description and design of main components of primary, secondary, auxiliary and safety systems: physical phenomena determining order of magnitude of key parameters of reactor operation; system modelling, normal operating transients, accident scenarios and extreme event identification; shutdown and restart; reactor coolant system; reactor protection; electricity supplies needed for production and safety; and simulators.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE4111Z REGULATORY STANDARDS FOR NUCLEAR POWER

16 NQF credits at HEQSF level 8

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This course aims to understand the principles of regulatory processes, including safety, environmental and operating regulations, and their application in the context of nuclear power. Topics will include the safety requirements and licencing processes for nuclear plants: nuclear regulation; design philosophy; radiation protection management; emergency preparedness; verification and assurance; learning from incidents; international peer review. Energy regulation: energy regulator, integrated energy planning. Environmental regulation: environmental impact analysis; environmental management plans; and monitoring.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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### EEE5000W MASTERS DISSERTATION IN ELECTRICAL ENGINEERING

180 NQF credits at HEQSF level 9

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**EEE5002Z** MSC ELECTRICAL ENG PART DISS

120 NQF credits at HEQSF level 9

**DP requirements:** None

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**EEE5004Z** MINOR DISSERTATION

60 NQF credits at HEQSF level 9

**Course outline:**

Candidates for the degree of M.Eng will be required to complete a project to be selected in consultation with the programme convener. A written project report is required and is the sole assessment of the course.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**EEE5018Z** MULTIVARIABLE CONTROL SYSTEM DESIGN

*NOT OFFERED IN 2016*

16 NQF credits at HEQSF level 9

**Course entry requirements:** EEE3069W or equivalent.

**Course outline:**

This course in multivariable control system design will cover selected topics in: 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.

**DP requirements:** Satisfactory completion of coursework.

**Assessment:** Examination 3 hours.

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**EEE5022Z** IMAGING RADAR APPLICATIONS

*NOT OFFERED IN 2016*

20 NQF credits at HEQSF level 9

**Convener:** Prof M InggsA/Prof D O'Hagan

**Course entry requirements:** BSc(Eng) in Electrical Engineering or BSc(Hons) in Physics

**Course outline:**

This advanced course covers the underlying principles of all common imaging radar applications. Topics include: fundamentals of electromagnetic surface scattering; basics of synthetic aperture radar; interferometry; subsidence monitoring; polarimetry; scatterometers; altimeters; lidar and ground penetrating radar applications.

**Assessment:** Examination 3 hours.

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**EEE5026Z** CONVERGENT TELECOMMUNICATION & DATA NETWORKS

15 NQF credits at HEQSF level 9; tutorials, practicals, and project as required..

**Convener:** Dr A Murgu

**Course entry requirements:** EEE3084W or equivalent.

**Course outline:**

## 190 DEPARTMENTS IN THE FACULTY

This course aims to develop an advanced understanding of convergent telecommunication and data networks. Topics include: Fixed-mobile convergence and voice-data networks lead to the next-generation networks delivering applications and integrated multimedia services. This course provides the students with the understanding of the network convergence principles enabling the next generation networks to deliver IP-based services to user terminals moving between fixed and wireless access technologies and roaming between operator networks. The course will cover selected topics related to: network convergence: evolutionary trends, markets and services; service convergence. Network Interoperability: PSTN, hierarchical networks, LAN/SOHO networks, access networks, WAN, internet and core networks. Data Plane Technologies: Multiplexing, L2/L3/L4 switching, routing, multicasting. Control Plane Technologies: signaling principles, call set-up, connection control, SS7, H.323, SIP, MPLS, SNMP. Network Virtualization: principles and requirements; network virtualization elements and deployment, VPN, VPLS. Services Management: service requirements, qualifiers and management; SDP, APIs, Parlay, JAIN. NGN Service Platforms: multiservice platforms, softswitches, cluster servers, Asterisk. Service Clouds: principles, SOA, cloud computing; resource sharing, pooling and splitting; service models, monitoring and governance; content distribution networks. Applications: packetized voice telephony, video streaming, multimedia data networks, VoIP, and IPTV.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 50%, year mark 50%

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### EEE5027Z NETWORK & INTERNET SECURITY

15 NQF credits at HEQSF level 9; tutorials, practicals, and project as required.

**Convener:** Dr A Murgu

**Course entry requirements:** EEE3084W or equivalent.

**Course outline:**

This course aims to develop an advanced understanding of computer network security; forms of protection: access control, authentication, confidentiality, integrity, non-repudiation; security threats to computer networks; cyber-crimes and hackers; hacker motives, hacking topologies, hackers tools of system exploitation; hostile scripts; common gateway interface (CGI), CGI scripts in a tree-way handshake, server CGI interface, CGI script security issues, web script security issues; security assessment, analysis, and assurance; disaster management; disaster prevention, disaster response, disaster recovery, planning for a disaster recovery; firewalls; system intrusion detection and prevention; computer and network forensics; virus and content filtering; computer network security protocols; mobile communication systems and security issues; virtualisation infrastructure and security issues; and cloud computing and security issues.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 50%, year mark 50%.

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### EEE5029Z BROADBAND NETWORKS

15 NQF credits at HEQSF level 9; tutorials, practicals, and project as required.

**Convener:** Mr N Ventura

**Course entry requirements:** EEE3084W or EEE3083F and EEE3085S or equivalent.

**Course outline:**

The course aims to develop an understanding of 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. Beside learning the architectural frameworks, students will be exposed to various analytical methods and simulation tools used in the design and engineering of next-generation networks. Design and analysis of computer networks, modelling and performance evaluation, and queuing theory applied to computer networks. Traffic flow management and error control. Routing algorithms and protocols. Switch and router

architectures. Extensions of internet technologies in various application domains, i.e., the future internet, internet of things; and machine type communications.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 50%, year mark 50%.

### **EEE5032Z** DIGITAL COMMUNICATIONS

*NOT OFFERED IN 2016*

20 NQF credits at HEQSF level 9; tutorials and 8 practical exercises as required and a project.

**Convener:** Associate Professor M Dlodlo

**Course entry requirements:** EEE3084W, EEE3086F or equivalent and Postgraduates standing in Telecommunications or Radar

**Course outline:**

This advanced course in digital communications includes: 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 50%, year mark 50%.

### **EEE5103Z** DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

**Course outline:**

The aim of this course is to allow a student to undertake preparatory work for the master's 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.

**DP requirements:** None

### **EEE5105Z** FUNDAMENTALS RADAR SIGNAL & DP

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor A Mishra

**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students

**Course outline:**

This course in the fundamentals of radar signal and data processing includes selected topics in: signal processing in radar systems (history of radar; basic radar functions; elements of pulsed radar; signal processing concepts in radar e.g. spatial resolution, sampling theory, correlation, interference suppression, phenomenology, imaging, detection). Signal models and processing in radar (radar cross section; radar equation; swerling models; clutter modelling; noise modelling and signal-to-noise ratio; jamming; doppler shift; cross-range; multipath; sampling in doppler and angle domains; quantization; I/Q modulation; radar; matched filtering; compression filtering; ambiguity function; pulse burst waveforms; frequency-modulated waveforms; phase modulated waveforms; doppler spectrum; moving target indication; pulse doppler processing; pulse pair processing) data processing; topics in radar (radar detection and hypothesis testing; threshold detection; binary

integration; constant false alarm rate; cell-averaging CFAR; order statistic CFAR; spatial filtering; beam forming; space-time adaptive processing; and cognitive radar).

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Project 25%, tutorials 20% and examination 55%

### EEE5108Z ADVANCED ENGINEERING MATHEMATICS

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course entry requirements:** All undergraduate calculus, algebra and numerical methods required by a typical BSc Engineering (Electronics) degree.

**Course outline:**

This course aims to develop an advanced understanding of radar, electronic protection and telecommunications mathematics. Selected topics include: statistics and random processes: probability and induction; causality versus randomness; distribution and density functions; mean and variance; moments; characteristic functions; probability space; conditional distributions and probability; Bernoulli's theorem and games of chance; bivariate distributions; joint moments; joint characteristic functions; conditional expected values; ergodicity detection and estimation: systems with stochastic inputs; the power spectrum; parameter estimation; hypothesis testing; mean square estimation; Cramer-Rao bounds; stochastic convergence and limit theorems; finite-order systems and state variables; spectral representation of random processes; spectrum estimation; bandlimited processes and sampling theory; deterministic signals in noise; bispectra and system identification; filtering and prediction; Kalman filters. linear algebra: system of linear equations; Cramer's rule; Gaussian elimination; Gauss-Jordan elimination; vectors and vector spaces; least squares; Gram-Schmidt process; vector differential calculus; vector integral calculus. Matrix algebra: matrix addition, multiplication, dot product, transpose; eigenvalue, eigenvector and eigenspace; Jordan normal form; matrix rank, determinants and inversion; matrix congruence and congruence relation; conjugate transpose and hermitian matrices; matrix orthogonality; matrix decomposition methods; specific types of matrices e.g. Toeplitz matrices. Numerical methods: numerical linear algebra, e.g. solving systems of linear equations and eigenvalue algorithms; Interpolation, e.g. polynomial interpolation, spline interpolation and trigonometric interpolation; finding roots of nonlinear equations; optimization, e.g. linear programming and nonlinear programming; numerical quadrature (i.e. integration); numerical differential equation solutions; and the Monte Carlo analysis.

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Coursework 20%, examination 55% and project 25%.

### EEE5109Z MULTI-TARGET MULTISENSOR TRACKING AND DATA FUSION

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students.

**Course outline:**

**Part 1:** Multi-Target Tracking (selected topics from) The Basics of Target Tracking. Sensor and Source Characteristics. Kinematic State Estimation: Filtering and Prediction basics (Kalman filtering, Bayesian filtering, others). Information-theoretic models (parametric templates, artificial neural networks, cluster algorithms, voting methods, figures of merit, pattern recognition, others) Modelling and Tracking Dynamic Targets. Passive Sensor Tracking. Basic Methods for Data Association. Advanced Methods for MTT Data Association. Attribute Data Fusion. Multiple Sensor Tracking - Issues and Methods. Multiple Sensor Tracking - System Implementation and Applications. Reasoning Schemes for Situation Assessment and Sensor Management. Situation Assessment; Tracking System Performance Prediction, and Evaluation. Multi Target Tracking with an Agile Beam Radar. Sensor Management. Multiple Hypothesis Tracking System Design and Application. Detection and Tracking of Dim Targets in Clutter.

**Part 2:** Kinematic Data Fusion (selected topics from) Data/Information Fusion Models — JDL Data Fusion Model. Unified Data Fusion Model. Visual Situation Assessment Model. Strategies and Algorithms for Target Tracking and Data Fusion; Multiple Radar Tracking (Architectures; Centralized or distributed? Tracks or measurements? Sensor registration and alignment; Track fusion) Performance Evaluation of Data Fusion Systems, Software, and Tracking; Evaluation of tracking system; Covariance analyses; Correlation probabilities; Markov chains Simulation and Monte Carlo techniques Applications of Multisensor Systems and Data Fusion; Sensor Management in Data Fusion Systems (Sensor management functions Establishing target priorities; Sensor tasking).

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Projects 25%, tutorials 20% and examination 55%.

## **EEE5110Z CLUTTER & DETECTION IN CLUTTER**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

### **Course outline:**

Selected topics from:

Part 1: Ground and Sea Radar Clutter Modelling.

Statistical modelling of radar clutter. General sea and ground clutter features; Modelling for radar cross section (RCS); Empirically observed models (Rayleigh, Weibull, K, generalized K, log-normal, etc.); Extension of the Central Limit Theorem (CLT): the compound-Gaussian model; Multidimensional models of random clutter vectors; Radar clutter power spectral density models (Gaussian, power-law, exp., AR, etc.); - Experimental Validation: Sea Clutter Data. Amplitude analysis of HH, VV, HV, and VH data; Validation of the compound-Gaussian model by means of speckle and texture analyses; Cumulant domain analysis; Coherent analysis: empirical correlation and PSD; Incoherent analysis: empirical correlation; Non-stationarity and cyclostationarity of sea clutter data; Validation of the compound-Gaussian model by means of speckle and texture analyses; Cumulant domain analysis; Coherent analysis: empirical correlation and PSD; Incoherent analysis: empirical correlation; Non-stationarity and cyclostationarity of sea clutter data; Experimental Validation: Ground Clutter Data. Measurement instrumentation; Analysis of I and Q clutter components; Azimuth and range correlation/spectral analyses; Cumulant based Gaussianity test; Amplitude PDF analysis; Impact of clutter statistics and spectral models on radar performance prediction. Clutter simulation for radar performance evaluation.

Part 2: Coherent Radar Target Detection in Heavy-Tailed Clutter.

- Coherent Detection of Radar Targets in non-Gaussian Disturbance. Radar detection problem; Optimum coherent detection in Gaussian clutter; Optimum coherent detection in compound-Gaussian clutter (the likelihood ratio test; the estimator-correlator; the whitening matched filter and data-dependent threshold); Suboptimum detection in Gaussian clutter and in compound-Gaussian clutter (based on the three interpretations of the optimum detector); Performance analysis - design trade-offs; Optimum and suboptimum detection in compound-Gaussian clutter when the target signal is r-D unknown (modelled as a rank-deficient Gaussian random vector); - Adaptive Implementation of Detectors in non-Gaussian Disturbance. Gaussian clutter when the clutter covariance matrix is unknown; Compound-Gaussian clutter when the clutter covariance matrix is unknown; compound-Gaussian clutter when the target signal is 1-D unknown (unknown steering vector); Adaptive implementation in compound-Gaussian clutter when the target signal is r-D unknown (modelled as a rank-deficient Gaussian random vector); Advanced radar detection under mismatched signal models (Mismatched signals; Robust receivers; Selective receivers; Tunable receivers).

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Project 25%, tutorials 20% and examination 55%.

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**EEE5111Z HIGH RESOLUTION AND IMAGING RADAR**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students.**Course outline:****Part 1:** High Resolution Radar (selection of) Application of the Radar Range Equation to High-Resolution Radar, High-Resolution Radar Design; High-Range-Resolution Waveforms and Processing; Synthetic High-Range-Resolution Radar.**Part 2:** Synthetic Aperture Radar (selection of) Synthetic Aperture Concepts; SAR Signal Properties; SAR Processing Algorithms (Range Doppler Algorithm; Chirp Scaling Algorithm; Omega-K Algorithm; SPECAN Algorithm) Comparison of Algorithms; Doppler Centroid Estimation; Automatic Focusing; Advanced concepts (Polarimetric SAR; Interferometric SAR; GMTI); Applications of SAR (Military, Earth Observation, Digital Terrain Elevation Models).**Part 3:** Inverse Synthetic Aperture Radar (selection of) Inverse Synthetic Aperture Radar Concepts; ISAR Geometry and Signal Modeling; ISAR image formation (RF Front-End and Signal demodulation; Radial motion compensation (Autofocusing); Image formation (Range-Doppler (RD), Joint Time-Frequency Analysis (JTFA), Back-projection); Interpretation of ISAR Images Image Autofocusing techniques (Parametric and non-parametric techniques; Hot Spot Processing (Prominent Point Processing); Phase Gradient Autofocus (PGA); Image Contrast Based Autofocus (ICBA); Image Entropy Based Autofocus (IEBA); Comparison of methods Time-window selection; Cross range scaling; ISAR imaging using CLEAN techniques; Polarimetric ISAR; Recent advances (Bistatic and multi-static ISAR, 3D ISAR).**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.**Assessment:** Projects 25%, tutorials 20% and examinations 55%.

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**EEE5112Z RADAR SYSTEM MODELLING**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students**Course outline:**

This course aims to develop an advanced understanding of radar system modelling. Topics include: modelling &amp; simulation to assess radar systems; the complexities of radar cross section of a target; propagation and clutter and application of techniques to integrate propagation, radar cross section and clutter models into the radar model.

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.**Assessment:** Projects 25%, tutorials 20% and examinations 55%.

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**EEE5114Z SPECIAL TOPICS IN RADAR A***Not offered in 2016*

5 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan**Course outline:**

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures and a post cost seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

**DP requirements:** None**Assessment:** 3 hour Examination 100%.

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**EEE5115Z SPECIAL TOPICS IN RADAR B**

5 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course outline:**

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post cost seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

**DP requirements:** None

**Assessment:** 2 hour examination 100%.

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**EEE5116Z SPECIAL TOPICS IN RADAR C**

*Not offered in 2016*

5 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course outline:**

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

**DP requirements:** None

**Assessment:** 3 hour examination 100%

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**EEE5117Z SPECIAL TOPICS IN RADAR D**

*Not offered in 2016*

10 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course outline:**

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

**DP requirements:** None

**Assessment:** 3 hour examination 100%

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**EEE5118Z SPECIAL TOPICS IN RADAR E**

*Not offered in 2016*

10 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course outline:**

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

**DP requirements:** None

**Assessment:** 3 hour examination 100%

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**EEE5119Z INTRODUCTION TO RADAR SYSTEMS**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students

**Course outline:**

This advanced course in radar systems includes: Introduction to Signal Processing in Radar Systems (basic radar functions; elements of pulsed radar; signal processing concepts in radar e.g. spatial resolution, sampling theory, correlation, interference suppression, phenomenology, imaging, detection). Signal Models and Processing in Radar (radar cross section; radar equation; swerling

models; clutter modelling; noise modelling and signal-to-noise ratio; jamming; doppler shift; cross-range; multipath; sampling in doppler and angle domains; quantization; I/Q modulation; radar; matched filtering; compression filtering; ambiguity function; pulse burst waveforms; frequency-modulated waveforms; phase modulated waveforms; Doppler spectrum; moving target indication; pulse doppler processing; pulse pair processing). Data Processing Topics in Radar (radar detection and hypothesis testing; threshold detection; binary integration; constant false alarm rate; CFAR forms, {Cell-averaging CFAR; Order statistic CFAR}; spatial filtering; temporal filtering, beam forming; space-time adaptive processing; concepts of cognitive radar). Introduction to Radar Target Recognition Information available in radar signals; extracting features from radar signals, signal processing for target recognition, pattern recognition techniques, secondary radar, over the horizon radar, and subsurface radar.

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Coursework 40% and examination 60%

### EEE5120Z INTRODUCTION TO ELECTRONIC DEFENCE

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O' Hagan

**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students.

**Course outline:**

This course is an advanced introduction to electronic defence. Selected topics include: Electronic Warfare: threats, requirements and principles (information warfare, intelligence, electronic attack against radar & communication systems). Advanced Radar Threat (low-intensity threat, air defence radar, phased array radars, airborne radar, EP techniques for surveillance and tracking radar). Modern EA Systems: architecture, types, and technology (onboard/offboard architectures, operational EA systems architecture, EA radar jamming waveforms, transponder jamming, support jamming). EA Against Modern Radar Systems (pulse compression, pulsed doppler radar, monopulse, coherent sidelobe cancelers). Digital Radio Frequency Memory (DRFM architectures, DRFM fundamentals, DRFM sampling techniques, direct digital synthesizer, advanced DRFM architecture, voltage controlled oscillators). Electronic Warfare Support (signal and threat environment, parameters measured by the ES system, advanced ES systems, direction finding, probability of intercept). Expendables and Decoy Systems (design of expendable EA systems, chaff, infrared missile attack). Directed Energy Weapons and Stealth Technology (directed energy weapons, stealth). Applications of EW-Surveillance (search for, intercept, identify, and locate or localize sources of intentional and un-intentional radiated electromagnetic energy for immediate threat recognition, targeting, planning). Jamming (use of electromagnetic energy, directed energy, or anti-radiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability). Protection (passive and active means to protect personnel, facilities, and equipment from any effects of friendly or enemy use of the electromagnetic spectrum that could degrade, neutralize, or destroy friendly combat capability).

**DP requirements:** 80% attendance of lectures and completion of tutorials/projects.

**Assessment:** Coursework 40% and examination 60%

### EEE5121Z MICROWAVE COMPONENTS& ANTENNAS

*Not running in 2016*

20 NQF credits at HEQSF level 9; block release.

**Convener:** Emeritus Professor BJ Downing

**Course outline:**

This advanced course will focus on microwave components and antennas used in radar systems. The design of components and antennas is a core part of the curriculum and includes an understanding of: filters and multiplexing: microwave filters, diplexers, duplexers, ferrites in circulators and isolators, isolator, gyrator, circulator, power tubes, klystron, travelling wave tube, backward wave oscillator antenna theory: antenna characteristics including gain, directivity, reciprocity far field, reflector antennas, antenna arrays, and radar antennas.

**DP requirements:** None

**Assessment:** Coursework 30% and examination 70%

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### **EEE5122F COMPUTATIONAL ELECTRONICS I**

20 NQF credits at HEQSF level 9; block release.

**Convener:** Professor A Baghai-Wadji

**Course outline:**

This course introduces advanced students to classical, modern and cutting-edge computational techniques for modelling and simulation of micro-electronic, micro-acoustic, and photonic devices. The course provides instruction in: finite difference method, finite element method, boundary element method, classical statistical methods, standard integral transform techniques, variational analysis techniques, method of functional analysis, iterative techniques, asymptotic analysis methods and micro-acoustic devices, electromagnetic and acoustic near-fields, photonic devices, meso-scopic electronic devices.

**DP requirements:** None

**Assessment:** Coursework 30% and examination 70%.

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### **EEE5123S COMPUTATIONAL ELECTRONICS II**

20 NQF credits at HEQSF level 9; block release.

**Convener:** Professor A Baghai-Wadji

**Course outline:**

This course introduces advanced students to modern computational techniques for modelling and simulation of nano-electronic, plasmonic, quantum electronic, and molecular-electronic devices and provides instruction in: path integral method, quantum statistical methods, wavelets and frames, modern integral transform techniques, theory of distributions, various differentiation techniques, various integration techniques, method of functional analysis, lie algebras, coherent states, dressed states, squeezed states, wanner functions, nano-acoustic devices, plasmonic devices, meta-materials, and quantum devices, quantum dots, quantum wires.

**DP requirements:** None

**Assessment:** Coursework 30% and examination 70%.

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### **EEE5124Z SPACE AND SOCIETY**

15 NQF credits at HEQSF level 9; block release.

**Convener:** Professor P Martinez

**Course outline:**

This advanced course will focus on the societal dimensions of space science and technology. The course will cover the scientific, military, economic and political rationales for space activities. The various international and national regulatory frameworks for space activities will be covered as well as the rationales for and salient aspects of international space cooperation. Space activities are often thought of in terms of their scientific and technological attributes. Yet, the successful implementation of both public and private sector space programmes relies on a wide variety of non-space factors. This course will cover: the historical and current economic, political, military and regulatory drivers for space activities. The drivers for international cooperation in space activities and the changing geopolitics of space cooperation. An overview of regulation of space activities at national and international level and the financing of space projects. A further important aim will be to train students in the communication of space activities to the media and to non-specialist audiences. Students will be required to complete one compulsory outreach activity.

**DP requirements:** None

**Assessment:** Coursework 45% and examination 55%

**EEE5125Z SPACE APPLICATIONS FOR SUSTAINABLE DEVELOPMENT**

15 NQF credits at HEQSF level 9; block release.

**Convener:** Professor P Martinez

**Course outline:**

Space systems play a critical role in the modern information society. The course will focus on the applications of space technology to address sustainable development challenges from a local and global perspective. The three main pillars of space applications are: Earth observation, communications and satellite-aided positioning, timing and navigation. These technologies may be applied to a wide variety of problems in food, water and human security, climate change, environmental management, disaster management and telemedicine and tele-education. The course will provide an overview of the main applications of space systems to support sustainable development. The course content will be supplemented by hands-on workshops in which students will have the opportunity to work with satellite data to solve real-world problems.

**DP requirements:** None

**Assessment:** Coursework 45% and examination 55%

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**EEE5126Z SPACE MISSION ANALYSIS AND DESIGN**

15 NQF credits at HEQSF level 9; block release.

**Convener:** Professor P Martinez

**Course outline:**

Spacecraft are considered to be part of a space system that comprises both a space segment and a ground segment. This requires an understanding of the space environment and its effects on spacecraft, as well as the basic principles of astronautics to describe satellite orbits and spacecraft trajectories. This course aims to provide a systematic introduction to all the aspects and processes involved in the definition, design, development, testing and operation of space systems. Students are introduced to analysis tools that can be used to explore different mission architectures from the point of view of the space environment, Earth coverage, orbit selection, mission operations and data/information flow and analysis. The course will also cover access to space and space transportation.

**DP requirements:** None

**Assessment:** Coursework 45% and examination 55%

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**EEE5127Z SPECIAL TOPICS IN SPACE STUDIES**

5 NQF credits at HEQSF level 9

**Convener:** Professor P Martinez

**Course outline:**

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The course will cover an important topic in space studies that is not covered by other courses. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures and supplemented by the use of online resources. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and deepen the students' knowledge of the special topic.

**DP requirements:** None

**Assessment:** Coursework 45% and examination 55%

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**EEE5128Z NUCLEAR REACTOR THEORY AND DESIGN**

20 NQF credits at HEQSF level 9

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This advanced course aims to develop strong concepts of engineering theory and design as applied in the context of nuclear power reactors. Topics include: nuclear reactor engineering theory and design, with an emphasis on pressurised water reactors: types and generations of power reactors;

neutron life cycle; reactor operation theory; reactor core design; thermal-hydraulic analysis; core power density and effect on reactor size, control and shielding; corrosion and materials properties.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

### **EEE5129Z NUCLEAR REACTOR OPERATIONS AND SAFETY**

20 NQF credits at HEQSF level 9

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This advanced course aims to establish strong concepts of the operation and safety of complex systems and the application in the context of nuclear power stations. Topics include: functional description and design of main components of primary, secondary, auxiliary and safety systems; physical phenomena determining order of magnitude of key parameters of reactor operation; system modelling, normal operating transients, accident scenarios and extreme event identification; shutdown and restart; reactor coolant system; reactor protection; electricity supplies needed for production and safety; and simulators.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

### **EEE5130Z REGULATORY REQUIREMENTS FOR NUCLEAR POWER**

20 NQF credits at HEQSF level 9

**Convener:** Emeritus Professor CT Gaunt

**Course outline:**

This course aims to develop an advanced understanding of nuclear facility licencing, assess the integration of nuclear energy into large power systems, and understand environmental impact assessment and management. Topics include: safety requirements and licencing processes for nuclear plants: nuclear regulation; design philosophy; radiation protection management; emergency preparedness; verification and assurance; learning from incidents; international peer review. Energy regulation: energy regulator, integrated energy planning; independent system operators; market systems. Environmental regulation: environmental impact analysis; environmental management plans; and monitoring.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

### **EEE5131Z MICROWAVE FILTERS**

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor R Geschke

**Course outline:**

The course is presented over five days and presents a systematic progression of topics from specification and theoretical synthesis, CAD-assisted design and practical manufacturing techniques for microwave filters operating in the frequency ranges of typical radar systems.

**DP requirements:** 80% attendance and submission of seminars and tutorial assignments

**Assessment:** Coursework 50%, Examination 50%

### **EEE5132Z SPECIAL TOPIC IN RADAR F**

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor D O'Hagan

**Course entry requirements:** An Engineering Honours Degree or equivalent.

**Course outline:**

This course is a presentation and study of a specialist topic in the field of Radar and Electronic Defence. A student will attend 35 hours of lectures in block release format in 1 week. This will be

## 200 DEPARTMENTS IN THE FACULTY

followed by about 5 weeks of tutorials and projects. Assessment is by means of coursework 30% and a final examination 30%.

**DP requirements:** 80% attendance and submission of seminars and tutorial assignments

**Assessment:** Coursework 30%, Examination 70%

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### EEE5133Z SPECIAL TOPICS IN SPACE TECHNOLOGY B

5 NQF credits at HEQSF level 9

**Convener:** Professor P Martinez

**Course outline:**

This course provides an introduction to a highly specialised or cutting-edge topic in space studies. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures, supplemented by the use of online resources and distance-learning methods. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and hence deepen the course participant's knowledge of the special topic in question.

**DP requirements:** 80% attendance at all lectures and learning events and submission of all assignments.

**Assessment:** Coursework 45%, Examination 55%

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### EEE5134Z SPECIAL TOPICS IN SPACE TECHNOLOGY C

5 NQF credits at HEQSF level 9

**Convener:** Professor P Martinez

**Course entry requirements:** An Engineering degree or equivalent four-year degree.

**Course outline:**

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures, supplemented by the use of online resources and distance-learning methods. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and hence deepen the course participant's knowledge of the special topic in question.

**DP requirements:** 80% attendance at all lectures and learning events and submission of all assignments.

**Assessment:** Coursework 45%, Examination 55%

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### EEE5135Z INFORMATION THEORY

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Dlodlo

**Co-requisites:** Postgraduate standing in Electrical Engineering and exposure to undergraduate telecommunications content

**Course outline:**

This course explains the basic ideas of information theory and the correspondences between the elements of this theory and certain natural concepts of importance in a wide number of fields, such as transmission, storage, authoring and protection of data. On the basis of simple concepts from probability calculus, models are developed for a discrete information source and a discrete communication channel. Further, the theoretical basics for developing source coding algorithms is provided, as well as the basics of optimal data transmission through a discrete communication channel. Introduction to error-correcting codes; mathematical basics; block codes fundamentals; cyclic codes; co-operating codes; soft-decision decoding; convolutional codes; iterative decoding (turbo codes, LDPC codes); applications.

**DP requirements:** None

**Assessment:** Coursework 30%, Examination 70%

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**EEE5136Z STATISTICAL SIGNAL THEORY**

20 NQF credits at HEQSF level 9

**Convener:** Dr A Murgu

**Course entry requirements:** MAM2083F/S, EEE2036S, EEE3086F, or equivalents.

**Co-requisites:** None

**Course outline:**

This course originates in the realm of causal uncertainty over observed phenomena due to incomplete information from the real world. The theory of probability seeks to mathematically verify whether or not predictions about these phenomena are justifiable and pragmatic. The course challenges the participants to assume the probabilistic model of events where some of the possible determining factors may be unavailable. Mathematical statistical theory then enables us to examine the concepts and measure the likelihood of those predictions to the physical world and our engineering applications within it. The development will include topics such as: probability theory, random variables, functions of a random variable, two or more random variables, sequences of a random variable, introduction to stochastic processes, second-order processes, and applications of random processes to fields such as communications.

**DP requirements:** DP Requirement: Test Marks  $\geq 40\%$

**Assessment:** Coursework 40%, Examination 60%

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**EEE5137Z OPTICAL COMMUNICATIONS**

20 NQF credits at HEQSF level 9

**Convener:** Prof. A Baghai-Wadji

**Course entry requirements:** None

**Co-requisites:** None

**Course outline:**

This course aims to introduce advanced students to the physics of optoelectronic communication devices and their applications to communication systems. Topics include: optical fibre characteristics, lasers and light wave modulation, photonics, noise, receiver design, error control and system performance.

**DP requirements:** None

**Assessment:** Coursework 30%, Examination 70%

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**EEE5138Z BROADBAND COMMUNICATION NETWORKS**

20 NQF credits at HEQSF level 9

**Convener:** Mr N Ventura

**Course entry requirements:** Postgraduate standing in Electrical Engineering or background in undergraduate communication engineering course work.

**Co-requisites:** None

**Course outline:**

This course aims to develop an understanding of the fundamental techniques, algorithms and protocols underlying the recent advances in the field of broadband networking and ensure an understanding of the network architecture and protocols involved in the Evolved Packet Core (EPC). The course 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 provides 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. In addition to learning the architectural frameworks, students will be exposed to various analytical methods and simulation tools used in the design and engineering of next-generation networks. Topics include: Design and analysis of computer networks, modelling and performance evaluation, and queuing theory applied to computer networks. Traffic flow management and error control. Routing algorithms and protocols. Switch and router architectures. Extensions of internet technologies in various application domains. Mobile Broadband and Core Network Evolution overview of the

## 202 DEPARTMENTS IN THE FACULTY

Evolved packet system (EPS) Architecture, Data and Voice Services, Security in the Evolved packet Core, Quality of Service, Charging and Policy Control, Selection Functions in the EPC, Voice Services, LTE Broadcasting, EPS Network entities, Interfaces, Protocols and procedures.

**DP requirements:** 80% attendance and handing in of tutorials

**Assessment:** Coursework 20%, Project 30% and Examination 50%

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### EEE5139Z WIRELESS DATA NETWORK CONVERGENCE

20 NQF credits at HEQSF level 9

**Convener:** Associate Professor M Dlodlo

**Course entry requirements:** Postgraduate standing in Electrical Engineering or EEE3084W or EEE3083F and EEE3085S or equivalent.

**Co-requisites:** Postgraduate standing in Electrical Engineering and prior exposure to undergraduate telecommunications content.

**Course outline:**

This course aims to introduce students to advanced wireless networks with an emphasis on architecture, components, and protocols, as well as the latest developments in 4G towards 5G wireless standards. New concepts of mobility management, software defined network and new developments will be covered together with 3GPP standards and Internet Engineering Task Force (IETF) standard protocols. These examples will enable student engagement with the theoretical material and the related practical issues. Students will be able to understand the challenges associated with the latest generation of wireless networks and gain insight into new techniques under development.

**DP requirements:** None

**Assessment:** Coursework 40%, Examination 60%

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### EEE5140Z SOFTWARE DEFINED RADIO

20 NQF credits at HEQSF level 9

**Convener:** Dr S Winberg

**Course outline:**

This course aims to provide advanced students with an overview of software-defined radio systems and the technologies necessary for successful implementation, as well as exposure to significant computer and hands-on project work necessary to implement working SDR systems. Students will be able to: Identify the fundamentals of the communication link, the characteristics of network protocols, and be able to discuss the allocation of radio resources and technologies. Understand the systems required by a software-defined radio to function and the trade-offs and limitations encountered in the design of a software-defined radio system. Understand the radio propagation channel for radio communications links, and the basics of designing antenna systems to accommodate the needs of a particular software-radio system. Calculate an accurate link budget for a software-defined radio system or other wireless communications link. Understand how analogue and digital technologies are used for software-defined radios and the topologies and applications of those networks.

**DP requirements:** Minimum 45% for project

**Assessment:** Coursework 50%, Examination 50%

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### EEE6000W PHD IN ELECTRICAL ENGINEERING

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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## MECHANICAL ENGINEERING

The Department offers the following Postgraduate Degree Programmes:

Research project 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 (CME)  
 Centre for Research in Computational and Applied Mechanics (CERECAM)  
 Energy Research Centre (ERC)

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:

RD Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE

### Deputy Heads of Department:

Research: Professor GS Langdon, BEng PhD *Liverpool* MIMechE CEng  
 Teaching: Associate Professor CJ von Klemperer, BSc(Eng) MSc(Eng) PhD *Natal*

### Professors:

T Bello-Ochende, PrEng B.Eng M.Eng *Ilorin* PhD *Duke* MASME.  
 PG Rousseau, PrEng BEng (Mech) MEng (Mech) PhD *Pret* OPM *HBS*  
 H Winkler, MSc, *Berkley* MA PhD *Cape Town*

### Emeritus Professor:

KF Bennett, BSc(Eng) *Cape Town* MSc CNA A PhD *Cape Town* FSAIMechE  
 J Gryzagoridis, PrEng BSc(Eng) *Lamar* MSc(Eng) *Texas A&M* PhD *Cape Town* MSAIMechE  
 M(SA)IRAC M(SA)INT M(SAAM) M(N.YORK) ACAD.SCIENCES  
 RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE

### Adjunct Professor:

L Jestin, MSc(Eng) PhD *Marseille* HDR Provence  
 ADB Yates, BSc(Eng) MSc(Eng) PhD *Cape Town* MSAIMechE

### SARChI Professor in Industrial CFD:

AG Malan, PrEng BEng (Mech) MEng (Mech) *Pret* PhD *Swansea*

## 204 DEPARTMENTS IN THE FACULTY

### **Honorary Professor:**

D Karagiozova, PhD *Ukrainian Academy of Science*

### **Associate Professors:**

BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* FSAIMechE

R Kuppuswamy, BEng(Hons) MTech PhD *Singapore* SMSME

HD Mouton, BSc Eng *Pretoria* BSc *Unisa* B Eng Hons M Eng *Pretoria* PhD Eng *NWU*

G Vicatos, PrEng BSc(MechElec)(Marine) *Newcastle* MSc(Aero) DIC *London* PhD *Cape Town*

### **Senior Lecturers:**

S Chung Kim Yuen, BSc(Eng) MSc(Eng) PhD *Cape Town*

TJ Cloete, BIng *Stell* MIng *Stell*

C Findeis, NHD(Mech Eng) *Pret*

D Findeis, BSc(Eng) MSc(Eng) *Cape Town* MSAIMechE

WF Fuls, BSc(Eng) MSc(Eng) PhD(Eng)*NWU*

SL George, BSc(Eng) MSc(Eng) PhD *Cape Town*

R Govender, BSc(Eng) MSc(Eng) PhD *Cape Town*

EB Ismail, BSc(Eng) MSc(Eng) *Cape Town*

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

HT Pearce, BSc(Eng) *Cape Town* MS PhD *Illinois*

S Parker, BSc(Eng) MSc(Eng) *Cape Town*

CB Shaw, BSc(Eng) MSc(Eng) HDE MPhil(EngMan) DPhil(EngMan) *Cape Town*

### **Lecturers:**

T Booyesen, BSc(Eng) MSc(Eng) *Cape Town*

MN Ngoepe, BSc(Eng)*Cape Town*, DPhil *Oxon*

LC Raw, BSc(Eng) MSc(Eng) *Cape Town*

### **Principal Technical Officers:**

H Emrich

J Mayer

P Smith

H Tomlinson

### **Chief Technical Officers:**

D Jacobs

R Whittemore, BSc(Eng) *Cape Town*

### **Senior Technical Officer:**

### **Part-Time Technical Officer:**

T Newins

### **Laboratory Attendants:**

G Doolings

P Jacobs

W Slaverse

### **Departmental Manager**

CM Thomas HED BSc *Unisa* BSc(Hons) *NWU* MSc(MCM) *Natal* PGDip (EdTech) *Cape Town*

### **Administrative Assistant (Finance):**

B Glass

**Administrative Assistant (Undergraduate):**

R Maree

**Administrative Assistant (Postgraduate):**

C Jordaan

## Postgraduate Programmes

- Bachelor of Science (Honours) in Materials Science
- Master of Engineering by 120 credits coursework and a 60 credit dissertation
- Master of Science in Engineering by 180 credit dissertation
- Master of Science in Engineering by 60 credits coursework and a 120 credit dissertation
- Master of Philosophy by coursework and dissertation
- Doctor of Philosophy

## Honours Programmes

### Bachelor of Science (Honours) in Materials Science

[EH005MEC04]

**Programme Convener:**SL George BSc(Eng) MSc(Eng) PhD *Cape Town*

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 Master's 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.

**Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC4091S</b>	Honours Research Project .....	40	8
<b>MEC4096Z</b>	Manufacture & Properties of Composites .....	12	8
<b>MEC4097Z</b>	Manufacture & Properties of Ceramics .....	8	8
<b>MEC4098Z</b>	Properties & Manufacture of Metallic Materials .....	16	8
<b>MEC4100Z</b>	Manufacture & Properties of Polymers .....	12	8
<b>MEC4114Z</b>	Experimental Techniques in Materials Science .....	16	8
	Approved Electives .....	0	0
	Total credits .....	0	0

**Elective Courses***Select 40 credits from the following courses:*

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC3045F</b>	Experimental Methods .....	12	7
<b>MEC3060F</b>	Materials under Stress .....	8	7
<b>MEC4088Z</b>	Manufacturing with Materials .....	12	8
<b>MEC4099Z</b>	Phase Transformations in Materials .....	8	8
<b>END4000F</b>	Professional Communication Studies .....	12	08

## Master's Programmes

### MSc in Engineering specialising in Mechanical Engineering [MEC01]

#### Research Master's by dissertation

[EM023MEC01]

#### EM023 Research Master's by dissertation

##### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5000W</b>	Dissertation Mechanical Engineering .....	180	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	0	0

#### Research Master's by coursework and dissertation

[EM024MEC01]

#### EM024 Research Master's by coursework and dissertation

##### Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5010Z</b>	Dissertation Mechanical Engineering .....	120	9
	Elective courses approved by supervisor.....	0	0
<b>MEC5097Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Total credits .....	0	0

### MSc in Engineering specialising in Materials Engineering [MEC03]

The Centre for Materials Engineering prepares candidates for the Master of Science in Engineering in Materials Engineering and for the Doctor of Philosophy.

The Master of Science in Engineering specialising in Materials Engineering can be either by dissertation only [EM023] or by coursework (approved by your supervisor) and dissertation [EM024].

#### Research Master's by dissertation

[EM023MEC03]

#### EM023 Research Master's by dissertation

##### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5070W</b>	Dissertation Materials Engineering.....	180	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	0	0

**Research Master's by coursework and dissertation**

[EM024MEC03]

**EM024 Research Master's by coursework and dissertation****Core Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5071Z</b>	Dissertation Materials Engineering .....	120	9
	Elective courses approved by supervisor .....	0	0
<b>MEC5097Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Total credits .....	0	0

**MSc in Engineering specialising in Sustainable Energy Engineering**

[EM024MEC07]

**Professor and Convener:**H Winkler MSc *Berkeley* MA PhD *Cape Town*

The Energy Research Centre offers a structured Master's Programme in Sustainable Energy Engineering, specifically aimed at engineering graduates. Students are required to complete 80 credits of course work, the courses being chosen from the list below. Courses other than those on the list below may be taken subject to approval by the Director of the Energy Research Centre. 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.

**Compulsory Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5061W</b>	Dissertation: Sustainable Energy .....	120	09
<b>MEC5091Z</b>	Introduction to Energy Policy & Sustainable Energy Engineering	20	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master's journal paper .....	0	9
	Approved electives .....	0	0
	Total credits .....	0	0

**Elective Courses (60 credits must be selected from the following list)**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5056Z</b>	Energy Efficiency & Demand Side Management .....	20	9
<b>MEC5059Z</b>	Energy Modelling .....	20	9
<b>MEC5075Z</b>	New & Renewable Energy Technologies .....	20	9
<b>MEC5089Z</b>	Energy Project .....	20	9
<b>MEC5090Z</b>	Energy & Climate Change .....	20	9

**MSc in Engineering specialising in Sustainable Energy Engineering**

[EM023MEC07]

**Professor and Convener:**H Winkler MSc *Berkeley* MA PhD *Cape Town*

**Compulsory Courses**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5060W</b>	Dissertation: Sustainable Energy Engineering.....	180	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	<b>180</b>	

**Master of Philosophy specialising in Energy & Development Studies**

[EM026MEC08]

**Professor and Convener:**H Winkler MSc *Berkeley* MA PhD *Cape Town*

The Energy Research Centre offers a structured Master's Programme in Energy and Development Studies, specifically aimed at graduates from diverse academic backgrounds. Students are required to complete 80 credits of course work, the courses being chosen from the list below. Courses other than those on the list below may be taken subject to the approval of the Director of the Energy Research Centre. To qualify for the MPhil degree 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.

**Compulsory Course**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5092W</b>	Dissertation Energy & Development Studies.....	120	9
<b>MEC5091Z</b>	Introduction to Energy Policy & Sustainable Energy Engineering.....	20	9
<b>MEC5097Z</b>	Dissertation Preparation.....	0	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Approved electives.....	0	0
	Total credits.....	0	0

**Elective Courses (60 credits must be selected from the following list)**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5059Z</b>	Energy Modelling.....	20	9
<b>MEC5075Z</b>	New & Renewable Energy Technologies.....	20	9
<b>MEC5087Z</b>	Energy Markets & Governance.....	20	9
<b>MEC5088Z</b>	Energy Poverty & Development.....	20	9
<b>MEC5089Z</b>	Energy Project.....	20	9
<b>MEC5090Z</b>	Energy & Climate Change.....	20	9

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.

**Master of Philosophy specialising in Energy & Development Studies**

[EM025MEC08]

**Professor and Convener:**H Winkler MSc *Berkeley* MA PhD *Cape Town***Compulsory Course**

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5093W</b>	Dissertation Energy & Development Studies.....	180	9
<b>END5050X</b>	Master's journal paper.....	0	9
	Total credits.....	0	0

## Master of Philosophy specialising in Computational Mechanics [EM026MEC01]

### Professor and Convener:

BD Reddy, OMB BSc(Eng) *Cape Town* PhD *Cantab* FRSSAF FSAAE MASSAF

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.

### Compulsory Courses

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5010Z</b>	Dissertation.....	120	9
<b>MEC5097Z</b>	Dissertation Preparation.....	0	9
<b>END5050X</b>	Master's journal paper.....	0	9

### Elective courses

*Select courses to the value of 60 credits:*

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5063Z</b>	An Introduction to Finite Elements.....	12	9
<b>MEC5064Z</b>	Finite Element Analysis.....	12	9
<b>MEC5065Z</b>	Programming for Scientists & Engineers.....	12	9
<b>MEC5066Z</b>	Continuum Mechanics.....	12	9
<b>MEC5067Z</b>	Non-linear Material Behaviour.....	12	9
<b>MEC5068Z</b>	Topics in Computational & Applied Mechanics.....	12	9
<b>MEC5069Z</b>	Computational Fluid Dynamics: A First Course.....	12	9
	Total credits.....	0	0

## Master of Philosophy specialising in Engineering Management [EM026MEC02]

### Programme Convener:

CB Shaw, BSc HDE MPhil (EngMan) PhD *Cape Town*

Although this programme is in the Faculty of Engineering and the Built Environment it is designed for graduates from any discipline interested in gaining interdisciplinary knowledge and an advanced understanding of key subjects in management practice. The programme is focused around principles, tools, techniques and thinking for the development of management practice. The programme includes coursework and a dissertation. The dissertation involves sustained supervised research and writing-up throughout the period of study. The coursework includes online work and taught modules integrated and applied in the context of the work environment. To qualify for the MPhil specialising in Engineering Management, candidates are required to complete a supervised dissertation, equivalent to a further 120 credits, on an approved topic.

### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5025Z</b>	Dissertation.....	120	9
<b>MEC5097Z</b>	Dissertation Preparation.....	0	9
<b>END5050X</b>	Master's journal paper.....	0	9
<b>MEC5035Z</b>	Project Management.....	20	9
<b>MEC5054Z</b>	Introduction to Business Administration.....	40	9
	Total credits.....	0	0

## 210 DEPARTMENTS IN THE FACULTY

\*Please note that certain courses run every alternate year and courses will only run if there are sufficient students registered for the course.

### Master of Philosophy specialising in Engineering Management [EM027MEC02]

#### Programme Convener:

CB Shaw, BSc HDE MPhil(EngMan) PhD *Cape Town*

The Department offers a structured Master's Programme in Engineering Management. This is an interdisciplinary programme primarily aimed at engineering graduates, although suitable for non-engineering graduates. Students are required to complete a minimum of 120 credits of coursework, chosen from the list below. To qualify for the MPhil degree specialising in Engineering Management, candidates are required to complete a supervised minor dissertation, equivalent to a further 60 credits, the topic of which requires the approval of the programme convener.

Note: Candidates are required to complete courses to the value of 120 credits from the list of elective-core courses listed below, to be selected in consultation with the Programme Convener.

#### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5095Z</b>	Minor Dissertation.....	60	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	9

#### Select courses to the value of 120 credits

Select courses to the value of 120 credits:

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC5035Z</b>	Project Management.....	20	9
<b>MEC5037Z</b>	Operations Management Project.....	20	9
<b>MEC5046Z</b>	Systems Engineering Practice.....	40	9
<b>MEC5054Z</b>	Introduction to Business Administration .....	40	9
<b>MEC5080Z</b>	Managing New Venture Projects.....	20	9
	Total credits.....	0	0

\*Please note that certain courses run every alternate year and courses will only run if there are sufficient students registered for the course.

## Doctoral Programmes

### Doctor of Philosophy

[ED001-MEC]

**ED001 Doctor of Philosophy is a Research Degree**

#### Core Course

Course Code	Course Title	NQF Credits	HEQSF Level
<b>MEC6000W</b>	Thesis (Mechanical Engineering).....	360	10
<b>MEC6002W</b>	Thesis (Engineering Management) .....	360	10
<b>MEC6003W</b>	Thesis (Sustainable Energy Engineering).....	360	10
<b>MEC6004W</b>	Thesis (Materials Engineering).....	360	10
<b>MEC6005W</b>	Thesis (Energy & Development Studies).....	360	10
<b>MEC6006W</b>	Thesis (Engineering Education).....	360	10

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

## Course Outlines

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### **MEC4088Z** MANUFACTURING WITH MATERIALS MEC4088Z IS NOT OFFERED IN 2016

12 NQF credits at HEQSF level 8

**Convener:** Professor RD Knutsen

**Assessment:** .

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### **MEC4096Z** MANUFACTURE & PROPERTIES OF COMPOSITES

12 NQF credits at HEQSF level 8

**Convener:** Dr C Woolard

**Course entry requirements:** MEC2042F or BSc (Hons) MatSc candidate

**Course outline:**

This course aims to develop an advanced understanding of the manufacture and properties of composites. Topics include: history of composites; carbon, glass and aramid fibres; functions of the reinforcement and matrix, polymer-, metal- and ceramic-matrix composites; manufacture of composites; thermal properties, 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, and modification and design of composites.

**DP requirements:** None

**Assessment:** Class tests, examination 3 hours.

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### **MEC4097Z** MANUFACTURE AND PROPERTIES OF CERAMICS

8 NQF credits at HEQSF level 8

**Convener:** Professor RD Knutsen

**Course entry requirements:** MEC2042F or BSc (Hons) MatSc candidate

**Course outline:**

This course aims to develop an advanced understanding of the manufacture and properties of ceramics. Topics include: 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; and selection and design of ceramic components.

**DP requirements:** 35% minimum for class record.

**Assessment:** Class tests, examination 3 hours (40% min for examination).

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### **MEC4098Z** PROPERTIES AND MANUFACTURE OF METALLIC MATERIALS

16 NQF credits at HEQSF level 8

**Convener:** Professor RD Knutsen

**Course entry requirements:** MEC2042F or BSc(Hons) MatSc candidate

**Course outline:**

This course aims to develop an advanced understanding of the properties and manufacture of metallic materials. The course is divided into four modules (12 lectures each) and topics include: Phase transformations in metals and alloys; metallurgy and properties of ferrous alloys; metallurgy and properties of non-ferrous alloys; introduction to metallic corrosion.

**DP requirements:** None

**Assessment:** Projects, class tests, examination 3 hours.

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### **MEC4099Z** PHASE TRANSFORMATIONS IN MATERIALS

## 212 DEPARTMENTS IN THE FACULTY

8 NQF credits at HEQSF level 8

**Convener:** Professor RD Knutsen

**Course entry requirements:** MEC3060F

**Course outline:**

This course aims to develop an advanced understanding of phase transformations in materials. Topics include: thermodynamics and kinetics of phase equilibria and phase transformations in metals, alloys and ceramic materials.

**DP requirements:** Completion of all practicals & assignments

**Assessment:** Class record (30%); 2 hour examination (70%).

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### **MEC4100Z MANUFACTURE & PROPERTIES OF POLYMERS**

12 NQF credits at HEQSF level 8

**Convener:** Dr C Woolard

**Course entry requirements:** MEC2042F or BSc(Hons) MatSc candidate

**Course outline:**

This course aims to develop an advanced understanding of the manufacture and properties of polymers. Topics include: polymer nomenclature; morphology; bonding; molecular weight, polymerization, crystallisation; polymer types; rheology; manufacturing methods; applications; polymer identification; polymer modification, additives; analytical techniques; biodegradability; and selection and design.

**DP requirements:** None

**Assessment:** Practical, class tests, examination 3 hours.

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### **MEC4111Z NUCLEAR MANUFACTURING AND CONSTRUCTION ENG MANAGEMENT**

12 NQF credits at HEQSF level 8

**Convener:** Dr C Shaw

**Course outline:**

This course covers: Application of appropriate tools, techniques and theories for management problem solving; an overview of how construction projects are initiated and driven forward; roles and responsibilities of the various human resources involved in construction projects; knowledge of forms of regulations, contract and of law relevant to construction projects; health and safety; costing and financial implications in construction projects; processes and conversion of activities into processes in a nuclear power plant; value chain for identifying improvements; understanding of the origins of "wastes" in an organisation.

**Assessment:** Group assignment and presentation (10%); Individual assignments (20%); Written examination (70%)

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### **MEC4114Z EXPERIMENTAL TECHNIQUES IN MATERIALS SCIENCE**

16 NQF credits at HEQSF level 8

**Convener:** Professor B Sonderegger

**Course entry requirements:** Registration for BSc(Hons) in MatSc

**Course outline:**

This course aims to provide detailed insight into the experimental techniques for manipulating and investigating the properties and the microstructure of engineering materials. Techniques include: heat treatment (furnace construction, temperature control, furnace environment); mechanical testing (hardness, tensile/compression/bending, impact, work-hardening, fatigue and creep); corrosion resistance (exposure and potentiostatic/dynamic tests); thermal analysis including thermo-dilatometry, thermo-gravimetry and differential scanning calorimetry; quantitative microstructure characterization (X-ray diffraction, light microscopy, electron microscopy including SEM, TEM, EDS and EBSD).

**DP requirements:** None

**Assessment:** Coursework 50%, Examination 50%

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**MEC5000W** MASTER OF SCIENCE IN MECHANICAL ENGINEERING  
DISSERTATION

180 NQF credits at HEQSF level 9

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**MEC5010W** DISSERTATION MECHANICAL ENGINEERING

120 NQF credits at HEQSF level 9

**Course entry requirements:** MEC5097Z DP.

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**MEC5024S** STRUCTURAL IMPACT

12 NQF credits at HEQSF level 9

**Convener:** Professor G Langdon

**Course outline:**

This course aims to develop an advanced understanding of the importance of structural impact. Topics include: 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; dynamic loading effects; plastic buckling; and scaling laws and experimental techniques.

**DP requirements:** None

**Assessment:** Project(s)

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**MEC5036Z** MANAGING FOR PERFORMANCE IMPROVEMENT

*Not offered in 2016*

20 NQF credits at HEQSF level 9

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**MEC5037Z** OPERATIONS MANAGEMENT PROJECT

*Not offered in 2016*

20 NQF credits at HEQSF level 9

**Convener:** Dr C Shaw

**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.

**DP requirements:** None

**Assessment:** Project(s).

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**MEC5043Z DESIGN & MANAGEMENT OPERATIONAL SYSTEMS**

*Not offered in 2016*

40 NQF credits at HEQSF level 9

**Course outline:**

**DP requirements:** None

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**MEC5046Z SYSTEMS ENGINEERING PRACTICE**

40 NQF credits at HEQSF level 9

**Convener:** Dr C Shaw

**Course outline:**

This course aims to develop an advanced understanding of systems thinking. Topics include: management and organisational concepts; qualitative mapping and modelling; and a system's approach to problem solving.

**Lecture times:** Block release (two contact modules).

**DP requirements:** None

**Assessment:** Position papers 50%, portfolio of projects and reflective papers 50%.

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**MEC5047W MSC ENGINEERING MANAGEMENT**

180 NQF credits at HEQSF level 9

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**MEC5048S NON-DESTRUCTIVE TESTING & EVALUATION**

12 NQF credits at HEQSF level 9

**Convener:** Mr D Findeis

**Course entry requirements:** BSc(Eng) degree

**Course outline:**

This course aims to develop an advanced understanding of non-destructive testing and evaluation. Topics include: 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 flaw detection. Shearography as a 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; and testing for flaws in composite materials by mechanical impedance.

**DP requirements:** None

**Assessment:** Project, November examination 3 hours

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**MEC5049S ADVANCED REFRIGERATION**

*Not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor G Vicatos

**Course outline:**

This course aims to develop an understanding of advanced refrigeration. Topics include: Aspects of compression refrigeration. Effects that degrade vapour compression refrigeration; multiple compression; multiple evaporators; flash chambers; and cascade systems. 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; and aspects of combined compression/absorption cycle: comparison of performance.

**DP requirements:** None

**Assessment:** Examination 3 hours.

### **MEC5051Z MECHANICAL ENGINEERING PROJECT**

20 NQF credits at HEQSF level 9

**Course entry requirements:** 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 Master's 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.

**DP requirements:** None

**Assessment:** Examination and/or project.

### **MEC5054Z INTRODUCTION TO BUSINESS ADMINISTRATION**

40 NQF credits at HEQSF level 9

**Convener:** Dr C Shaw

**Course entry requirements:** Registration for postgraduate qualification.

**Course outline:**

This course aims to provide an advanced introduction to business administration. Topics include: Introduction to business and the business environment; marketing management; finance management; human resources management; operations management; general management; quantitative methods in management economics, accounting, business and society.

**Lecture times:** Block release (two contact modules).

**DP requirements:** None

**Assessment:** Position papers 50%, portfolio of projects and reflective papers 50%.

### **MEC5056Z ENERGY EFFICIENCY & DEMAND SIDE MANAGEMENT**

20 NQF credits at HEQSF level 9

**Convener:** Mr A Hibberd

**Course entry requirements:** Registration for the MSc(Eng) in Sustainable Energy Engineering

**Course outline:**

This course aims to develop an understanding of energy efficiency and demand side management (DSM). Topics include: Energy efficiency and DSM technologies in the domestic, commercial and industrial sectors; energy management systems; measurement and verification (M&V) of energy efficiency measures; energy auditing, efficiency economics and tariff structures. One written long paper on an agreed topic and one group work exercise will be undertaken.

**Lecture times: Practicals:** Data Analysis. A set of energy use data is made available which needs to be analysed to identify patterns, trends, possible concerns.

**DP requirements:** Attendance at lectures and participation in the group project as well as submission of the long paper by the published deadline date.

**Assessment:** Long paper 25%, Group work 25%, Examination 50%.

### **MEC5059Z ENERGY MODELING**

20 NQF credits at HEQSF level 9

**Convener:** Mr A Stone; Mr F. Ahjum (Co-Convenor)

**Course entry requirements:** Registration for the MPhil in Energy & Development Studies or for the MSc (Eng) in Sustainable Energy Engineering.

**Course outline:**

This course aims to deliver a practical introduction to techno-economic energy system modelling as typically undertaken for grid capacity planning or climate change mitigation action assessment. Topics include: An introduction and overview of systems thinking, and general modelling techniques, followed by a focus on energy modelling and analysis including: energy demand projections, production cost projections, energy supply planning, policy planning, climate change mitigation assessment and integrated resource planning. Linkages between energy modelling, energy statistics and scenario planning will be discussed. Examples of existing energy modelling software and modelling systems will be demonstrated and used in assignments. Important considerations in energy modelling, such as, energy-economic relationships or technology advances, will be discussed. Students will engage in exercises during the core contact period to cement some of the techniques and concepts covered and will then undertake a long assignment over the remaining course duration which will involve researching, modelling and reporting on an energy modelling application involving energy infrastructure decisions across one or more sectors.

**Lecture times: Practicals:** Students will undertake a practical modelling assignment based on the theoretical material covered during the contact period, pre-readings and course tutorials. The assignment will be based on a real-life modelling problem, and students will be required to demonstrate an understanding of the modelling process, proficiency with energy modelling techniques, and an ability to communicate the modelling process and results clearly. **Fieldwork:** None.

**DP requirements:** To be eligible for the examination, students will be required to attend a minimum of 80% of the lectures, and complete the pre-course tutorial work and recommended pre-readings and to participate in discussions and complete tutorial assignments given during the course.

**Assessment:** Participation and Tutorial Exercises (15%), Examination (25%), and Long paper assignment (60%)

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**MEC5060W MASTERS DISSERTATION SUSTAINABLE ENERGY ENGINEERING**

180 NQF credits at HEQSF level 9

**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 Master's 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.

**DP requirements:** None

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**MEC5061Z MASTERS DISSERTATION SUSTAINABLE ENERGY ENGINEERING**

120 NQF credits at HEQSF level 9

**Course entry requirements:** 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 while 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. A dissertation towards a MSc (Eng) degree may incorporate any or all of the following: design of all or part of an engineering or built environment project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical and/or practical nature on an advanced topic belonging to the Engineering sciences; critical review of a specified topic based on a

comprehensive search of the literature or available data pertinent to an advanced topic belonging to the Engineering Sciences development of an item of equipment or a technique involving novel features or advanced design; and any other study acceptable to the Faculty of Engineering & the Built Environment.

**DP requirements:** None

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### **MEC5063Z AN INTRODUCTION TO FINITE ELEMENTS**

12 NQF credits at HEQSF level 9

**Convener:** Professor BD Reddy

**Course outline:**

This course is an advanced introduction to finite elements. Topics include: weak formulations of boundary value problems, using heat conduction or diffusion as a model problem; the finite element method for one- and two-dimensional problems; coding the finite element method using Matlab; and applications to heat conduction and problems in elasticity.

**DP requirements:** None

**Assessment:** June examination

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### **MEC5064Z FINITE ELEMENT ANALYSIS**

12 NQF credits at HEQSF level 9

**Convener:** Professor BD Reddy

**Course entry requirements:** MEC5063Z.

**Course outline:**

This course aims to develop an advanced understanding of finite element analysis. Selected topics in finite element analysis include: curvilinear elements; incompressibility and mixed methods; time-dependent problems; and nonlinear problems.

**DP requirements:** None

**Assessment:** November examination.

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### **MEC5065Z PROGRAMMING FOR SCIENTISTS AND ENGINEERS**

12 NQF credits at HEQSF level 9

**Convener:** Dr A McBride

**Course outline:**

This course aims 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 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.

**DP requirements:** None

**Assessment:** June examination

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### **MEC5066Z CONTINUUM MECHANICS**

12 NQF credits at HEQSF level 9

**Convener:** Dr A McBride

**Course outline:**

This course aims to develop an advanced understanding of continuum mechanics. Topics include: introduction to tensors; kinematics of continuous media; balance of mass, linear and angular momentum, and energy; stress; constitutive theory; linear elasticity; ideal fluids and Newtonian fluids.

**DP requirements:** None

**Assessment:** June examination.

**MEC5067Z** NONLINEAR MATERIAL BEHAVIOUR

12 NQF credits at HEQSF level 9

**Convener:** Dr S Skatulla

**Course entry requirements:** MEC5066Z

**Course outline:**

This course aims to develop an advanced understanding of nonlinear material behaviour. Topics in nonlinear mechanics; nonlinear elasticity; behaviour of elastic-plastic solids and non-Newtonian fluids are included.

**DP requirements:** None

**Assessment:** November examination

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**MEC5068Z** TOPICS IN COMPUTATIONAL & APPLIED MECHANICS

12 NQF credits at HEQSF level 9

**Convener:** Dr A McBride

**Course entry requirements:** MEC5063Z, MEC5066Z.

**Course outline:**

The aim of this course is to introduce advanced computational aspects of the finite element method using the modern, open-source finite element library deal.II. The topics covered include: non-linear problems, time-dependent problems, parallelisation and adaptivity. The course is project based. An extensive overview of the course may be viewed on the website.

**DP requirements:** None

**Assessment:** Project.

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**MEC5069Z** COMPUTATIONAL FLUID DYNAMICS (CFD)

12 NQF credits at HEQSF level 9

**Convener:** Professor AG Malan

**Course entry requirements:** MEC4045F

**Course outline:**

This course provides an introduction to select advanced concepts in Computational Fluid Dynamics (CFD). CFD is a fast growing field which has become a key strategic technology in numerous engineering fields. The emphasis of this course is on developing a fundamental understanding. It commences with a derivation of Navier-Stokes conservation equations. Next, a modern and versatile finite volume solution method is introduced and studied in terms of accuracy and computational cost. The student will be expected to implement algorithms into computer programmes using programming language of choice and such as to solve model problems. Topics include: discretization; error analysis; advection-diffusion systems; turbulent flows; and advanced solvers.

**DP requirements:** None

**Assessment:** Examination and project.

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**MEC5070W** DISSERTATION MATERIALS ENGINEERING

180 NQF credits at HEQSF level 9

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

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**MEC5071W** DISSERTATION MATERIALS ENGINEERING

120 NQF credits at HEQSF level 9

**Course entry requirements:** MEC5097Z DP

**Course outline:**

The dissertation should 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; or any other study acceptable to the Faculty.

**DP requirements:** None

**Assessment:** Written work counts 100%.

**MEC5075Z NEW & RENEWABLE ENERGY TECHNOLOGIES**

20 NQF credits at HEQSF level 9

**Convener:** Dr A Madhlopa

**Course entry requirements:** Registration for the MPhil in Energy and Development Studies, the MSc (Eng) in Sustainable Energy Engineering or equivalent postgraduate programme.

**Course outline:**

This course aims to develop an advanced understanding of new and renewable energy technologies. Topics include: renewable energy resources, solar radiations 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. The course focuses on renewable energy technologies, and within this large field, on RE technologies which have the most important present/future roles in countries like South Africa. Broader international trends will also be examined, but in less detail. More detailed engineering principles and RE system design issues will focus on major RE applications for South/Southern Africa.

**Fieldwork:** At least one field trip. Each student should submit a written report on the trip.

**DP requirements:** All assignments/reports should be completed and handed in timeously.

**Assessment:** Assignments/reports 20%, short class tests 20%, course examination 60%.

**MEC5087Z ENERGY MARKETS & GOVERNANCE**

20 NQF credits at HEQSF level 9

**Convener:** Dr B Rennkamp

**Course entry requirements:** Registration for the MPhil in Energy and Development Studies. [Students not registered in the ERC, may not register for this course].

**Course outline:**

This course aims to develop an advanced understanding of energy markets and governance. Topics include: National and international energy policy and 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; and energy pricing theory and methods.

**DP requirements:** Attendance at lectures and seminars and submission of all assignments.

**Assessment:** Examination 20%, weekly assignments 30%, long paper 50%.

**MEC5088Z ENERGY, POVERTY & DEVELOPMENT**

20 NQF credits at HEQSF level 9

**Convener:** Ms L Tait

**Course entry requirements:** Registration for either/or both MPhil in Energy and Development Studies and MSc Sustainable Energy Engineering

**Course outline:**

This course introduces students to the topic of access to energy services for the poor. It aims to give the student an overall understanding of the role that modern energy services play in human and economic development. It will also cover appropriate policy and programme responses to supplying energy services. Finally the course aims to give students an understanding of social science research

## 220 DEPARTMENTS IN THE FACULTY

methods appropriate to conducting primary research in this field. There will also be site visits to gain a better understanding of the practical implications and social context for the implementation of energy access projects.

**Lecture times:** **Fieldwork:** There will be a site visit to a low-cost housing site with solar water heaters and other energy interventions.

**DP requirements:** Lecture attendance, completion of all assignments.

**Assessment:** Short assignments, presentations and a final long paper.

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### **MEC5089Z ENERGY PROJECT**

20 NQF credits at HEQSF level 9

**Convener:** Professor H Winkler

**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 Master's 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.

**DP requirements:** None

**Assessment:** Project(s) 100%.

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### **MEC5090Z ENERGY & CLIMATE CHANGE**

20 NQF credits at HEQSF level 9

**Convener:** Dr D Sparks

**Course entry requirements:** Registration for either/or both MPhil in Energy and Development Studies and MSc Sustainable Energy Engineering or at the discretion of the convener.

**Course outline:**

This course aims to develop an advanced understanding of energy and climate change. Topics include: 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.

**DP requirements:** Attendance at lectures and seminars and submission of all assignments/tests and long paper.

**Assessment:** Project, examination.

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### **MEC5091Z INTRODUCTION TO ENERGY POLICY & SUSTAINABLE ENERGY ENGINEERING**

20 NQF credits at HEQSF level 9

**Convener:** Professor H Winkler and Ms J Burton

**Course entry requirements:** Registration for the MPhil in Energy & Development Studies or the MSc (Eng) in Sustainable Energy Engineering, or at the discretion of the convener.

**Course outline:**

This course aims to develop an advanced understanding of energy policy and sustainable energy engineering. Topics include: Introduction to energy concepts and terminology. Energy resources and reserves, extraction methods and conversion techniques, including coal, gas, liquid fuels, hydro nuclear, renewable energy electricity. 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; and South African and international energy policy issues.

**DP requirements:** Attendance at lectures and seminars and submission of all assignments.

**Assessment:** 70% coursework (50% long paper, 20% class assignments), 30% examination.

### **MEC5092W** DISSERTATION ENERGY & DEVELOPMENT STUDIES

120 NQF credits at HEQSF level 9

**Course entry requirements:** MEC5097Z.

**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 while also being relevant to the general field of sustainable energy or energy and development.

A dissertation towards a MPhil degree may incorporate any or all of the following: design of all or part of an engineering or built environment project to a specification involving advanced concepts and theoretical principles; a theoretical and/or practical research project of an inter-disciplinary nature; critical review of a specified topic based on a comprehensive search of the literature or available data of an inter-disciplinary nature; and any other study acceptable to the Faculty of Engineering & the Built Environment.

**DP requirements:** None

**Assessment:** Written work counts 100%.

### **MEC5093W** DISSERTATION ENERGY AND DEVELOPMENT STUDIES

180 NQF credits at HEQSF level 9

**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 Master's 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. A dissertation towards a MPhil degree may incorporate any or all of the following: design of all or part of an engineering or built environment project to a specification involving advanced concepts and theoretical principles; a theoretical and/or practical research project of an inter-disciplinary nature; critical review of a specified topic based on a comprehensive search of the literature or available data of an inter-disciplinary nature; and any other study acceptable to the Faculty of Engineering & the Built Environment.

**DP requirements:** None

**Assessment:** Written work counts 100%.

### **MEC5095Z** MINOR DISSERTATION ENGINEERING MANAGEMENT

60 NQF credits at HEQSF level 9

**Convener:** Dr C Shaw

**Course entry requirements:** Completion of appropriate postgraduate courses.

**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.

**DP requirements:** None

**Assessment:** The written report will be examined, and a further oral examination may be held.

**MEC5096Z** ATMOSPHERIC FLIGHT MECHANICS

*Not offered in 2016*

12 NQF credits at HEQSF level 9; Postgraduate status.

**Convener:** Professor C Redelinghuys

**Course entry requirements:** Relevant Degree

**Co-requisites:** None

**Course outline:**

This course aims to develop an advanced understanding of atmospheric flight mechanics. Topics include: 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. 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.

**Lecture times:** 3 Lectures and 1 Tutorial per week.

**DP requirements:** A sub-minimum of 40% for the class mark is required. The class mark equals 40% of the test mark plus 60% of the project mark.

**Assessment:** The final mark equals the average of the class and exam marks. A sub-minimum of 50% for the final mark is required.

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**MEC5097Z** DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

**Course outline:**

The aim of this course is to allow a student to undertake preparatory work for the master's 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.

**DP requirements:** None

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**MEC5098F** LASER ENGINEERING

*Not offered in 2016*

12 NQF credits at HEQSF level 9

**Convener:** Associate Professor FJ Kahlen.

**Course entry requirements:** CHE3063F or MEC4048F or EEE3055F

**Co-requisites:** None

**Course outline:**

This course is an advanced introduction to laser engineering, electromagnetic radiation, absorption of laser radiation, heat and mass transfer, laser beam intensity distribution, melt pool dynamics, laser-induced vaporization, plasma physics, laser sources, temperature dependence of thermo-physical material properties, laser-assisted manufacturing. This area of engineering is a complex mix of electromagnetic theory, mass and heat transfer, higher level mathematics, (intended and unintended) phase changes of materials, and optical engineering. The co-requisites were chosen so that the participants are proficient in at least one technical area of the course's content.

**DP requirements:** Attendance of all lab demonstrations and satisfactory completion of project.

**Assessment:** Project counts 50%; one 3-hour theory examination counts 50%. A subminimum of 50% each is required for project and theory examination.

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**MEC6000W** THESIS MECHANICAL ENGINEERING

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None**Assessment:** Written work counts 100%.

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**MEC6002W** THESIS ENGINEERING MANAGEMENT

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None**Assessment:** Written work counts 100%.

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**MEC6003W** THESIS SUSTAINABLE ENERGY ENGINEERING

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None**Assessment:** Written work counts 100%.

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**MEC6004W** THESIS MATERIALS ENGINEERING

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None**Assessment:** Written work counts 100%.

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**MEC6005W** THESIS ENERGY AND DEVELOPMENT STUDIES

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None**Assessment:** Written work counts 100%.

**MEC6006W** THESIS ENGINEERING EDUCATION

360 NQF credits at HEQSF level 10

**Course outline:**

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake research, and such advanced coursework as may be required, under the guidance of a supervisor or supervisors appointed by Senate.

**DP requirements:** None

**Assessment:** Written work counts 100%.

# 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) is a UCT Signature Theme established in 2007 to serve as a platform for interdisciplinary urban research - both theoretical and applied - across UCT. As a new generation knowledge institution, ACC's specific mission is to engage in collaborative research and develop imaginative policy discourses and practices to promote vibrant, just and sustainable cities. The ACC works in Cape Town, across southern Africa, and continentally, partnering with academics, city officials and practitioners. The co-produced research advances novel ways of thinking about and understanding urbanism across the global South, yet is rooted in the realities of African urban spaces. In 2015 ACC hosted 25 research initiatives. Africa-wide projects include African urban knowledge hubs, turn-around cities, urban food insecurity, urban risk knowledge, and infrastructure and land. ACC is one of two research platforms in the MISTRA Urban Futures network. The policy arm of WIEGO (Women in Informal Employment, Globalizing and Organizing) is based in ACC. The Director has used ACC research while leading the urban policy element of South Africa's National Planning Commission. ACC's 2016 CityLabs in Cape Town will focus on human settlement upgrading, safety and violence, political ecologies and public culture. The ACC supports an MPhil programme in Urban Infrastructure and Design: this equips built environment professionals with the knowledge to conduct sustainable urban development in a fast changing world. ACC's urban knowledge dissemination features edited books, the magazine Cityscapes, the UrbanAfrica.net portal, and regular academic and 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*

#### Professor and Deputy Director:

G Pirie, BA (Hons) MA PhD *Wits*

#### Research Staff:

J Battersby-Lennard, BSc(Hons) *London* MA *Newcastle-upon-Tyne* DPhil *Oxford*

M Brown-Luthango, BSocSc(Hons) MSocSc *Cape Town* DPhil *Stellenbosch*

L Cirolia, BA *UCBerkeley* MCRP *Cape Town*

J Duminy, BSc *Rhodes* MTRP *UKZN* MA *Leicester*

G Haysom, MPhil *Stellenbosch* PhD *Cape Town*

N Marrengane, BA *Earlham* MA *Clark Atlanta*

S Oldfield, BA(Hons) MA *Syracuse* PhD *Minnesota*

L Sibanda, BSc MPhil *Cape Town*

C Skinner, BSocSci *Cape Town* MSc *Natal*

W Smit, BSc MCRP PhD *Cape Town*

#### Research Finance Manager:

I Najaar, BCom *UWC*

#### Administrative Officer:

M Joubert

**Administrative Assistants:**

V Mafanya

M Waglay, BSocSc (Hons) *Cape Town***Centre for Bioprocess Engineering Research (CeBER)**

CeBER was formally constituted as a Unit in 2001 and upgraded to a Centre in 2008 cementing a long history of bioprocess engineering research at UCT. It aims to underpin the growth and exploitation of the biotechnology, chemical and minerals sectors 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.

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, ARD prevention and remediation of metal rich effluents, fine chemicals through bacterial and fungal processes, algal biotechnology for bioenergy products, commodities and fine chemicals, biotransformation for value addition, biorefineries including the wastewater biorefinery, 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, microbiology and molecular biology. CeBER hosts the DST/NRF SARChI Research Chair in Bioprocess Engineering.

**Professor and Director:**STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAiChE FSAMM SASM FSAAE ASSAF**Associated Academic and Research Staff:**MA Fagan-Endres, BSc (Eng) Chem *UCT* PhD *Cambridge*CJ Fenner, BSc(Hons) *Rhodes* PhD *Cape Town*R Huddy, BSc(Hons) PhD *Cape Town*M Johnstone-Robertson, *BSc (Eng) Chem* PhD *Cape Town*J Petersen, BSc(Eng)Chem *Wits* PhD *Cape Town* MSAIMMRP van Hille, BSc(Hons) PhD *Rhodes*S Tai, BSc(Hons) *UMIST* MSc(Biochemical Engineering) PhD(Industrial Microbiology) *TU Delft***Technical Staff:**TM Goleka, NDip BTech *Cape Peninsula*J Mwase, MSc *Cape Town*E Ngoma, BTech *TUT*S Rademeyer, NDip (Chem Eng) *CPUT*T Samkanga, NITC NTC NHD *Harare Polytechnic* MBA *Rhodes***Postdoctoral Researchers:**PP Diale, BSc (Eng) Chem *Johannesburg* PhD *Wits*

E Govender, BSc (Eng) Chem PhD *Cape Town*  
 A Kotsiopoulos, BSc(Eng) PhD *Cape Town*  
 M Smart, BSc (Hons) MSc *Stellenbosch* PhD *Cape Town*

**Research Associates:**

C Bryan, BSc(Hons) *Nottingham* PhD *Bangor*  
 C Garcian, BSc(Eng) PhD *Cape Town*  
 MJ Griffiths, BSc (Hons) *Cape Town* MPhil *Cambridge* PhD *Cape Town*  
 RP van Hille, Bsc (Hons) PhD *Rhodes*

**Administrative Staff:**

SH Jobson, BA *Rhodes* HDE *Cape Town*  
 C Mazzolini, BA Print Journalism *Cape Town*  
 LD Mostert, BSc(Eng) Chem *Cape Town*  
 S Christian, NSC *Pretoria Tech*

*Website: www.ceber.uct.ac.za*

## Centre for Catalysis Research (Cat Centre)

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, hydrocracking, phenolics conversion, and hydrogen and fuel cell technologies. 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:**

S Blair, PhD Materials Chemistry *Simon Fraser(Canada)*  
 W Böhringer, DiplChem *Karlsruhe*  
 R Brosius, PhD (Eng) *Leuven* Dr (Eng) *Cape Town*  
 M Claeys, Dipl.Ing. (Chem Eng) Dr.-Ing. *Karlsruhe*  
 N Fischer, MSc PhD (Eng) Dr (Eng) *Cape Town*  
 N Hussain, BSc (Eng) Chem MSc (Eng) Chem *Cape Town* MSACIhE  
 P Kooyman, PhD Eng, *TU-Delft*  
 P Levecque, MSc(Eng) Bio PhD *Leuven*  
 N Luchters, BSc (Eng) *Leiden*  
 CT O'Connor, PrEng BSc *Unisa* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM  
 FSAIChE FSAAE FRSSAf  
 S Roberts, BSc(Eng)Chem MSc(Eng)Chem *Cape Town*  
 S Tanaka, BSc(Eng) MSc(Eng) *Kyoto*  
 E van Steen, MSc(Eng) *Eindhoven* PhD *Karlsruhe* FSAIChE FSAAE

**Administrative Officer:**

E Williams

**Centre for Research in Computational & Applied Mechanics (CERECAM)**

The Centre for Research in Computational and Applied Mechanics (CERECAM) is a multi-faculty and inter-disciplinary research grouping which concerns itself with basic and applied research and postgraduate education in computational and applied mechanics. Its members are drawn from chemical, civil, mechanical engineering, applied mathematics, and health sciences. 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 FSAAE MASSAf**Members:**T Chinyoka, MSc *Zimbabwe* PhD *Virginia Tech*DA Deglon, BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMMF Ebobisse Bille, BSc(Hons) *Yaounde' I Cameroon* PhD *Pisa*I Govender, BSc *UDW* HDE *UNISA* BSc(Hons) PhD *Cape Town*S Skatulla, Dipl Ing *Karlsruhe* PhD *Adelaide*A Mainza, BSc(Eng)Chem *UNZA* PhD *Cape Town***Associate members:**TJ Cloete, MIng *Stell*T Franz, PhD *Bremen*EB Ismail, BSc(Eng) MSc(Eng) *Cape Town*JE van Zyl, PrEng, BEng MEng *RAU* PhD *Exeter* MSAICE MASCE FWISA**Senior Research Officer:**AT McBride, MSc, PhD, *Cape Town***Administrative Assistant:**

N Bent

Website: [www.cerecam.uct.ac.za](http://www.cerecam.uct.ac.za)**Centre for Materials Engineering (CME)**

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, DST 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 and related sciences. 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:**

SL George, BSc(Eng) MSc(Eng) PhD *Cape Town*

**Visiting Lecturers:**

T Becker, BSc(Eng) MSc(Eng) PhD *Cape Town*

M Topic, BSc *Belgrade* PhD *Cape Town*

CD Woolard, BSc (Hons) PhD *Cape Town* MSc *London*

**Emeritus Professor:**

RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMEchE

**Senior Technical Officers:**

P Park-Ross, BSc(Hons) *Cape Town*

**Part-time Technical Officer:**

T Newins

**Secretary:**

Vacant

**Centre for Minerals Research (CMR)**

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 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:**

DA Deglon, BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMM

**Associated Academic and Research Staff:**

L Bbosa, MSc *Cape Town*

M Becker, MSc *Cape Town* PhD *Pret*

P Bepswa, BSc(Eng) *Cape Town*

K Corin, MSc PhD, *Cape Town*

I Govender, BSc *UDW* HDE *UNISA* BSc(Hons) PhD *Cape Town*

MC Harris, MSc(Eng) *Cape Town*

A Mabentsela, BSc (Hons) *Cape Town*

A Mainza, BSc(Eng) *UNZA* PhD *Cape Town*

B McFadzean, MSc PhD *NMMU*

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

T Rampai, BSc(Hons) MSc(Eng) *Cape Town*

J Sweet, BSc(Eng) MSc *Cape Town* MSAIMM

A van der Westhuizen, BEng *Stell* MSc(Eng) *Cape Town* MSAIMM

J Waters, BTech *Cape Technikon*

JG Wiese, MSc *Cape Town*

### **Honorary Adjunct Professors:**

P Dempsey, BSc *UNISA*

S Lambert, BSc(Eng) BSc(Hons) *Strathclyde*

J Mann, BSc(Eng) *Wits* MBL *UNISA*

### **Administrative Staff:**

H Sundström

N Davies

C Pomario

L Jacobs

## **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 sixteen 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.

### **Director:**

TS Craig, PhD *Cape Town*

### **Associated Academic Staff:**

BI Collier-Reed, Pr Eng MSc(Eng) PhD *Cape Town* MSAIMechE

AE Deacon, MSc *Stell*

B Kloot, BSc(Eng) *Wits* MSc(Eng) PhD *Cape Town*

K le Roux, BA(Hons) *Natal* HDEMPHil *Cape Town* PhD *Witwatersrand*

CB Shaw, BSc(Eng) MSc(Eng) HDE MPhil(EngMan) *Cape Town*

DL Taylor, BSc Hons HDE *UKZN* MSc PhD *Wits*

N Wolmarans, BSc(Eng) MSc(Eng) PGDipEd(HES) *Cape Town*

### **Administrative Staff:**

D Chuter, BA HDE *Cape Town*

## **Centre for Transport Studies**

The Centre for Transport Studies is a multidisciplinary research and postgraduate teaching body. The Centre's primary aim is to develop into an internationally recognised research and teaching body that produces relevant research, develops skilled professionals, and advocates innovative practices and institutional arrangements for the management of complex transport systems in the dynamic cities of South Africa and other African countries.

The purpose of the Centre is to stimulate debate and undertake research that focuses on the equity, sustainability and efficiency problems associated with urban passenger transport systems in South African cities, and on the development of practices and skills that are consistent with the goals and objectives of contemporary and progressive policies. The Centre's priorities in curriculum development, and in undertaking research, are to contribute to the equitable, efficient and safe

accommodation of the travel needs of poorer households within urban passenger transport systems, and to the promotion of more efficient and sustainable travel behaviour patterns and transport system operations.

**Associate Professor and Director:**

R Behrens, Pr Pln BA MCRP PhD *Cape Town*

**Associated Academic Staff:**

M Vanderschuren, BSc(Eng) *Tilburg* MSc(Eng) *Delft* PhD *Enschede* MSAICE MSASITS

M Zuidgeest, MSc PhD *Twente*

**Research Officer:**

H Schalekamp, BAS BArch MPhil *Cape Town*

Website: [www.cfts.uct.ac.za](http://www.cfts.uct.ac.za)

## DST - NRF Centre of Excellence in Catalysis (c\*change)

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 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 ten 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, Dipl.Ing Dr-Ing (Chem Eng) *Karlsruhe*

DST Hydrogen Catalysis Competence Centre (HySA/ Catalysis)

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.

**Director:**

S Blair, PhD Materials Chemistry *Simon Fraser(Canada)*

## 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.

## 232 CENTRES AND OTHER ENTITIES ESTABLISHED IN THE FACULTY

The ERC is a multi-disciplinary Centre that conducts high quality, targeted and relevant research as well as offering postgraduate opportunities at the Master's and PhD levels. Two Master's programmes are convened by the Centre, an MSc in Sustainable Energy Engineering and an MPhil in Energy and 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 Master's 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:**

H Winkler, MSc *Berkeley* MA PhD *Cape Town*

### **Energy & Climate Change Group Leader:**

K Altieri, MPP *Princeton University* PhD *Rutgers*

### **Energy, Poverty and Development Group Leader:**

B Batidzirai, BSc(Eng)Elec *UZ* MSc (Energy) PhD *Utrecht*

### **Energy Efficiency Group Leader:**

A Hibberd, MSc PGDipMan(Dist Com Info) *Cape Town*

### **Energy Modelling Group Leader:**

AG Hughes, BIng *Stell* MSc (Eng) *Cape Town*

### **Renewable Energy Group Leader:**

A Madlopha, BSc MSc *Malawi* PhD *Strathclyde*

### **Research Staff:**

F Ahjum, MSc(Eng) *Cape Town*

MJ Boulle, BSc, BSc (Hons) *Rhodes* MPhil *Cape Town*

T Caetano, MSc(Eng) BCom (Hon) Economics *Cape Town*

J de Groot, BSc(Int Dev) *Wageningen* MA(Cult Antropology) *Leiden* MSc(Dev Studies) *Wageningen*

GC Gariseb, BTech

S Jenner, BSc MPhil *Cape Town*

W Kruger, BA(Policy Studies) BPhil(Sust Dev) MPhil(Sust Dev) *Stell*, MSc(Dev Studies) *Antwerp*

R Larmour, BSc(Eng) *Cape Town*

A Marquard, BA *Cape Town* BA(Hons) MA *Rhodes* PhD *Cape Town*

B Martin, Nat Dip Business *CPUT* PGDip: Climate Leadership *Wits*

B McCall, MSc(Eng) *Cape Town*

B Merven, MSc(Eng) MSc(FinMaths) *Cape Town*

M Moorlach, MSc *Eindhoven*

A Moyo, MSc in Applied Economics *Cape Town*

B Rennkamp, Diplom Regional Sciences Latin America *Cologne* PhD *Universiteit Twente* *Netherland*

D Sparks, MSc PhD *Cape Town*

A Stewart, MSc(Eng) *Cape Town*

M Torres Gunfaus, MSc Industrial Engineering *Germany*

HL Trollip, BSc (Elec Eng) *Wits* MSc (Elec Eng) *Wits*

**Operations Manager:**

F Babalwa

**Administrator, Postgraduate & Human Resources:**

F Harribi

**Assistant Administrator:**

B Matubatuba

**Postgraduate Programme Coordinator:**J Burton, BA(Hons)*Rhodes*, MSc(Eng) *Cape Town***Publications & Media Staff:**R Drummond, BSocSci MRCP *Cape Town* AAA DipCEA MSAPI MIEAT James, BA *Wits* 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 extreme loading events such as explosions, 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 extreme loading events 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
- Buried explosions
- Energy Absorbers
- Human Response
- Sporting Equipment

**Professor and Director:**GS Langdon, BEng PhD *Liverpool* MIMechE CEng**Honorary Professor:**D Karagiozova, PhD *Ukrainian Academy of Science***Associated Academic Staff:**S Chung Kim Yuen, BSc(Eng) MSc PhD *Cape Town*TJ Cloete, BEng *Stell* MEng *Stell*R Govender, BSc(Eng) MSc(Eng) PhD *Cape Town*GS Langdon, BEng PhD *Liverpool* MIMechE CEngGN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* Hon FSAIMechE MASME FSAAE**Researchers:**VH Balden, MSc(Eng) *Cape Town***Finance/Administrative Assistant:**

L Starck

**Website:** [www.bisru.uct.ac.za](http://www.bisru.uct.ac.za)

### **Crystallisation and Precipitation Research Unit (CPU)**

Although industrial applications of precipitation have a long history and precipitation has been studied scientifically since the 1930s, understanding of these processes 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 in a batch-wise mode. 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 develop a deeper 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 extractive metallurgical processes as well as in treatment of effluent streams.

The Crystallisation 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 on-going, as seen by active funding for and interest in research projects. Presentation of Continuing Professional Development courses to industry; such as the Industrial Crystallisation course (in collaboration with Prof GM van Rosmalen of TU Delft) and specific courses given to industrial partners are an on-going activity.

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

AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAiChE FSAIMM MASSA fSAAE FIChemE

#### **Associated Academic and Technical Staff:**

J. Chivavava, BEng(Chem) *NUST* MSc(Chem) *Cape Town* AMiChemE

*Website:* [www.crystal.uct.ac.za](http://www.crystal.uct.ac.za)

### **Minerals to Metals**

The Minerals to Metals Signature Theme (MtM) was established in 2007 to integrate existing capacity in minerals beneficiation research in the Department of Chemical Engineering, and expand the work to other researchers at UCT. There is a strong focus on sustainability, with research aimed at increasing the amount of mineral or metal extracted from ores, and at reducing the environmental and social impacts of mineral beneficiation operations. What makes the MtM initiative unique is that researchers focus on entire minerals processing flow sheets or production sequences (systemic approach), as well as on individual mineral extraction processes (fundamental approach). Members of the group have developed a new Master of Philosophy program specialising in Sustainable Mineral Resource Development, which was inaugurated in 2014. The programme is delivered jointly with the University of Zambia, as part of the Education for Sustainable Development in Africa project of the United Nations, and includes courses at the UCT Graduate School of Business and the Sustainability Institute at the University of Stellenbosch. Another major international collaborative activity is the Global Minerals Industry Risk Management Programme (G-MIRM), to train mining company executives and managers in safety risk management, to reduce accidents and fatalities on mines and mineral processing operations. The course is delivered in collaboration with the University of Pretoria, the University of the Witwatersrand and the University of Queensland in Australia. On the local front, Minerals to Metals has teamed up with The Green House, a niche sustainability consultancy, to develop a minerals beneficiation strategy for the K-ZN Province, on behalf of the K-ZN Department of Economic Development, Tourism and Environment.

**Professor and Director:**

JL Broadhurst, BSc(Hons) MSc *Port Elizabeth* PhD *Cape Town*

**Associated Academic Staff:**

M Becker, BSc(Hons) MSc Geology *Cape Town* PhD *Pret*

A Black, BA *Cape Town* BA(Hons) *Sussex* MSocSc *Natal* PhD *Cape Town*

D Bradshaw, BSc(Eng) PhD *Cape Town* (SARChI (elect) in Minerals Beneficiation)

A Buffler, MSc PhD HDE *Cape Town*

B Cohen, BSc(Eng) PhD *Cape Town*

DA Deglon, BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMM

J-P Franzidis, BSc(Eng) MSc(Eng) *Cape Town* PhD *Open* MSAICHE MSAIMM

D Fuh, BSc(Hons) *Buea* MA *Botswana* PhD *Basel*

I Govender, BSc Hons PhD *Cape Town* HDE *Unisa*

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHE SASM FSAIMM FSAAE ASSAF  
FWISA

N Isafiade, BSc(Hons) *Ilorin* MSc(ChemEng) Ife PhD *Cape Town*

AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAICHE FSAIMM MASSA  
fFSAAE

A Mainza, BSc(Eng) UNZA PhD *Cape Town*

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

HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *UNISA* MSc(Eng) *Cape Town* Dr.-Ing.  
*RWTHAachen* MSAICHE

**Finance and Administrative Officer:**

E Jacobs

**Nedbank Urban Real Estate Research Unit (URERU)**

This is a new unit that has been approved by the UCT Council in June 2015 under the directorship of Associate Professor Francois Viruly and will be managed by an advisory board which includes academics and property professionals. The aim of the unit is to provide an inter-disciplinary platform that promotes the identification of issues and seeks solutions to Urban Real estate investment, Finance, Economics and management problems in Africa. It offers an opportunity to initiate a unique research alliance between UCT, Industry and society at large. It also provides an opportunity to further define and enhance the existing research thrusts of the department of Construction Economics & Management.

URERU will be driven by three broad thrusts:

- Urban Land Economics and Urban Management,
- Urban Real Estate Investment and Finance,
- Urban Real Estate Markets, Dynamics and Trends.

URERU will promote academic research and disseminate research to the private sector.

We will be developing a research agenda for the period 2015-2020.

The primary source of funding of the research unit is Nedbank Corporate Property Finance who have committed to the amount of R 1 million per year for four years. The intention of the unit is to raise further funding from a variety of sources. These are likely to include:

- Private sector funding,
- Public Sector funding,
- Professional Bodies (RICS),
- International bodies.

**Associate Professor and Director:**

F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

**Associated Academic staff:**

KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MSAFMA  
 RPT McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*  
 MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate)  
*Pret*

## Other entities

### Continuing Professional Development

**Co-ordinator:**

H Tait, BHE *Stell*

**Administrator:**

S Jemaar

The CPD programme offers short courses, workshops and conferences. These provide a means for the on-going 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 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:**

N Lindenberg, BSc(Hons) *Cape Town*  
 T Slingsby, MSc(Eng) *Cape Town*

The UCT GIS Laboratory acts as a consulting and 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

**Associate Professor and Convener:**

J English, BA MPhil *Cape Town* PhD *Glasgow Caledonian*

**Administrative Staff:**

AJ Rumbelow, Diagnostic and Therapeutic RadDip *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)

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## CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

### Departments Established in the Faculty of Commerce

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#### COLLEGE OF ACCOUNTING

**Associate Professor and Head of Department:**

M Graham, BBusSc MCom *Cape Town* CA(SA) ACMA

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#### ACC2022F/S MANAGEMENT ACCOUNTING I

18 NQF credits at HEQSF level 6

**Convener:** J de Villiers

**Course entry requirements:** ACC1006F/S or approved equivalent.

**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.

**DP requirements:** Attendance at and submission of a minimum of 75% of tutorials AND a weighted average of 40% for class tests (excluding objective tests).

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

### Centres and Departments Established in the Faculty of Humanities

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#### SCHOOL OF AFRICAN & GENDER STUDIES, ANTHROPOLOGY & LINGUISTICS

The sections in the School share a commitment to research and teaching responsive to African political, social, cultural, and material contexts, and the interaction of those contexts with others, especially but not exclusively located in the global South. The intellectual interests of the proposed new School cohere around questions relating to the production of social, political, cultural, scientific and economic knowledge within the continent of Africa, as a platform for internationally relevant research.

The letter code for all courses offered in the School is AXL.

Departmental website: [www.humanities.uct.ac.za/hum/departments/axl](http://www.humanities.uct.ac.za/hum/departments/axl).

The School comprises the following Sections:

**AFRICAN STUDIES**

**ANTHROPOLOGY**

**GENDER STUDIES**

**LINGUISTICS**

**Associate Professor and acting Director of the School:**

H O Garuba, MA PhD *Ibadan*

**Administrative Officer:**

TBA

**AFRICAN STUDIES SECTION**

The African Studies Section is housed in the Harry Oppenheimer Institute Building, Engineering Mall, Upper Campus, and can be contacted by email at: [cas-africas@uct.ac.za](mailto:cas-africas@uct.ac.za), or telephone: 021 650 4034.

**Associate Professor and Head of Section:**

N Shepherd, PhD *Cape Town*

**ANTHROPOLOGY SECTION**

The Anthropology Section is housed in the AC Jordan Building, University Avenue, Upper Campus, and can be contacted by email at: [san-admin@uct.ac.za](mailto:san-admin@uct.ac.za), or telephone: 021 650 3678.

**Professor and Head of Section**

F C Ross, A W Mellon Chair in the Anthropology of the First 1000 Days of Life, MSocSc PhD *Cape Town*

**GENDER STUDIES SECTION**

The Gender Studies Section is housed in Harry Oppenheimer Institute Building, Engineering Mall, Upper Campus, and can be contacted by email at: [genderstudies@uct.ac.za](mailto:genderstudies@uct.ac.za) or telephone: 021 650 2970.

**Associate Professor and Head of Section:**

J Bennett, BA(Hons) *Natal* MA (Linguistics) EdD (Applied Linguistics) *Columbia*

**LINGUISTICS SECTION**

The Linguistics Section is housed in the A C Jordan Building, University Avenue, Upper Campus, and can be contacted by email at: [axl-linguistics@uct.ac.za](mailto:axl-linguistics@uct.ac.za), or telephone: 021 650 2847.

**Professor and Acting Head of Section (January to June):**

R Mesthrie, DST/NRF Chair in Migration, Language and Social Change, BPaed *UDW* BA(Hons) *Cape Town* BA(Hons) *Unisa* MA *Texas* PhD *Cape Town*

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**AXL4202F RACE, CULTURE & IDENTITY IN AFRICA**

24 NQF credits at HEQSF level 8

**Convener:** Associate Professor N Shepherd

**Course entry requirements:** Acceptance for an Honours or Master's programme.

**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 & 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,

## 240 CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

students will be provided with readings especially chosen for non-specialists and accompanied by an assignment at each seminar. Assignments can be chosen by students according to their interest and will only have to be handed in twice during the course, or if students choose to hand in more, their best two will count.

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.

**Assessment:** Two essays (25% each): 50%; one exam: 50%. **NOTE:** Attendance at seminars is compulsory; failing which students' papers may not be marked.

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### AXL5203S CRITICAL ISSUES IN HERITAGE STUDIES

24 NQF credits at HEQSF level 9

**Convener:** Associate Professor N Shepherd

**Course entry requirements:** Acceptance for an Honours or Master's programme.

**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.

**DP requirements:** Attendance at seminars is compulsory, failing which students' papers may not be marked.

**Assessment:** One major project 100%.

## Departments Established in the Faculty of Law

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### COMMERCIAL LAW

**Professor and Head of Department:**

A Rycroft, BA Rhodes LLB Natal LLM London Attorney of the High Court

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### CML6056F TELECOMMUNICATIONS LAW

12 NQF credits at HEQSF level 9

**Course outline:**

This course aims to develop an understanding of telecommunications laws. Topics include: 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; and future developments.

**DP requirements:** None

**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

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### PUBLIC LAW

**Professor and Head of Department:**

E van der Spuy, BA(Hons) MA Stell 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 PBL.

**PBL5045S ENVIRONMENTAL LAW FOR NON-LAWYERS**

15 NQF credits at HEQSF level 9

**Convener:** Professor A Paterson

**Course entry 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 15 years. These 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: 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).

**Lecture times:** 1 x 3 hour lecture per week.

**DP requirements:** Satisfactory attendance of lectures and completion of essay.

**Assessment:** Short Assignment (10%); Long Assignment (40%); Written Examination (50%)

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**PBL5046S CLIMATE, LAW AND GOVERNANCE**

15 NQF credits at HEQSF level 9

**Convener:** Professor Jan Glazewski

**Course entry requirements:** Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree.

**Course outline:**

The phenomenon of climate change poses major challenges to the international community of nations, the African continent, and the South African body politic. Meeting these challenges requires among other things an inter-disciplinary approach and finding interconnectedness between the natural and social sciences. This course will provide postgraduate students with an insight into principles of international law, regional law and South African national law of relevance to climate change. Key content covered in the course includes: an introduction to basic international and domestic legal principles and institutions; environmental governance systems and theories; and an introduction to various branches of the law relevant to climate change such as energy law, planning and environmental impact assessment law; natural resource law (biodiversity, protected areas, water and marine living resources), pollution laws (marine, fresh water, land and air pollution) and fiscal law (in the context of climate financing).

**Lecture times:** One double lecture per week.

**DP requirements:** Satisfactory attendance of lectures and completion of a series of assignments.

**Assessment:** Assignments (50%); written examination (50%).

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# 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.

### Geomatics

**Twamley Undergraduate Scholarship:** 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:** Awarded on the recommendation of the Chair of Surveying on the basis of academic achievement and other appropriate experience for postgraduate study in Geomatics.

## Construction Economics and Management

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

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

**JT Ross (Pty) Ltd scholarship:** The full tuition fee for the BSc Honours in Property Studies. Awarded to the BSc Property Studies qualifier with the highest cumulative GPA above 70%. In the event of a tie, both candidates shall be awarded the full scholarship.

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

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

**NRF Grantholder Bursaries:** Applications to be submitted by 28 February (internal) or 31 March (agency).

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

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

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

## Engineering

### General

**Klaus-Jürgen Bathe Scholarships:** 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):** 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):** Awarded to the student obtaining the highest weighted average in the First Year examinations.

**Twamley Undergraduate Scholarship:** 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):** 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):** 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):** 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):** Awarded annually to the First Year Mechanical Engineering student gaining the highest weighted average, subject to the holder maintaining satisfactory progress and conduct.

Class Medals

## Architecture, Planning and Geomatics

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

<b>APG1016F</b>	Geomatics
<b>APG2039W</b>	Design and Theory Studio II
<b>APG3037W</b>	Design and Theory Studio III

## Construction Economics and Management and Engineering

Class medals may be awarded to the best students in each of the following first year core courses: CHE1005W, CIV1005W, CON1004W, CON1011F, CON1012S, CON1018W, CON1019F/S, EEE1006F, EEE1007S, MEC1002W and MEC1005W.

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 R3000) (i) for the best Master's dissertation in the Faculty of Engineering & the Built Environment (ii) for the best PhD thesis in the Faculty of Engineering & the Built Environment.

## **Architecture, Planning and Geomatics**

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

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

**South African Association of Consulting Professional Planners (SAACPP) Prize:** R2000 and certificate for the best dissertation in the MCRP programme.

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

**Bruce Burmeister Architects Prize:** R500 for the Best Student in the Technology 2 course.

**Bruce Burmeister Architects Prize:** R500 for the Most Improved Student in Technology 2.

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

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

**Cape Institute for Architecture Prize:** R2000 for the best student in Design and Theory Studio II.

**Cape Institute for Architecture Prize:** R2000 for the best student in Design and Theory Studio III.

**Cape Institute for Architecture Prize:** R2000 for the best student graduating in the postgraduate Architecture degree programmes.

**The Carl Borckenhagen Memorial Prize:** R3000 to be awarded to the best student over the two years of study in the MCRP programme.

**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.

**CNdV Africa Prize:** R500 for the Best Student in Landscape Construction in the second year of the Master of Landscape Architecture.

**CNdV Africa Prize:** R500 for the Best Student in History and Theory of Landscape Architecture across first and second year in the Master of Landscape Architecture.

**Essay Prize: R300** awarded to the BAS(Hons) student who produces the best essay.

**General JBM Hertzog Prize:** R1250 awarded annually to the best final year student in the MArch(Prof) programme.

## 246 SCHOLARSHIPS, PRIZES, CLASS MEDALS AND DEAN'S MERIT LIST

**George Menzies Prize:** R2000 awarded on the results of the final examinations to the best student in Geomatics.

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

**Helen Gardner Travel Prize:** Two prizes of R20 000 each awarded by UCT to students who have completed the third year of the BAS degree but who have not yet been admitted to the BAS(Hons) degree. Applications to the Director, School of Architecture and Planning.

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

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

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

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

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

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

**Ivor West Memorial Prize:** R4000 for the best second or third year Geomatics student.

**John Perry Prize:** R2000 for the best work done in the third year of study of the BAS degree.

**Molly Gohl Memorial Prize:** R3000 for books or instruments to the best woman student completing the third year of study of the BAS degree.

**New World Associates Prize:** R300 voucher for the student with the best use of plants in Landscape Design.

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

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

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

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

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

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

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

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

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

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

**The Western Cape Government Prize for the best Local Area Planning Project (Project A):** Certificate and six-month internship prize for the best Local Area Planning Project.

**The Western Cape Government Prize for the best Metropolitan Planning Project (Project B):** Certificate and six-month internship prize for the best Metropolitan Planning Project.

**The Western Cape Government Prize for the best Regional Planning Project (Project C):** Certificate and six-month internship prize for the best Regional Planning Project.

## **Construction Economics and Management**

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

**Association of South African Quantity Surveyors Gold Medal:** The Faculty nominates a candidate for this national award for the best quantity surveying graduate at any accredited South African university offering a degree in quantity surveying. Awards are not necessarily made each year.

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

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

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

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

**Capital Land Prize:** R1500 for the best student collectively in the subjects of Property Investment, Finance and Portfolio Management (CON2024S, CON3034F and CON4048S)

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

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

## 248 SCHOLARSHIPS, PRIZES, CLASS MEDALS AND DEAN'S MERIT LIST

**Clay Brick Association Prizes:** Two prizes of R2000 and R1500 respectively for the best and second best students collectively in the Construction Technology subjects CON1004W, CON2006W and CON3012W.

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

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

**Grinaker-LTA Book Prizes:** R1000 for the best student registered for the BSc(Hons) in Construction Management (CON4038F, CON4039S and CON4049S) (Minimum First Class Pass); R1000 for the best student registered for the BSc(Hons) in Quantity Surveying in the subject of Measurement and Design Appraisal III (CON4032F and CON4037S) (Minimum First Class Pass).

**Master Builders Association of the Western Cape Prize (for South African Students):** R1000 for the best BSc(Construction Studies) in the second year of study; R1500 for the best BSc(Construction Studies) in the third year of study; R2000 plus floating shield for the best BSc(Hons) student in Construction Management.

**Mbata, Walters and Simpson Prize:** R1000 for the best all round student in third year of study for the BSc(Construction Studies) degree.

**The Nedbank Corporate Property Finance Academic Achievement Award:** R10 000 for the MSc in Property Studies graduating student who has achieved the highest cumulative grade point average in the taught courses of the degree.

**The Nedbank Corporate Property Finance Academic Achievement Award:** R10 000 for the BSc (Honours) in Property Studies graduating student who has achieved the highest cumulative grade point average in the degree.

**The Nedbank Corporate Property Finance Academic Achievement Award:** R10 000 for the BSc in Property Studies graduating student who has achieved the highest cumulative grade point average in the degree (to be assessed over the three years of the degree).

**Old Mutual Corporate Real Estate Prize:** R1000 voucher for the best all round student in the second year of study for the BSc(Property Studies) degree.

**Paragon Lending Solutions Prizes:** R2500 plus job-shadow opportunity with the Paragon Lending Solutions CEO for the best student in the subject of Property Finance (CON3034F). R2500 for the best postgraduate student in the course Property Finance (CON5009Z).

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

**Robin Marten Prize:** (value to be announced) for the student with the highest average final year examination results for the third (final) year of the BSc(Property Studies) and the BSc(Hons)

Property Studies degrees, taken together, subject to a minimum average of 75% 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.

**Tower Property Fund Academic Book Prize:** R5000 for the Honours Research Report which best encapsulates Green Building technologies and/or initiatives.

## Engineering

### General

**Bain Merit Awards:** A first prize of R5000 and a second prize of R3000 to the best third-year students in Engineering.

**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 four-year degree curriculum.

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

**Sammy Sacks Memorial Prize:** Two prizes of R4000 each for the best classwork in MEC1002W Engineering Drawing.

### Chemical Engineering

**4<sup>th</sup> Year Book Prize for South African Institute for Mineral & Metallurgy:** Textbook for best student in Mineral Processing for CHE4050.

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

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

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

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

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

**SA Institution of Chemical Engineers' Silver Medal:** for outstanding performance over the four year curriculum, based on best overall year and credit-weighted GPA, including a fourth year credit-weighted GPA of above 75%.

### Civil Engineering

**Adina Award for Excellence in Computational Engineering Mechanics:** R3000 for the best undergraduate final year project on any aspect of computational engineering mechanics by a student in Civil Engineering.

**Aurecon Best overall Achievement Prizes:** R2500, R1500, R1000 for the three best performing students.

## 250 SCHOLARSHIPS, PRIZES, CLASS MEDALS AND DEAN'S MERIT LIST

**Aurecon Prize for Water Engineering:** R2000 to the student achieving the highest aggregate score in Water Engineering courses (CIV2040S, CIV3043F, CIV3044F, CIV3046S, CIV3047S, CIV4042F).

**Concrete Society of SA (WP Branch) Award:** R1000, a book, and one year's membership of the Concrete Society of Southern Africa for outstanding work in the area of concrete technology.

**D C Robertson Memorial Prize (donated by the Western Cape Branch of the South African Institution of Civil Engineering):** R1000 for the student submitting the best work in the final year design project.

**Mott MacDonald PDNA 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 design project.

**George Menzies Prize:** R2000 awarded on the results of the final examinations to the best student in Civil Engineering.

**Gibb Student Contribution Prize:** R2000, for the student with the greatest all-round contribution to the undergraduate programme.

**Gibb Prize for Transport Engineering:** R2000, for the student showing the most promise in the field of transportation and traffic engineering.

**Paterson & Cooke Prize:** R2000 for the best work in the final year research project.

**Jeffares & Green Award:** R1500 for the fourth year civil engineering student with the highest overall achievement in professional communication.

**Joint Structural Division of SAICE & IStructE Prize:** R2000, for the final year student with the best overall academic achievement in the field of structural engineering.

**PPC Cement Prize:** R2500 voucher and a book for the best undergraduate project on concrete technology.

**Prestedge, Retief, Dresner & Wijnberg Prize:** R2000 for the best Water Engineering final year project.

**Professor Derrick Sparks Geotechnical Engineering Prize (donated by the South African Institution of Civil Engineering, Western Cape Branch):** R1000 for the best final year project in Geotechnical Engineering.

**SA Institute of Steel Construction Prize:** R1500 for the best structural steel design project submitted by an undergraduate student.

**South African Institution of Civil Engineering Professional Practice Prize:** R1000 for the best performance in Professional Practice (CIV4041F)

**Thesis Poster/e-Portfolio Prize:** R500

**Thesis Talk Prize:** R500

**UWP Prize:** R1500 for the student with the best result for the Urban Water Services course (CIV3047S).

### **Electrical Engineering**

**Peralex Electronics prize:** R1500 for the best student in EEE3017W.

**Peralex Electronics prize:** R1500 for the best student in EEE4001F.

**Peralex Electronics prize:** R1500 for the best student in EEE4084F.

**Siemens Prize:** R2500 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

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

**AAT Composites Award:** R1000 for best project for MEC4110W Research Project involving use or application of composite materials.

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

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

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

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

**Aluminium Federation of South Africa Prize:** R1000 for the best report in MEC4110W Research Project or MEC4091S Honours Research Project involving the use or application of aluminium.

**Best Student in Dynamics I:** R500 awarded to the student with the top mark in Dynamics I

**Best Student in Dynamics II:** R500 awarded to the student with the top mark in Dynamics II

**Best Student in Solid Mechanics I:** R500 awarded to the student with the top mark in Solid Mechanics I

**Best Student in Solid Mechanics II:** R500 awarded to the student with the top mark in Solid Mechanics II

**Best Final-Year BScEng Project or BSc (Hons) Project:** R1000 awarded for the top mark in the final-year BScEng project or BSc (Hons) project in an Impact-Related topic.

**The Gerald Nurick Prize for Excellence in Impact-Related Postgraduate Research:** R1500 awarded to either an MSc student (the dissertation must be awarded with distinction) or PhD student (the thesis must have excellent reviews).

**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.

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

**SASOL Prize for MEC3073S:** Achievement Medal and R1000 for the best third year student in the course MEC3073S, Design II

## 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. 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 list is compiled annually in mid-December and includes all courses which have results at that point in time. The criteria for inclusion in a particular year are as follows:

- a first-year ASPECT student must have earned not less than 96 credits and obtain a year average of not less than 75 %; a student who was in the ASPECT programme in the first year of study must earn not less than 110 credits of approved coursework in any subsequent year and obtain a year average of not less than 70%.
- a student in any other undergraduate programme must have earned not less than 132 credits of approved course work for the year in question and obtain a year average of not less than 70%.

# PROFESSIONAL STATUS AND RECOGNITION OF DEGREES

## Architecture, Planning and Geomatics

### Architecture and Planning

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

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

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

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

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

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

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

certified statement to that effect.

- (b) All applicants who have not passed a qualifying examination recognised in terms of Section 19(2)(b) and 19(7)(c)(ii) of the Architects' Act 1970 must apply to the South African Council for Architects for admission to the Special Qualifying Examination. The following courses of action may be adopted: An applicant who, in the opinion of the Council, cannot be admitted to the Special Qualifying Examination shall be referred to the University of his or her choice which will decide what will be required of him or her in order to graduate.

## **Geomatics**

### **Registration**

The South African Geomatics Council recognises the BSc(Geomatics) degree, under The Geomatics Professions Act 19 of 2013, as a suitable theoretical qualification for registration as a Professional Land Surveyor and 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 with a practising Professional and to undertake various professional examinations. 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 (RICS) in most parts of the world.

### **Representation and professional organisations**

Holders of a degree in Geomatics, after registration with the SA Geomatics Council can apply for membership of the South African Geomatics Institute (SAGI). Graduates specialising in geoinformatics may prefer to become members of the Geo-Information Society of South Africa (GISSA), while those in the hydrographic surveying field may be interested in associating with the Hydrographic Society of South Africa. Internationally, Geomatics disciplines are represented by a number of organisations, the primary one being the Federation International Geodesic (FIG) and the International Society of Photogrammetry and Remote Sensing (ISPRS). These organisations represent the interests of their members at national or international level and are involved in various workshops, lectures and conference organisations.

## **Construction Economics and Management**

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

### **Association of South African Quantity Surveyors (ASAQS)**

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

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

### **South African Council for the Quantity Surveying Profession (SACQSP)**

The BSc in Construction Studies together with the BSc(Hons) in Quantity Surveying and Construction Management degrees are accredited by the South African Council for the Quantity Surveying Profession as fulfilling all the academic requirements for registration as Quantity Surveyors (in terms of the Quantity Surveyors Profession Act No 49 of 2000 as amended). The BSc in Property Studies, together with the BSc(Hons) in Property Studies, enjoys similar accreditation. Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Quantity Surveyor before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Quantity Surveyor.

Address: The Registrar, South African Council for the Quantity Surveying Profession, PO Box 3527, Halfway House, 1685.

**The Royal Institution of Chartered Surveyors (RICS)**

Graduates in Quantity Surveying, Construction Management and Property Studies are eligible to register with the Royal Institution as Probationers. Thereafter, a period of three years in-service training must be undertaken under the supervision of an approved mentor before being admitted to the Assessment of Professional Competence leading to membership of the Institution. Graduates of the MSc Programmes in Property Studies and Project Management enjoy similar accreditation.

Address: The Secretary-General, RICS, 12 Great George Street, Parliament Square, 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 (SACPCMP)**

The South African Council for the Project and Construction Management Professions registers professionals and candidates in the project and construction management professions. The BSc in Construction Studies together, with the Bsc (Hons) in Construction Management is accredited by the SACPCMP. A minimum of four years post-graduation relevant practical experience must be attained under the supervision of a registered Professional Construction Manager or Professional Construction Project Manager before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Construction Manager or Professional Construction Project Manager. 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 the Property Valuers' Profession 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.

## Engineering

The current BSc(Eng) degrees in Chemical, Civil, Electrical, Electrical and Computer, Electro-Mechanical, Mechanical Engineering and Mechatronics are accepted by the Engineering Council of South Africa (ECSA) as fulfilling all the academic requirements for registration as a Professional Engineer. In terms of the Washington Accord signed in June 2000, of which South Africa is a signatory, the Faculty's engineering qualifications have been recognised by professional engineering accrediting bodies in the United States of America, Canada, Australia, New Zealand, the United Kingdom, Ireland and Hong Kong.

In terms of the Engineering Profession Act (Act No 46 of 2000), ECSA has stipulated a minimum period of three years' approved practical training and experience after graduation under the guidance of a Professional Engineer before a candidate may register as a Professional Engineer. This period may be shortened by up to one year in recognition of successful postgraduate degree work. It is of the utmost importance that every graduate should register immediately as a candidate engineer.

The University of Cape Town enjoys a special relationship with the Association of Commonwealth Universities. The curricula, systems and standards of engineering education at the University conform to the general pattern of the British universities and professional institutions. The degrees are therefore widely recognised.

The better known of the British and South African professional institutions are listed below. Graduates are eligible for exemption from the written Associate Membership examinations of the British institutions, as detailed below, but in all cases a period of approved professional work is required before admission to corporate membership. Student membership of these institutions is generally available to undergraduates. Information on other professional engineering bodies is available from the relevant department in the Faculty.

### **The Institution of Chemical Engineers**

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

### **The South African Institution of Chemical Engineers**

Graduates in Chemical Engineering may be admitted to membership, without further examination. Address: PO Box 808, Pinegowrie, 2123.

### **The Institution of Civil Engineers**

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

### **The South African Institution of Civil Engineering**

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

### **The Institution of Structural Engineers**

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

### **The Institution of Engineering and Technology (IET)**

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

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# INDEX

Adv Bioprocess Engineering .....	126
Adv Construction Management .....	169
Adv Engineering Statistics I .....	122
Adv Hist & Theory of Arch .....	100
Adv Mech of Materials .....	148
Adv Radar & Elec Protec Maths .....	192
Adv Structural Concrete Eng .....	142
Adv Technology Research .....	108
Adv Theory Research .....	108
Adv Topics in Adsorption .....	125
Adv. Landscape Arch. Studio .....	105
Advanced Building Technology .....	100
Advanced Chemical, Physical & Biological Processes Modelling .....	146
Advanced GIS .....	95
Advanced Property Studies A .....	169
Advanced Property Studies B .....	170
Advanced Property Studies C .....	171
Advanced Property Valuation .....	177
Advanced Refrigeration .....	214
Advanced Soil Mechanics .....	152
An Introduction to Finite Elements .....	217
Appl Num Analy in Biochem Syst .....	126
Applied Contract Law II .....	168
Applied Maths & Modeling II .....	122
Applied Property Law .....	170
Aquatic Chemistry Part A .....	146
Aquatic Chemistry Part B .....	146
Arch Design Studio I .....	101
Arch Design Studio II .....	101
Architecture Research Method .....	102
Architecture, Planning and Geomatics .....	84
Aspects of City Design .....	97
Aspects of History & Theory .....	102
Atmospheric Flight Mechanics .....	222
Basic Applied Statistics .....	176
Biobleach of Sulfide Materials .....	124
Biotechnology Laboratory .....	123
Bridge Analysis & Design .....	144
Bridge Management & Maintenanac .....	150
Broadband Communication Networks .....	201
Broadband Networks .....	190
Catalyst Characterization .....	128
Centres and other entities established in the faculty .....	225
Chemical Engineering .....	113
Chemical Engineering Topics For Scientists .....	123
Choice Modelling and Design .....	160
Civil Engineering .....	130
Civil Engineering Measurement .....	168
Civil Engineering Project .....	143
Civil Engineering Report .....	142
Climate, Law & Governance .....	241
Clutter & Detection in Clutter .....	193

Community Development .....	157
Computational & Applied Mech .....	218
Computational Electronics I .....	197
Computational Electronics II .....	197
Computational Fluid Dynamics .....	218
Computing for GIS .....	95
Conserv Dev & Impact Assess II .....	109
Conservation Development & Impact Assessment I .....	109
Conservation Discip & Prac .....	109
Constructing Landscape Systems .....	98
Construction Economics and Management .....	161
Construction Innovation .....	171
Contaminated Land and Remediation .....	153
Contents .....	3
Continuum Mechanics .....	217
Contract Law .....	143
Convergent Telecomm & Data Net .....	189
Corp RealEstate Portfolio Mgmt .....	177
Course Codes .....	10
Courses: Guide to Terminology .....	12
Credit system .....	12
Critical Issues in Heritage St .....	240
Crystallisation & Precipitat .....	122
Dean's Merit List .....	252
Degrees and diplomas awarded by the Faculty .....	9
Design & Management Operational Systems .....	214
Design & Model Water Distr Sys .....	152
Design Dissertation .....	110
Detail Landsc. Design & Doc .....	105
Digital Communications .....	191
Dissertation Architecture & Planning .....	111
Dissertation Chemical Engineering .....	121
Dissertation Construction Economics & Management .....	174
Dissertation Energy & Development Studies .....	221
Dissertation Energy and Development Studies .....	221
Dissertation Materials Engineering .....	218
Dissertation Mechanical Engineering .....	213
Dissertation Preparation .....	108
Dissertation: Geomatics 120 .....	104
Durability & Cond Assessment .....	151
Elec& Mec Equip in Nuclear Sta .....	187
Electrical Engineering .....	179
Electrochem Charact Techniques .....	127
Electrowinning/Refining .....	125
Energy & Climate Change .....	220
Energy Effic& Demand Side Mng .....	215
Energy Markets & Governance .....	219
Energy Modeling .....	215
Energy Project .....	220
Energy, Poverty & Development .....	219
Eng Mgmt Research Report .....	221
Environm Law for Non-Lawyers .....	241
Environmental Management .....	106
Environmental Policy Processes .....	103

Environmental Stewardship .....	120
Ethics Clearance .....	10
Experimental Techniques .....	212
Explanatory Notes on Course Codes .....	11
Finite Element Analysis .....	217
Foundation Design .....	150
Fundamental Hydrometallurgy .....	124
Fundamentals of Process Model .....	126
Fundamentals Radar Signal & DP .....	191
Further Applied Statistics .....	176
General Information .....	6
Geo-Informatics .....	106
Geo-informatics Project .....	102
Geosynthetics Engineering .....	153
Geotechnical Engineering Project .....	154
GIS For Urban & Regional Planning .....	106
Ground Improvement Techniques .....	149
Guide to the usage of this Handbook .....	5
High Resolution and Imaging Radar .....	194
History & Theory Of Landscape Architecture A .....	98
History & Theory Of Landscape Architecture B .....	105
History Of Conservation .....	110
Housing Development & Management I T .....	170
HRM & Communication .....	173
Hydrometallurgical Sep Proces .....	125
Imaging Radar Applications .....	189
Information Theory .....	200
Integrated Land Use Transport Planning .....	156
Integrated Management Project .....	169
Integrated Wastewater Treatment Plant Design .....	146
International Affiliate 2 Months .....	155
International Affiliate 2-4 Months .....	155
International Affiliate 4-6 Months .....	155
International Affiliate 6-12 M .....	129
International Affiliate 6-12 Months .....	155
Intro Nuclear Physics& Radiat .....	187
Intro to Business Admin .....	215
Intro To Electronic Defence .....	196
Intro to Energ Pol & Sus Energ .....	220
Intro to Molecular Modeling .....	122
Intro To Radar Systems .....	195
Introduction to Catalysis .....	121
Introduction to Research .....	175
Introductory GIS .....	94
Laboratory & Field Techniques .....	149
Landscape Arch. Studio I .....	99
Landscape Representation .....	98
Landscape Systems .....	103
Landscape Techniques II .....	98
Laser Engineering .....	222
Lateral Earth Supports .....	153
Law of Conservation & Dev .....	109
Leaching Hydrometallurgy .....	124
Lecture periods .....	10

Local Area Transport Planning, Management and Design.....	156
Loss Management in Water Distribution.....	154
Management Accounting I.....	238
Management of Transport Supply & Demand.....	155
Managing for Performance Improvement.....	213
Manufact & Props of Ceramics.....	211
Manufact & Props of Polymers.....	212
Manufacture & Properties of Composites.....	211
Manufacturing with Materials.....	211
Masters Arch & Planning Diss.....	111
Masters Dissert:Transport Stud.....	157
Masters Dissertation Architecture & Planning.....	111
Masters Dissertation Geomatics.....	104
Masters Dissertation:Transport Studies.....	157
Masters Paper Requirement.....	158
MCPUD Dissertation.....	106
MCRP Minor Dissertation.....	107
Measumnt& Design Appraisal III.....	167
Mechanical Engineering Project.....	215
Metro Landscape Project.....	99
Microbial Physiology & Dynamic.....	123
Microwave Components& Antennas.....	196
Microwave Filters.....	199
Minor Dissertation.....	189
Minor Dissertation Project Management.....	174
MLA Dissertation.....	107
Modelling & Simulation of Wastewater Treatment Systems.....	145
Molec Biology & Biocatalysis.....	123
MSc CEM Dissertation.....	174
MSc Chemical Eng Dissertation.....	121
MSc Civil Engineering Dissert.....	141
MSc Civil Engineering Part Dis.....	141
MSc Electrical Eng Dissert.....	188
MSc Electrical Eng Part Diss.....	189
MSc Engineering Management.....	214
MSc Mechanical Eng Dissert.....	213
MSc Project Mgmt Dissertation.....	175
MSc Property Studies Dissert.....	175
MSc Sustainable Engy Eng Diss.....	216
Multi-target Multisensor Tracking and Data Fusion.....	192
Multivariable Control System Design.....	189
Natural Systems.....	97
Network & Internet Security.....	190
New & Renewable Energy Technol.....	219
Non-destructive Test & Evaluat.....	214
Nonlinear Material Behaviour.....	218
Non-motorised Transportation.....	156
Nuclear Manufacturing and Construction Eng Management.....	212
Nuclear Reactor Ops & Safety.....	199
Nuclear Reactor Theory& Design.....	198
Numerical Methods for Eng.....	127
Officers in the Faculty.....	6
Operations Management Project.....	213
Ops& Safety Nuclear Reactors.....	188

Optical Communications .....	201
Phase Transformation Materials .....	211
PhD Civil Engineering Dissert .....	155
PhD Eng Education Thesis .....	224
PhD in Arch & Planning .....	111
PhD in Chemical Eng .....	129
PhD in Constr Eco & Man .....	178
PhD in Electrical Eng .....	202
PhD in Eng Education .....	129
PhD in Engineering Management .....	223
PhD in Geomatics .....	111
Planning & Govt Systems .....	96
Planning Project A .....	96
Planning Project B .....	97
Planning Techniques I .....	99
Planning Techniques II .....	100
Planning Techniques III .....	104
Planning Theory & Practice .....	95
Plants & Design .....	101
Plate & Shell Structures Part A .....	147
Plate & Shell Structures Part B .....	148
Postdoctoral Fellow .....	155
Practical Aspects of Catalysis .....	128
Practical Training .....	168
Principles Of Wastewater Treatment & Wastewater Characterisation .....	143
Prizes .....	244
Professional Practice .....	168
Professional Status and Recognition of Degrees .....	253
Programming for Scientists and Engineers .....	217
Proj Mgmt & Systems Theory .....	173
Proj Plan & Implementation .....	173
Project Finance & Procurement .....	174
Project Implementation & Management .....	175
Project Risk Management .....	174
Prop Valuation Theory & Prac .....	176
Properties and Manufacture of Metallic Materials .....	211
Property Development .....	172
Property Development & Finance .....	175
Property Finance .....	172
Property Law .....	172
Property Portfolio Management .....	171
Property Studies II .....	167
Public Transport Policy and Regulation .....	159
Public Transport System Design and Management .....	159
Race, Culture & Identity In Africa .....	239
Radar System Modelling .....	194
Regional Planning Project .....	104
Regional Planning Theory .....	104
Regulatory & Legal Framework .....	97
Regulatory Reqs Nuclear Power .....	199
Regulatory Stds Nuclear Power .....	188
Repair & Rehabilitation of Concrete Structures .....	152
Research Comm & Methodology .....	123
Research Design and Methodology for Civil Engineers .....	155

Research Methodologies .....	110
Research Methodology .....	129
Research Project .....	109
Research Report .....	171
Researching & Assessing Heritage Resources .....	111
Rules for Postgraduate Degrees .....	13
Safety of Special Structures .....	151
Scholarships/Awards .....	242
Sedimentation in Water & Wastewater Treatment .....	144
Selected Topics in Applied Sci .....	103
Separations & Thermodynamics .....	126
Sewage Sludge Treatment .....	144
Slope Stability .....	154
Software Defined Radio .....	202
Solvent Extraction .....	125
Space and Society .....	197
Space Applications for Sustainable Development .....	198
Space Mission Analysis and Design .....	198
Special Topic in Radar F .....	199
Special Topics in Radar A .....	194
Special Topics In Radar B .....	195
Special Topics In Radar C .....	195
Special Topics In Radar D .....	195
Special Topics In Radar E .....	195
Special Topics in Space Studies .....	198
Special Topics in Space Technology B .....	200
Special Topics in Space Technology C .....	200
Stab&Designof Steel Structures .....	150
Statistical Signal Theory .....	201
Steady State Design of Biological Nutrient Removal Systems .....	145
Struct Concrete Prop & Practic .....	142
Structural Dynamics with Applications .....	150
Structural Impact .....	213
Structural Performance Assessment & Monitoring .....	151
Student Councils and other faculty specific details .....	8
Sustainability in Chemical Eng .....	125
Sustainable Development .....	121
Sustainable Practice .....	120
Sustainable Urban Systems .....	157
Systems Engineering Practice .....	214
Technology:Lab to Marketplace .....	127
Telecommunications Law .....	240
Term dates .....	10
Terrain Analysis .....	99
The Activated Sludge System .....	144
Theory& Design Nuclear Reactor .....	188
Thermodynamics for Nuclear Power Stations .....	187
Thesis Energy and Development Studies .....	223
Thesis Materials Engineering .....	223
Thesis Mechanical Engineering .....	223
Thesis Sustainable Energy Engineering .....	223
Topics in Advanced Concrete Materials .....	148
Total Quality Management in a Project Environment .....	173
Transport Demand Analysis & Project Assessment .....	158

Transport Modelling .....	158
Transport Planning and Engineering Methods Project .....	159
Transport Policy and Planning Case Study.....	160
Urban Design Project.....	107
Urban Design Research Project .....	111
Urban Design Theory .....	107
Urban Economic Dev Processes .....	96
Urban Infrastructure.....	95
Urban Land Economics .....	172
Urban Renewal .....	147
Urban Transitions in the Global South .....	147
Urban Water Management.....	148
Water pressure management.....	154
Web GIS .....	105
Wireless Data Network Converge .....	202