



## UNIVERSITY OF CAPE TOWN

# FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT (POSTGRADUATE)

## 2015

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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

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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## Guide to the usage of this Handbook

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

- (a) *General Information:* This section includes information on the professional status and recognition of the Faculty's degrees, its links with professional bodies and the list of qualifications offered. It also includes lists of the various prizes, medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.
- (b) *Rules for degrees:* This section covers the Faculty rules for each of the various degree programmes. These rules should be read in conjunction with the general University rules in the General Rules and Policies Handbook (Handbook 3). Students are expected to acquaint themselves with the rules in both Handbooks and to check annually whether the rules or curriculum requirements have changed since the last edition. *Important rules:* All students must familiarise themselves with the Degree Rules in this Handbook. In addition, students must refer to Handbook 3, General Rules and Policies and particularly take note of the following:
- rules relating to registration and examinations;
  - rules relating to changes of curriculum;
  - rules relating to leave of absence;
  - rules on Academic Conduct, N.B. the rules concerning dishonest conduct and plagiarism.

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

- (c) *Departments and Programmes:* This section contains entries for each department in the Faculty. Each lists members of staff, a summary of laboratory, workshop and other facilities, the research entities, and the programmes of study administered by each department. The curriculum for each programme (list of required courses) is set out in table form. The curriculum tables must be read together with (cross-referenced to) the lists of courses in the Courses Offered section which is described under (e) below.
- (d) *Centres/Units established in the Faculty and Centres, Departments, Schools and Units Established in other Faculties:* There are entries for the principal Faculty entities/units which do not fall directly under academic departments e.g. the Centre for Research in Engineering Education and the Continuing Professional Development Programme and entries for the centres, units and departments in other faculties which offer courses for students registered in the Faculty. This is crossreferenced to the list of courses offered in section (e).
- (e) *Courses Offered:* The full list and descriptions of courses offered by the Faculty, both undergraduate and postgraduate, is set out in this section in alpha-numeric order (i.e. based on the course code prefix) which identifies the department offering the course and the course number. The courses offered by other faculties which are more commonly taken by students in the Faculty of Engineering & the Built Environment are also listed and described. N.B. A key (guide) to the course code system, the credit system and terminology (definitions) is set out at the beginning of this section.

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## GENERAL INFORMATION

### Officers in the Faculty

#### Academic

##### Dean of the Faculty

TBA

##### Personal Assistant to the Dean:

Ms J Baron

##### Deputy Deans:

Associate Professor BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* FSAIMechE

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

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

##### Assistant Deans:

Professor A Baghai-Wadji, MSc(Eng) PhD *Vienna* DSc *Helsinki* FEMA SIEEE

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 AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* MSAICHe MSAIMM MASSAFSAAE

###### Civil Engineering:

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

###### 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):

Ms G Valodia, BA (Hons) HDE *Cape Town*

##### Undergraduate Manager (Academic Administration):

Ms D Chuter, BA HDE *Cape Town*

**Postgraduate Manager (Academic Administration):**

Ms I Dilraj, BSocSc (Hons) *Cape Town*

**Administrative Officer and Data Support:**

Mr M van der Westhuizen, BA *Cape Town*

**Administrative Assistants:**

Mrs D Botha, BPrimEd *Wits*

Ms S Naidoo, Dipl Primary Education *Hewat*

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

Ms K Hendricks

**Senior Secretary - Receptionist:**

Ms S Reizenburg

**Clinical Psychologist**

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

**Communications, Marketing and Development**

**Manager:**

Ms M Hilton

**Alumni Officer:**

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

**Finance**

**Faculty Finance Manager:**

Mr B Daubenton, HND Civil Engineering Structures *Cape Technikon*

**Assistant Faculty Finance Manager:**

Ms N Ngubo

**Senior Finance Officer:**

Mrs M Hyland

**Finance Officer:**

Ms A Burmeister, BA *UNISA*

**Human Resources**

**Human Resources Officer:**

Ms Z Matthews, BAdmin *UWC*

**IT and Facilities**

**Manager:**

Ms E le Roux

**Student Councils**

## 8 GENERAL INFORMATION

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 2014/2015 Chair of the undergraduate student council is Mr Zain Bana ([bnxzai001@myuct.ac.za](mailto:bnxzai001@myuct.ac.za)) and Ms Sister Kashala ([kshsis001@myuct.ac.za](mailto:kshsis001@myuct.ac.za)) is the Vice-Chair. 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 2014/2015 Chair is Mr Rene Nsanzubuhoro ([nsnren001@myuct.ac.za](mailto:nsnren001@myuct.ac.za)) and Mr Mburu Mwangi ([mwvmbu001@myuct.ac.za](mailto:mwvmbu001@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 [gradcentre@uct.ac.za](mailto:gradcentre@uct.ac.za) or visited at [www.pgfo.uct.ac.za](http://www.pgfo.uct.ac.za).

### Distinguished Teachers

The University has instituted a Distinguished 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 R��ther	(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. The lecture periods are shown at the back of this handbook.



## 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 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
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 Engineering Management	PGDipEngMan
*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 2015

### 1st Semester

1st Quarter	16 February to 27 March
Mid-term break	28 March to 06 April
2nd Quarter	07 April to 12 June

### Mid-year Vacation

13 June to 19 July

### 2nd Semester

3rd Quarter	20 July to 28 August
Mid-term Break	29 August to 07 September
4th Quarter	07 September to 22 December

## Public Holidays for 2015

New Year's Day	01 January 2015	Thursday
Human Rights Day	21 March 2015	Saturday
Good Friday	03 April 2015	Friday
Family Day	06 April 2015	Monday
Freedom Day	27 April 2015	Monday
Worker's Day	01 May 2015	Friday
Youth Day	16 June 2015	Tuesday
National Women's Day	09 August 2015	Sunday
Heritage Day	24 September 2015	Thursday
Day of Reconciliation	16 December 2015	Wednesday
Christmas Day	25 December 2015	Friday
Day of Goodwill	26 December 2015	Saturday

\* Note: Whenever a public holiday falls on a Sunday the following Monday is a public holiday.

## RULES FOR POSTGRADUATE DEGREES

### \*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.

#### Obtaining the Postgraduate Diploma

## 12 RULES FOR DEGREES AND DIPLOMAS

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 Project Management**

### **Minimum Admission Requirements**

- FGD1 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 of any other university recognised for the purpose;
  - (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 the examinations prescribed for a four year bachelor's degree or honours degree at this University; or
  - (d) has in any other manner attained a level of competence which, in the opinion of Senate, on the recommendation of the Faculty, is adequate for the purposes of admission as a candidate for the Postgraduate Diploma.

### **Selection**

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

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

### **Registration Requirements**

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

### **Obtaining the Postgraduate Diploma**

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

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

- FGD6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any

## 14 RULES FOR DEGREES AND DIPLOMAS

other institution and (ii) at least half the courses prescribed for the Postgraduate Diploma shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.

FGD6.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

### Progress Report

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

### Readmission

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

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

### Examination

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

### Award of the Postgraduate Diploma

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

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

### Upgrading to Master's Degree Registration

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

## 16 RULES FOR DEGREES AND DIPLOMAS

### Progress Report

FGE7 A candidate shall submit a written report to the Head of Department by 31 July each year, setting out, briefly, the progress made during the preceding twelve months or, if the period of registration is less than twelve months, the period that is relevant.

### Readmission

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

FGE8.2 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the diploma fails to complete a course after having been registered for it twice.

### Examination

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

### Award of the Postgraduate Diploma

FGE10. The Postgraduate Diploma is not awarded with Distinction.

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FGE10. The University does not undertake to reach a decision on the award of the  
2 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.

### **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**

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

### **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.

## Postgraduate Degrees

### Honours Degrees

#### 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 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

- (a) is a graduate of the Bachelor of Architectural Studies degree of this University; or
- (b) 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
- (c) 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:

- (a) 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.
- (b) 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).

#### 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

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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 Bachelor of Science (Honours) in Construction Management 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.
- 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

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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 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

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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.

### 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;

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- (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**

FHN5.1 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 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.

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### 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 Bachelor of Science (Honours) in Property Studies 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,

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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 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 Bachelor of Science (Honours) in Quantity Surveying 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

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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.



## Master's Degrees

### Master's Degrees

Qualification	Specialisation	Plan Code	Qual Code
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 Engineering	Minerals Beneficiation	CHE02	EM017
	Water Quality Engineering	CIV02	
	Structural Engineering & Structural Materials	CIV04	
	Radar	EEE06	
	Nuclear Power	EEE08	
	Telecommunications	EEE09	
Master of Science in Engineering	Geomatics	APG08	EM023/
	Chemical Engineering	CHE01	EM024
	Civil Engineering	CIV01	
	Geotechnical Engineering	CIV08	
	Water Quality Engineering	CIV02	
	Electrical Engineering	EEE01	
	Mechanical Engineering	MEC01	
	Materials Engineering	MEC03	
	Energy Studies	MEC06	
	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	MEC02	
	Energy & Development Studies	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.

### Supervision

FMAA6.1 A candidate shall work under the guidance of a supervisor appointed by Senate and shall be required to attend 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**

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- 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.

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.

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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 recognised by the Senate for the purpose; or
- (b) has passed at any University or at any Institution recognised by the Senate for the purpose, such examinations as are, in the opinion of the Senate, equivalent to the examinations prescribed for the 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 months;
- (b) shall complete at least three quarters of the courses prescribed for the degree in the School of Architecture and Planning.

FMB6.3 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

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### 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

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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**

- FM7 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**

- FM8.1 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.
- FM8.2 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.
- FM8.3 No dissertation or research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

### **Publication**

- FM9.1 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) and 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 recognised 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**

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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 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;

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- (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;
- (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 or of any other university recognised by the Senate for the purpose; or
- (b) holds an approved three-year degree and (i) who has a minimum of five years' experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or

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

### Selection

FMH2 Selection is based on an applicant's academic record and the availability of a suitable supervisor. Submission of a 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 value of 60 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 value of 120 credits and a minor dissertation of 60 credits on the subject of the research topic.

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.

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### 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.

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- FMHA4.4 A candidate, other than one registering for the first time for the degree must re-register 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).
- 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.
- 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

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(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
- is a graduate of the University with a four-year bachelor level or honours degree in a related field; or
  - holds an approved three-year degree and (i) who has a minimum of five years' experience relevant to the field in which he/she proposes to study, or (ii) who in addition to the standard programme requirement first completes a minimum of 144 credits of approved coursework; or
  - has passed at any University or 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
  - 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.

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### 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 dissertation or the research project, per year, except where only one course module is required to complete the degree.

### Obtaining the Degree

- FMI6.1 A candidate may obtain the degree in one of the following ways:
- (a) by completing advanced coursework (as prescribed) of a minimum value of 12 research report on the subject of a minor dissertation of a minimum value of 60
  - (b) by completing advanced study by coursework of a minimum value of 60 dissertation (120 credits); or

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- (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 from 2015.

## **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 reregister 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

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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 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
- (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.

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### 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.

## 72 RULES FOR DEGREES AND DIPLOMAS

### 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 reregister 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.

### **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

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

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

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

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

### **Doctor of Science in Engineering**

*NOTE:* Details of the preliminary screening, registration and examination procedures are obtainable on request from the Faculty Manager (Academic 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	Qual Code
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 AND PROGRAMMES OF STUDY

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## ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following Postgraduate Degree Programmes:

**Architecture**

**Geomatics**

**Landscape Architecture**

**City and Regional Planning**

**City Planning and Urban Design**

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

### Director:

Professor 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 *Wits* MSAPI SACP

### Emeritus Professors:

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

H Rütther, Dipl-Ing *Bonn* PhD *Cape Town* PrS(SA) FRSSAf FSAAE

F Todeschini, BArch *Cape Town* MCP MArch (Urban Design) *Penn* MIA MUDISA ArchSA

### Associate Professors:

A Steenkamp, BArch MArch *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 *Wits* PhD *British Columbia*

### Adjunct Associate Professor:

S Townsend, PhD *Cape Town*

### Emeritus Associate Professor:

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

### Senior Lecturers/StudioMaster's:

F Carter, BAS BArch MPhil *Cape Town* PrArch PRCPM MIA RIBA  
C Hindes, BLA *Pret* MArch  
F Isaacs, BArch *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 *Wits* RTPI  
M Silverman, BArch *UJ* MUD *UJ*  
M Fraschini, MSc(Arch) *Milan* PhD Arch and Urban Design *Milan*  
R Govind, BSc(Surveying) *Natal* MSurvSc *New South Wales* PhD *Colorado*

**Lecturers:**

A Crowder, ND Arch (PTech) BTech (Applied Design) *CPUT* BArch *UP*, MArts *BTU-Cottbus*  
K Fellingham, BArch *Wits*, SM Archs *MIT*, PR Arch (SA), ARB (UK), RIBA (UK)  
S Hull, BSc Surveying *UKZN* MSc(Eng) *Cape Town* PGCE *UNISA* PrL(SA)  
S Le Grange, BArch *Cape Town* M Urban Design *UC Berkeley*  
M Louw, BArch *Pret* MPhil *Stell* PrArch(SA), MIArch  
SS Papanicolaou, BArch *Cape Town*  
J Raxworthy, Assoc Dip (Applied Science) TAFE BLAHons MLA *RMIT*, PhD *Queensland*

**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 (Mechanical Eng.) ND (Surveying)

**Chief Technical Officer:**

J Coetzee, NHD (Building Tech)

**Senior Technical Officer:**

M Wells

**Photographic Technician:**

P Kanye

**Departmental Manager:**

J Meyer

**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:**

E Dryding

**Technical Assistant:**

S Matthews

**IT Liaison:**

L Coetzee

## Postgraduate Programmes

### Honours Programmes

#### **BSc(Hons) in Geographical Information Systems [EH001APG07]**

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

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

**Programme Convener:** *Associate Professor JL Smit B.Sc(Surv)PhD Cape Town*

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
APG2018X	GIS Camp .....	4	6
APG3012S	Geomatics III .....	24	7
APG4051W	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	

#### **Bachelor of Architectural Studies (Honours) [EH006APG01]**

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).

**Associate Professor and Programme Convener:**

N Coetzer, BArch *Natal MARCH Denver PhD London*

**Studio work Courses**

Number	Course	NQF Credits	HEQSF Level
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## PROGRAMMES OF STUDY: ARCHITECTURE, PLANNING AND GEOMATICS 79

Number	Course	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:

Number	Course	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.....	24	8
	Total credits.....	168	

### Elective Core Courses (select 24 credits)

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

Number	Course	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.....	12	8

\*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.

## Master of Architecture [EM006APG01]

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.

### Professor and Programme Convener:

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

## Master of Architecture (Professional) [EM021APG01]

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

## 80 PROGRAMMES OF STUDY: ARCHITECTURE, PLANNING AND GEOMATICS

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.*

### Associate Professor and Programme Convener:

N Coetzer, BArch Natal MArch Denver PhD London

### Design Dissertation - Year Course

Studio work Course

Number	Course	NQF Credits	HEQSF Level
APG5079W	Dissertation Design.....	120	9

### Non-Studio Courses

Number	Course	NQF Credits	HEQSF Level
APG5059F	Advanced Theory Research.....	30	9
APG5057F	Advanced Technology Research .....	30	9
	Total credits .....	180	

## Master of City and Regional Planning & Master of City Planning and Urban Design

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

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

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

*Note: The structure of these programmes is likely to change from 2016.*

## Master of City and Regional Planning [EM007APG03]

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



**Associate Professor and Programme Convener:**

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

**First Year: first semester**

Number	Course	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**

Number	Course	NQF Credits	HEQSF Level
APG4023S	Urban Economic Development Processes.....	12	8
APG4024S	Planning & Governmental Systems.....	12	8
APG4025S	Regulatory & Legal Framework.....	12	8
APG4026S	Planning Project B .....	32	8
APG4038S	Planning Techniques II.....	12	8
	Total first year credits.....	168	

**Second Year: first semester**

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

**Second Year: second semester**

Number	Course	NQF Credits	HEQSF Level
APG5024S	Planning Techniques III .....	12	9
APG5051Z	Dissertation MCRP.....	120	9
	Total second year credits.....	184	
	Total credits.....	352	

**Master of City Planning and Urban Design [EM008APG04]**

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.)

**Associate Professor and Programme Convener:**

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

**First Year: first semester**

Number	Course	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**

Number	Course	NQF Credits	HEQSF Level
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Number	Course	NQF Credits	HEQSF Level
APG4023S	Urban Economic Development Processes .....	12	8
APG4024S	Planning & Governmental Systems.....	12	8
APG4025S	Regulatory & Legal Framework.....	12	8
APG4026S	Planning Project B .....	32	8
APG4038S	Planning Techniques II .....	12	8
	Total first year credits.....	168	

### Second Year: first semester

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

### Second Year: second semester

Number	Course	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 [EZ001APG06]

**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.

Number	Course	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]

*Note: The structure of this programme is likely to change from 2016.*

### 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.

**Senior Lecturer and Programme Convener:**

C Hindes, BLA *Pret* MLArch

**First Year: first semester**

Number	Course	NQF Credits	HEQSF Level
<b>APG4028F</b>	Aspects of City Design.....	12	8
<b>APG4029F</b>	Natural Systems.....	12	8
<b>APG4030F</b>	History & Theory of Landscape Architecture A.....	12	8
<b>APG4031F</b>	Landscape Techniques I.....	12	8
<b>APG4034F</b>	Terrain Analysis.....	12	8
<b>APG4036F</b>	Local Area Landscape Architecture Project.....	32	8

**First Year: second semester**

Number	Course	NQF Credits	HEQSF Level
<b>APG4025S</b>	Regulatory & Legal Framework.....	12	8
<b>APG4032S</b>	Landscape Design.....	12	8
<b>APG4033S</b>	Landscape Techniques II.....	8	8
<b>APG4037S</b>	Metro Landscape Project.....	36	8
<b>APG4047S</b>	Plants & Design.....	12	8
	Total first year credits.....	172	

**Second Year: first semester**

Number	Course	NQF Credits	HEQSF Level
<b>APG5025F</b>	History & Theory of Landscape Architecture B.....	12	9
<b>APG5026F</b>	Landscape Construction and Practice.....	12	9
<b>APG5029F</b>	Landscape Architecture Project.....	36	9

**Second Year: second semester**

Number	Course	NQF Credits	HEQSF Level
<b>APG5024S</b>	Planning Techniques III.....	12	9
<b>APG5052S</b>	Dissertation MLA.....	120	9
	Total second year credits.....	192	
	Total credits.....	<b>364</b>	

**Master of Philosophy specialising in Conservation of the Built Environment [EM027APG05]**

*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

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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.

### Programme Convener:

S Townsend, PhD *Cape Town*

### First Year: first semester

Number	Course	NQF Credits	HEQSF Level
APG5073F	Law of Conservation & Development .....	12	9
APG5074F	Conservation Disciplines & Practice .....	8	9
APG5080F	History of Conservation.....	20	9

### First Year: second semester

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

### Second Year: first semester

Number	Course	NQF Credits	HEQSF Level
APG5077F	Conservation, Development & Impact Assessment .....	20	9
APG5078F	Research Methodologies.....	20	9

### Second Year: second semester

Number	Course	NQF Credits	HEQSF Level
APG5071S	Minor Dissertation Design.....	60	9
Total second year credits .....		100	
Total credits .....		184	

## Master of Philosophy in Engineering specialising in Geomatics [EM025APG08]

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

### Core Course

Number	Course	NQF Credits	HEQSF Level
APG5000W	Dissertation .....	180	9
APG5050X	Master's journal paper .....	0	9

## MSc in Engineering specialising in Geomatics [EM023APG08]

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

### Core Course

Number	Course	NQF Credits	HEQSF Level
APG5000W	Dissertation .....	180	9
APG5050X	Master's journal paper .....	0	9

**Doctor of Philosophy [ED001APG01, APG02, APG08]**

ED001 Doctor of Philosophy is a Research Degree

**Core Course**

Number	Course	NQF Credits	HEQSF Level
<b>APG6000W</b>	Thesis (Geomatics).....	360	10
<i>or</i>			
<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.

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## CHEMICAL ENGINEERING

The Department offers Postgraduate programmes in:

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 Chemical Engineering Building, which is on Upper Campus. Access to the Building is from South Lane, off Ring Road.

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

## Staff

### Professor and Head of Department:

AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAICHe FSAIMM MASSAFSAAE

### 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) *Wits* PhD *Cape Town* MSAIMM Director of Postgraduate Studies

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

J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAICHe SASM FSAIMM FSAAE ASSAF FWISA

KP Möller, BSc(Eng)Chem PhD *Cape Town*

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

HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTHAachen* MSAICHe

### Emeritus Professors:

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

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

### Honorary Research Associate:

MA Petersen, BSc(Maths, Physics) MSc (Applied Science) *Cape Town* PhD *Cantab*

### Honorary Professor:

D Bradshaw, BSc(Eng)Chem PhD *Cape Town*

**Honorary Adjunct Professors:**

A Lambert

D Wright BSc(Eng)Chem *Natal* MSAICHe FSAAE

**Associate Professors:**

A Mainza, BSc(Eng)Chem *UNZA* PhD *Cape Town*

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

R Rawatlal, BSc(Eng)Chem PhD *UKZN*

**Honorary Associate Professor:**

M Powell

**Senior Lecturers:**

O Conrad MSc(Eng)Chem PhD *Munster*

A Isafiade, BSc(Hons) *Ilorin* MSc(ChemEng) *Ife* PhD *Cape Town* AMICHEM E

L Bbosa, MSc(Eng) *PhD Cape Town*

S Tai BSc(Hons) *UMIST* MSc PhD *TU Delft*

W Böhringer Diplom-Chem *VN, Karlsruhe*

**Part-time Senior Lecturers:**

ME Dry, MSc *Rhodes* PhD *Bristol*

M Williamson MA PhD *Cantab* C.Eng

**Academic Development Lecturer & Director of Undergraduate Studies:**

HR Heydenrych, BSc(Eng)Chem MSc(Eng) *Cape Town*

**Chief Research Officer:**

M C Harris BSc(Eng), MSc(Eng) *Cape Town*

**Senior Research Officers:**

M Becker BSc(Hons) MSc Geology *Cape Town* PhD *Pret*

W Böhringer, Diplom-Chemiker *Karlsruhe*

RP van Hille, BSc(Hons) PhD *Rhodes* SASM

P Levecque, MSc (Eng) PhD *Leuven*

JA Sweet, BSc(Eng)Chem MSc *Cape Town*

APP van der Westhuizen, BEng *Stell* MSc(Eng) *Cape Town*

M Rodriguez, BSc PhD *Delft*

**Research Officers:**

PA Bepswa, BSc Chem Eng *Zimbabwe*

KC Corin, BSc BSc(Hons) PhD *Cape Town*

CJ Fenner, PhD *Cape Town*

BJ McFadzean, BSc BSc(Hons) MSc *Port Elizabeth* PhD *NMMU*

JG Wiese, NatDip *CPUT* MSc(Eng) *Cape Town*

**Chief Technical Officers:**

K Hauslaib BSc(Eng) Mechatronics

Mr P Dobias

HJ Macke Dip Mechanical Engineering Technician

**Technical Officer:**

G de la Cruz

**Analytical Laboratory Manager:**

S Snoek, BTech Chemistry *CPUT*

**Building Supervisor:**

E Matthews

N Minnie

**Administration Manager:**

R September, Nat Dip HRM BTech HRD *CPUT*

**Administrative Staff:**

J Broadley (Senior Secretary) B Cloete (UG Administrative Assistant)

N Davids (Purchaser)

N Dili (Receptionist)

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 centred on:

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

## **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**

Number

Course

NQF Credits HEQSF Level



Number	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering.....	120	9
CHE5051Z	Microbial Physiology & Dynamics#1 .....	8	9
CHE5052Z	Molecular Biology & Catalysis#1 .....	8	9

**Core Courses for Life Science Graduates**

Number	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering.....	120	9
CHE5049Z	Chemical Engineering Topics for Scientists#2 .....	16	9
CHE5054Z	Biotechnology Laboratory.....	8	9
CHE5055Z	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:**

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

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering.....	120	9
CHE5022Z	Introduction to Catalysis .....	16	9
CHE5055Z	Research Communication & Methodology .....	16	9
CHE5082Z	Dissertation Preparation .....	0	9
END5050X	Master’s journal paper.....	0	9
	<i>and at least one of:</i> .....		
CHE5040Z	Fuels & Chemicals from Oil .....	12	9
CHE5045Z	Fuels & Chemicals from Coal & Syngas .....	12	9
CHE5085Z	Hydrogen Technology .....	8	9
CHE5086Z	Electrochemical Characterisation Techniques for Fuel Cells.....	4	9
	Optional courses .....	16	9
	Minimum total credits .....	180	

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

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.

**Associate Professor and Convener:**

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

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering.....	120	9

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Number	Course	NQF Credits	HEQSF Level
<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)

Number	Course	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 .....	<b>180</b>	

## 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.**

### Professor and Convener:

J-P Franzidis, BSc(Eng)/Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM

## MEng specialising in Minerals Beneficiation [EM017CHE02]

Number	Course	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 .....	16	
	Total credits .....	<b>180</b>	

### Core Courses Stream B (Hydrometallurgy)

Number	Course	NQF Credits	HEQSF Level
<b>CHE5084Z</b>	Minor Dissertation .....	60	9
Approved courses from the following to a value of 120 credits:			
<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

Number	Course	NQF Credits	HEQSF Level
<b>CHE5079Z</b>	Integrated Analysis of Mineral Beneficiation Systems .....	16	9
<b>CHE5080Z</b>	Advanced Flotation I .....	16	9
	Total credits .....	<b>180</b>	

## **Master of Philosophy specialising in Sustainable Mineral Resource Development [EM026CHE05]**

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.

### **Professor and Convener:**

J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHE MSAIMM

Number	Course	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 .....	<b>180</b>	

\* 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

In addition to the courses listed below, the core courses of the three programmes above may be used as optional courses in the other programmes.

Number	Course	NQF Credits	HEQSF Level
<b>CHE5027Z</b>	Advanced Reaction Kinetics in Heterogeneous Systems .....	8	9
<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	9
<b>CHE5064Z</b>	Sustainability in Chemical Engineering .....	8	9
<b>CHE5066Z</b>	Computing for Engineers .....	8	9
<b>CHE5069Z</b>	Advanced Thermodynamics and Separation Processes .....	8	9
<b>CHE5070Z</b>	Advanced Bioprocess Engineering .....	16	9
<b>CHE5071Z</b>	Applied Numerical Analysis in Biochemical Systems .....	8	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	9
<b>CHE5085Z</b>	Hydrogen Technology .....	8	9
<b>CHE5086Z</b>	Electrochemical Characterisation Techniques for Fuel Cells .....	4	9
<b>CIV5101F</b>	Wastewater Treatment Part I .....	32	9
<b>EEE4103F</b>	Nuclear Power Sources .....	12	8
<b>END5049Z</b>	Research Communication & Methods .....	16	9
<b>MEC5035Z</b>	Project Management .....	20	9

## Research Entities

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

- Centre for Bioprocess Engineering Research (CeBER)
- Centre for Catalysis Research (CatCentre)
- Centre for Minerals Research (CMR)
- Centre for Research in Engineering Education (CREE)
- Crystallization and Precipitation Research Unit (CPU)
- DST - NRF Centre of Excellence in Catalysis (c\*change)
- DST Hydrogen Catalysis Competence Centre (HySA/Catalysis)
- Minerals to Metals

## Doctor of Philosophy [ED001CHE01]

ED001 Doctor of Philosophy is a Research Degree

### Core Course

Number	Course	NQF Credits	HEQSF Level
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Number	Course	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.

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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:

NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE MIWA

### Professors:

M G Alexander, PrEng BSc(Eng) MSc(Eng) PhD *Wits* FSAICE FSAAE, MASSAf MICT  
G A Ekama, BSc(Eng) PhD *Cape Town* SFWISA FRSSAf FSAAE MASSAf MWEF MIWA  
P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang* MSAICE, MIABSE  
J E van Zyl, PrEng BEng MEng *RAU* PhD *Exeter* MASCE, MSAICE, MIWA, FWISA  
A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng FStructE  
FZweIE MASSAf FIABSE FSAAE

### Associate Professors:

R Behrens, Pr Pln BA MCRP PhD *Cape Town*  
H Beushausen, Dipl-Ing HAW Hamburg MSc(Eng) PhD *Cape Town*  
M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* MSAICE MSASITS  
MB van Ryneveld, PrEng CEng BSc(Eng) *CapeTown* PhD *Wits* FSAICE, MICE, MIWA, MWISA, MSASEE  
M H P Zuidgeest, MSc(Eng) PhD (Eng) *Twente*

### Emeritus Associate Professors:

M O de Kock, PrEng BSc(Eng) *Cape Town*  
R Del Mistro, PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP *Cape Town* PhD *Pret*  
R O Heckroodt, MSc DSc *Pret* Dip Ceram *Leeds* FSAIMM FI Ceram (UK)  
F A Kilner, PrEng MA *Oxon* MSc(Eng) *London* DIC  
A D W Sparks, PrEng BSc(Eng) *Natal* MSc(Eng) *Wits* MICE FSAICEMOpResSocSAMRoySocSA  
CEng

**Senior Lecturers:**

D S Ikumi, PhD *Cape Town*

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

A A Siddiqui, MSc(Eng) *Aligarh* PhD *Southampton*

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

**Academic Development Senior Lecturer:**

N S Wolmarans, MScEng *Cape Town*

**Lecturer:**

F C Chebet, BSc(Eng) *Makerere* MSc(Eng) *Manchester*

**Research Officers:**

K J Carden, BSc MAppSc PhD *Cape Town*

H Schalekamp, BAS BArch MPhil *Cape Town*

**Honorary Research Associates:**

E Beukes, PhD *Cape Town*

V Collis, PrEng PrArch BSc(Eng) *Cape Town*

S Nhleko, BSc(Eng) MSc(Eng) *Cape Town* PhD *Oxon*

L A Kane, BEng *Cardiff* MSc(Eng) *Cape Town*

M Santhanam, BTech *IIT Madras* MS PhD *Purdue*

**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:**

A B Dalwai, BSocSc *Cape Town*

**Administrative Officer - Postgraduate:**

R Geswindt

**Research Administrative Assistants:**

R Joseph

G Verster

E Yelverton

**Administrative Assistant - Undergraduate:**

I Ncube

**Purchaser:**

A Courie

**Senior Secretary:**  
C Wright

**Departmental Assistants:**  
L Adams  
H Mafungwa  
C May  
E Witbooi

**Workshop Assistant:**  
M Swayiza

## Postgraduate Programmes

Courses are offered provided there is sufficient demand.

### 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**

Number	Course	NQF Credits	HEQSF Level
CIV5000W	Dissertation Civil Engineering .....	180	9
END5050X	Master’s journal paper .....	0	9
	Total credits .....	180	

#### EM024 Research Master’s by coursework and dissertation [EM024CIV01]

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation Civil Engineering .....	120	9
	Elective courses approved by supervisor .....	60	9
CIV5109Z	Dissertation Preparation .....	0	9
END5050X	Master’s journal paper .....	0	9
	Total credits .....	180	

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

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.

**Programme Convener:**



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

### Core Courses

Number	Course	NQF Credits	HEQSF Level
<b>CIV5000Z</b>	Dissertation.....	120	9
<b>CIV5109Z</b>	Dissertation Preparation .....	0	9
<b>CIV5111Z</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)

Number	Course	NQF Credits	HEQSF Level
<b>CIV5110Z</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 .....	12	9

### Enrichment courses (compulsory for MScEng)

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

## Civil Infrastructure Management and Maintenance

The primary aim of the MEng and MScEng 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, and renewal engineering.

### Programme Convener:

P Moyo, BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang*

## Master of Engineering specialising in Civil Infrastructure Management and Maintenance [EM017CIV07]

### Core Courses

Number	Course	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>CON5016Z</b>	Project Planning & Implementation .....	20	9
	Elective courses.....	40	9
	Total credits.....	<b>180</b>	

### Elective Courses (minimum of 16 credits)

Number	Course	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

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Number	Course	NQF Credits	HEQSF Level
CIV5118Z	Safety of Special Structures.....	20	9
CIV5119Z	Structural Performance Assessment & Monitoring.....	20	9
	Approved elective.....	16	9

### **MSc in Engineering specialising in Civil Infrastructure Management and Maintenance [EM023CIV07]**

Number	Course	NQF Credits	HEQSF Level
CIV5000W	Dissertation.....	180	9
END5050X	Master's journal paper.....	0	9
	Total credits.....	180	

### **MSc in Engineering specialising in Civil Infrastructure Management & Maintenance [EM024CIV07]**

Number	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation.....	120	9
CIV5109Z	Dissertation Preparation.....	0	9
CIV5067Z	Advanced Infrastructure Management.....	20	9
END5050X	Master's journal paper.....	0	9
	Elective courses.....	40	9
	Total credits.....	180	

#### **Elective Courses (minimum of 40 credits)**

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

### **Structural Engineering and Materials**

#### **Master of Engineering specialising in Structural Engineering [EM017CIV04]**

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

**Associate Professor and Programme Convenor:**

Hans Beushausen, Dipl.-Ing. MSc, PhD *HAW Germany*

**Core Courses (compulsory for EM024)**

*Select at least two of the following courses:*

Number	Course	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)**

Number	Course	NQF Credits	HEQSF Level
<b>CIV5006Z</b>	Advanced Structural Concrete Engineering .....	16	9
<b>CIV5112S</b>	Stability and Design of Steel Structures.....	16	9

**Elective Courses**

Number	Course	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:*

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

**Core Courses (compulsory for EM017)**

Number	Course	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.

**Transport Studies**

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

## 100 PROGRAMMES OF STUDY: CIVIL ENGINEERING

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 2015. (<http://www.cfts.uct.ac.za>)

### Programme Convener:

R Behrens, Pr Pln BA MCRP PhD Cape Town

### Postgraduate Diploma in Transport Studies [EG009CIV06]

#### Core Courses

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

### Master of Engineering specialising in Transport Studies [EM017CIV06]

#### Core Courses

Number	Course	NQF Credits	HEQSF Level
CIV5017Z	Minor Dissertation .....	60	9
END5047Z	Transport Demand Analysis and Project Assessment .....	20	9
END5048Z	Transport Modelling .....	20	9
END5071Z	Public Transport System Design and Operations Management ....	20	9
	Approved elective courses .....	60	9
	Total credits .....	180	

### Master of Philosophy specialising in Transport Studies [EM026CIV06]

#### Core Courses

Number	Course	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)

Number	Course	NQF Credits	HEQSF Level
END5036Z	Local Area Transport Planning Management & Design.....	20	9
END5039Z	Non-motorised Transportation (not offered) .....	20	9

Number	Course	NQF Credits	HEQSF Level
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.....	180	

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

### Urban Infrastructure Design and Management

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 developing cities: 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]

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))

#### Associate Professor and Programme Convener:

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

#### Core Courses

Number	Course	NQF Credits	HEQSF Level
END5037Z	Minor Dissertation.....	60	9
CIV5064Z	Urban Transitions in the Global South.....	20	9
CIV5065Z	Urban Renewal.....	20	9
END5042Z	Sustainable Urban Systems .....	20	9
END5043Z	Community Development .....	20	9

#### Elective Courses (select 40 credits)

Number	Course	NQF Credits	HEQSF Level
CIV5067Z	Advanced Infrastructure Management .....	20	9
CIV5107Z	Integrated Urban Water Management .....	20	9
CON5016Z	Project Implementation and Management.....	20	9
END5036Z	Local Area Transport Planning, Management & Design .....	20	9

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Number	Course	NQF Credits	HEQSF Level
ENDS038Z	Integrated Land-Use & Transport Planning.....	20	9
	Total credits .....	<b>180</b>	

### Water Quality Engineering

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.

#### Programme Convener:

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

### Master of Engineering specialising in Water Quality Engineering [EM017CIV002]

#### Core Courses

Number	Course	NQF Credits	HEQSF Level
CIV5017Z	Minor Dissertation.....	60	9
CIV5032Z	Introduction to Wastewater Treatment.....	4	9
CIV5045Z	The Activated Sludge System.....	10	9
CIV5046Z	Sedimentation in Water Treatment.....	8	9
CIV5047Z	Sewage Sludge Treatment.....	8	9
CIV5048Z	Design of Biological Nutrient Removal Systems.....	20	9
CIV5050Z	Integrated Wastewater Treatment Plant Design.....	20	9
	Pre-approved elective credits.....	50	09
	Total credits .....	<b>180</b>	

### MSc in Engineering specialising in Water Quality Engineering [EM023CIV02]

#### Core Courses

Number	Course	NQF Credits	HEQSF Level
CIV5000W	Dissertation.....	180	9
ENDS050X	Master's journal paper.....	0	9
	Total credits .....	<b>180</b>	

### MSc in Engineering specialising in Water Quality Engineering [EM024CIV02]

#### Core Courses

Number	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation.....	120	9
CIV5032Z	Introduction to Wastewater Treatment.....	4	9

Number	Course	NQF Credits	HEQSF Level
<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>ENDS050X</b>	Master's journal paper .....	0	9
	Total credits .....	<b>190</b>	

**Doctor of Philosophy [ED001CIV01]**

Number	Course	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

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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 MAAACE PrValuer

#### Associate Professors:

KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS ICIQB MSAFMA  
F Viruly, BA(Hons) *Wits* MA(Dev Econ) *Kent* FRICS

#### Emeritus Professors:

BG Boaden, BSc(QS) *Wits* MBA *British Columbia* PhD *Wits*  
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 MRICS  
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 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*  
A Windapo, BSc(Building) *IfE* MSc(Construction Management) PhD *Lagos* FNIOB

#### Lecturers:

SD Nurick, BCom BScHons(Property Studies) MPhil *Cape Town*  
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:**

E Koch

**Administrative Officer:**

M Fagodien (Postgraduate)

**Administrative Assistants:**

A Haddon (Undergraduate and Honours)

J Breda (Finance)

**Reception and General Administration:**

V Daries

**Departmental Assistant:**

B Baron

## 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.

### 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**

Number	Course	NQF Credits	HEQSF Level
<b>ACC202S</b>	Management Accounting I .....	18	6
<b>CON4030F</b>	Property Studies II.....	16	8
<b>CON4033W</b>	Applied Contract Law II .....	16	8
<b>CON4038F</b>	Advanced Construction Management .....	16	8
<b>CON4039S</b>	Integrated Management Project.....	16	8
<b>CON4047W</b>	Research Project.....	32	8
<b>CON4049S</b>	Construction Innovation.....	16	8
<b>STA1000F</b>	Statistics 1000 .....	18	5
<b>CON4035X</b>	Practical training .....	0	8
	Approved elective .....	12	8
	<b>Total credits.....</b>	<b>160</b>	

**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:

Number	Course	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]**

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.

**Professor and Programme Convener::**

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

**Core Courses**

Number	Course	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.....	16	
	<b>Total minimum credits.....</b>	<b>164</b>	

**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:

Number	Course	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]**

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.

**Professor and Programme Convener:**

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

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
<b>CON4041S</b>	Advanced Property Studies A .....	16	8
<b>CON4042H</b>	Advanced Property Studies B.....	16	8
<b>CON4043S</b>	Applied Property Law .....	16	8
<b>CON4045F</b>	Housing Development & Management IT .....	16	8
<b>CON4047W</b>	Research Project.....	32	8
<b>CON4048S</b>	Advanced Property Studies C.....	16	8
	Approved electives.....	32	8
	Total credits per year.....	<b>144</b>	

**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**

Number	Course	NQF Credits	HEQSF Level
<b>CON5006Z</b>	Property Development.....	20	9
<b>CON5007Z</b>	Property Law .....	20	9
<b>CON5008Z</b>	Urban Land Economics .....	20	9
<b>CON5009Z</b>	Property Finance .....	20	9
<b>CON5021Z</b>	Property Portfolio Management .....	20	9
<b>CON5036Z</b>	Introduction to Research .....	4	9
<b>CON5041Z</b>	Principles of Applied Statistics .....	4	9
<b>CON5043Z</b>	Property Valuation Theory & Practice .....	20	9
	Sub-total credits .....	<b>128</b>	

**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.

Number	Course	NQF Credits	HEQSF Level
<b>CON5044Z</b>	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.

Number	Course	NQF Credits	HEQSF Level
<b>CON5045Z</b>	Corporate Real Estate Portfolio Management.....	20	9

**Master of Science in Property Studies [EM013CON03]**

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.

**Associate Professor and Programme Convener:**

F Viruly BA(Hons) *Witwatersrand* MA(DevEcon) *KentFRICS*

**Core Courses**

Number	Course	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.....	<b>200</b>	

**Elective Core Courses**

To achieve registration with SACPV (South African Council for Property Valuers’ Profession) a student, in addition to the core courses, will have to complete the following core elective.

Number	Course	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.

Number	Course	NQF Credits	HEQSF Level
CON5045Z	Corporate Real Estate Portfolio Management .....	20	9

**Project Management (PGDip and Masters)**

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.

**Programme Convener:**

Cl Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA* PMP(PMI)

**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**

Number	Course	NQF Credits	HEQSF Level
CON5014Z	Project Management & Systems Theory .....	20	9
CON5016Z	Project Planning & Implementation .....	20	9
CON5018Z	Human Resource Management and Interpersonal Communication	20	9
CON5022Z	Total Quality Management in a Project Environment .....	20	9
CON5029Z	Project Risk Management .....	20	9
CON5036Z	Introduction to Research .....	4	9
CON5041Z	Principles of Applied Statistics .....	4	9
	Approved elective.....	20	9
	<b>Total credits .....</b>	<b>128</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**

Number	Course	NQF Credits	HEQSF Level
CON5023Z	Minor Dissertation Project Management.....	60	9
CON5014Z	Project Management & Systems Theory.....	20	9
CON5016Z	Project Planning & Implementation .....	20	9
CON5018Z	Human Resource Management and Interpersonal Communication	20	9
CON5022Z	Total Quality Management in a Project Environment.....	20	9
CON5029Z	Project Risk 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

**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)**

Number	Course	NQF Credits	HEQSF Level
CON5030Z	Project Finance & Procurement.....	20	9
	Approved elective.....	20	9
	<b>Total credits.....</b>	<b>200</b>	

**Doctor of Philosophy [ED001CON01]**

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

**Core Course**

Number	Course	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.

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## ELECTRICAL ENGINEERING

The Department offers the following specialisations in:

Control Engineering  
Computational Electronics  
Image Processing and Vision Systems  
Instrumentation  
Nuclear Power  
Machines and Power Electronics  
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* FSAAE SMSAIMC MIEEE

### Professors:

A Baghai-Wadji, MSc(Eng) PhD DSc *Vienna* FEMA SMIEEE  
MR Inggs, BSc(Hons) *Rhodes* PhD *London* MIEEE  
P Martinez, BSc BScHons(Mat Eng) MSc PhD *Cape Town* IAAA IISL FRAS MSAIP

### Professor (part-time):

P Pillay, CEng BSEng *UDW* MSc(Eng) *Natal* PhD *Virginia Tech* FIET FIEEE

### Emeritus Professors:

M Braae, MSc(Eng) *Cape Town* PhD *UMIST*  
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 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  
KA Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ SMIEEE MSAIEE

RH Geschke, BEng MSc(Eng) PhD *Stell* SMIEEE  
MA Khan, MSc(Eng) PhD *Cape Town* 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 Professor:**

JR Greene, MSc(Eng) *Cape Town* MIEEE

**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 *Kolkata* MIET SMIEEE MIE SMSAIEE  
OE Falowo, BEng MEng *Akure* PhD *Cape Town* SMIEEE  
SI Ginsberg, MSc(Eng) *Cape Town*  
M Hanif, BEng(Hons) *UK* PhD *Ireland* MIEEE  
A Mishra, BE (*REC India*) PhD *Edinburgh* SMIEEE  
A Murgu, MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD (Appl Math) *Jyväskylä* MIEEE

**Adjunct Senior Lecturer:**

I Khan, MSc(Eng) *Cape Town* MIEEE

**Lecturers:**

K Awodele, Reg Eng BSc(Eng) *Ife* MSc(Eng) *Abu* PGDM MNSE MIEEE  
A Patel, MSc(Eng) *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*

**Academic Development Senior Lecturer:**

R Smit, MSc(ScEd) *Wits*

**Senior Research Officer:**

R Herman, BSc(Eng) *Cape Town* MSc(Eng) PhD(Eng) *Stell*

**Senior Scholar:**

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

**Research Officer:**

A van der Byl, MTech *CPUT* PhD *Cape Town*

**Principal Technical Officer:**

AC Wozniak, BSc(Eng) *Cape Town*

**Chief Technical Officer**

J Pead, BSc(Eng), MSc(Eng) *Cape Town*

**Senior Technical Officers:**

P Daniels

D De Maar, BEd(Hons) *Cape Town*  
P Titus

**Technical Officers:**  
P Bizimana

**Departmental Manager:**  
J Buxey

**Administrative Officer (Undergraduate):**  
K van Wyk, BA (Hons) *Cape Town*

**Finance Assistant:**C Koonin

**Administrative Assistant (Postgraduate):**N Moodley

**Administrator (General):**  
R Harris

**Receptionist:**L Johannes

**Departmental Assistant:**  
B Daniels

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

## **Postgraduate Programmes**

### **Bachelor of Science (Honours) specialising in Nuclear Power [EH007EEE08]**

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 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.

**Emeritus Professor and Programme Convener:**  
CT Gaunt, PrEng BSc(Eng) *Natal MBL SA PhD Cape Town FIET FSAIEE*

**Core Courses**



Number	Course	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	8
	Total credits .....	<b>148</b>	

*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 Nuclear Power [EM017EEE08]**

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.

**Emeritus Professor and Programme Convener:** CT Gaunt, PrEng BSc(Eng) *Natal MBL SA PhD Cape Town FIET FSAIEE*

#### **Core Courses**

Number	Course	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.....	<b>180</b>	

*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]**

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 in resident in Cape Town for the full duration to complete all courses, by using distance learning techniques during the follow up

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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.

**Associate Professor and Programme Convener::**

DO'Hagan, BEng(Hons) MSc *Ulster* PhD *UCL* MIEEE MIET

**Core Course**

Number	Course	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation.....	60	9

**Select courses to the value of 120 credits**

Number	Course	NQF Credits	HEQSF Level
EEE5105Z	Fundamentals of Radar Signal and Data Processing.....	20	9
EEE5108Z	Advanced Radar & Electronic Protection 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.....	<b>180</b>	

\*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]**

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 Mathematics/Computational Electronics.

**Associate Professor and Programme Convener:**

ME Dlodlo, Reg Eng, BSEE BS *Geneva* MSc *Kansas State* PhD *Delft* FZweIE MIEEE

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation.....	60	9
EEE5108Z	Advanced Engineering Mathematics.....	20	9

Number	Course	NQF Credits	HEQSF Level
EEE5135Z	Information Theory and Error-Control Coding.....	20	9
EEE5136Z	Statistical Signal Theory .....	20	9

**Select courses to the value of 60 credits**

Number	Course	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 Science in Engineering specialising in Electrical Engineering [EEE01]**

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].

**EM023 Research Master’s by dissertation**

**Core Course**

Number	Course	NQF Credits	HEQSF Level
EEE5000W	Dissertation Electrical Engineering.....	180	9
END5050X	Master’s journal paper.....	0	9
	Total credits.....	<b>180</b>	

**EM024 Research Master’s by coursework and dissertation**

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
EEE5002W	Dissertation Electrical Engineering .....	120	9
	Elective courses approved by supervisor .....	60	9
EEE5103Z	Dissertation Preparation.....	0	9
END5050X	Master’s journal paper.....	0	9
	Total credits.....	<b>180</b>	

**Master of Philosophy specialising in Space Studies [EM026EEE07]**

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

**116 PROGRAMMES OF STUDY: ELECTRICAL ENGINEERING**

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.

**Programme Convener:**

P Martinez, BSc BScHons(Mat Eng) MSc PhD *Cape Town* IAA, IISL, FRAS, MSAIP

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
<b>EEE5002W</b>	Dissertation: Electrical Engineering .....	120	9
<b>EEE5103Z</b>	Dissertation Preparation .....	0	9
<b>END5050X</b>	Master’s journal paper .....	0	9
<b>EEE5124Z</b>	Space and Society.....	15	9
<b>EEE5125Z</b>	Space Applications for Sustainable Development.....	15	9
<b>EEE5126Z</b>	Space Mission Analysis and Design.....	15	9
<b>EEE5127Z</b>	Special Topics in Space Technology.....	5	9
	Elective .....	10	9
	<b>Total credits.....</b>	<b>180</b>	

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 Philosophy specialising in Nuclear Power [EM027EEE08]**

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.

**Professor and Convener:**

C.T. Gaunt, PrEng BSc(Eng) *Natal* MBL SA PhD *Cape Town* FIET FSAIEE

Number	Course	NQF Credits	HEQSF Level
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Number	Course	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.....	<b>180</b>	

Please note that courses will only be offered if there are sufficient students registered for the course.

## Doctor of Philosophy [ED001EEE01]

ED001 Doctor of Philosophy is a Research Degree

### Core Course

Number	Course	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

#### 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

#### Image Processing & Vision Systems

Fred.Nicolls@uct.ac.za

#### Control & Instrumentation Engineering

Mohohlo.Tsoeu@uct.ac.za

#### Machines & Power Electronics

Azeem.Khan@uct.ac.za

#### Microwave and Millimeter Wave Engineering

Riana.Geschke@uct.ac.za

#### Mobile Robotics

Robyn.Verrinder@uct.ac.za

#### Power & Energy Systems Protection

Sunetra.Chowdhury@uct.ac.za

#### Power Electronics

moin.hanif@uct.ac.za

#### Power Electronics, Drives & Machines

Paul.Barendse@uct.ac.za

#### Power System Network Studies

Kehinde.Awodele@uct.ac.za

#### Power Network Optimisation, Control and Stability

komla.folly@uct.ac.za

#### Radar and Remote Sensing

Michael.Inggs@uct.ac.za

#### Space Technology

Peter.Martinez1@uct.ac.za

#### Signal Processing

Amit.Mishra@uct.ac.za

#### Software Defined Radio

Simon.Winberg@uct.ac.za

#### Telecommunications Network Management

Alexandru.Murgu@uct.ac.za

#### Telecommunications Networks

Olabisi.Falowo@uct.ac.za

#### Telecommunications Systems

Mqhele.Dlodlo@uct.ac.za

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

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## MECHANICAL ENGINEERING

The Department offers the following Postgraduate Degree Programmes:

### Postgraduate 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)

## 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:

GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE  
C Redelinghuys, BIng(Hons) *Stell* MS *Stanford* PhD *Stell* MSAIMechE MAIAA  
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) MSc CNAA PhD *Cape Town* FSAIMechE  
J Gryzagoridis, PrEng BSc(Eng) *Lamar* MSc(Eng) *Texas A&M* PhD *Cape Town* MSAIMechE  
M(SA)IRACM(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*

### Honorary Professor:

D Karagiozova, PhD *Ukrainian Academy of Science*

**Associate Professors:**

T. Bello-Ochende, PrEng B.Eng M.Eng *Ilorin* PhD *Duke* MASME  
BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* FSAIMechE  
FJ Kahlen, Dipl-Ing *RWTH Aachen* MSc *Tennessee* PhD *Central Florida* SMAIAA  
R Kuppuswamy, BEng(Hons) MTech PhD *Singapore* SMSME  
HD Mouton, BSc Eng *Pret* BSc *Unisa* B Eng Hons M Eng *Pret* PhD Eng *NWU*

**Senior Lecturers:**

S Chung Kim Yuen, BSc(Eng) MSc(Eng) PhD *Cape Town*  
TJ Cloete, MIng *Stell*,  
C Findeis, NHD (Mech Eng) *Pret*  
D Findeis, BSc(Eng) MSc(Eng) *Cape Town* MSAIMechE  
WF Fuls, 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*  
HT Pearce, BSc(Eng) *Cape Town* MS PhD *Illinois*  
S Parker, BSc(Eng) MSc(Eng) *Cape Town*  
CB Shaw, BSc HDE MPhil(EngMan) PhD *Cape Town*  
G Vicatos, PrEng BSc(MechElec)(Marine) *Newcastle* MSc(Aero) DIC *London* PhD *Cape Town*

**Lecturers:**

T Booysen, MSc(Eng) *Cape Town*

**Part-Time Lecturers:**

J Evans, BA LLB *Cape Town*

**Academic Development Lecturer:**

Klout, MSc(Eng) PhD *Cape Town*

**Principal Technical Officers:**

J Mayer  
H Ermrich

**Chief Technical Officers:**

P Smith  
H Tomlinson  
R Whittemoore

**Technical Officer:**

D Jacobs

**Laboratory Attendants:**

G Doolings  
P Jacobs  
W Slaverse

**Administrative Officer:**

Mrs CA Bloomer

**Administrative Assistant (Undergraduate):**

Ms R Maree

**Administrative Assistant (Postgraduate):**

Mrs S Batho

**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

**Bachelor of Science (Honours) in Materials Science [EH005MEC04]**

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.

**Programme Convener:**

SL George, BSc(Eng) MSc(Eng) PhD *Cape Town*

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
<b>MEC4091S</b>	Honours Research Project.....	40	8
<b>MEC4096Z</b>	Manufacture & Properties of Composites .....	12	8
<b>MEC4097S</b>	Manufacture & Properties of Ceramics .....	8	8
<b>MEC4098Z</b>	Properties & Manufacture of Metallic Materials .....	16	8
<b>MEC4100F</b>	Manufacture & Properties of Polymers .....	12	8
<b>MEC4114F</b>	Experimental Techniques in Materials Science.....	16	8
	Approved Electives.....	40	8
	<b>Total credits .....</b>	<b>144</b>	

**Elective Courses**

*Select 40 credits from the following courses:*

Number	Course	NQF Credits	HEQSF Level
<b>MEC3045F</b>	Experimental Methods.....	12	7
<b>MEC3060F</b>	Materials under Stress .....	8	7
<b>MEC4099Z</b>	Phase Transformations in Materials .....	8	8
<b>END5044F</b>	Professional Communication Studies.....	16	9

**MSc in Engineering specialising in Mechanical Engineering [MEC01]**

**EM023 Research Master’s by dissertation**

**Core Course**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5000W</b>	Dissertation Mechanical Engineering .....	180	9
<b>END5050X</b>	Master’s journal paper.....	0	9
	<b>Total credits.....</b>	<b>180</b>	



**EM024 Research Master’s by coursework and dissertation**

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5010Z</b>	Dissertation Mechanical Engineering .....	120	9
	Elective courses approved by supervisor .....	60	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	0
<b>END5050X</b>	Master’s journal paper.....	0	9
	<b>Total credits.....</b>	<b>180</b>	

**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].

**EM023 Research Master’s by dissertation**

**Core Course**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5070W</b>	Dissertation Materials Engineering.....	180	9
<b>END5050X</b>	Master’s journal paper .....	0	9
	<b>Total credits .....</b>	<b>180</b>	

**EM024 Research Master’s by coursework and dissertation**

**Core Courses**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5071Z</b>	Dissertation Materials Engineering .....	120	9
	Elective courses approved by supervisor .....	60	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	0
<b>END5050X</b>	Master’s journal paper.....	0	9
	<b>Total credits.....</b>	<b>180</b>	

**MSc in Engineering specialising in Sustainable Energy Engineering [EM024MEC07]**

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 coursework, 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.

**Professor and Convener:**

H Winkler, MSc *Berkeley* MA PhD *Cape Town*

**Compulsory Courses**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5061W</b>	Dissertation: Sustainable Energy .....	120	9
<b>MEC5091Z</b>	Introduction to Energy Policy & Sustainable Energy Engineering20		9
<b>MEC5097Z</b>	Dissertation Preparation.....	0	0
<b>END5050X</b>	Master’s journal paper .....	0	9
	Approved electives .....	60	9

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Number	Course	NQF Credits	HEQSF Level
	Total credits.....	<b>200</b>	

### Elective Courses (60 credits must be selected from the following list)

Number	Course	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

### Master of Philosophy specialising in Energy & Development Studies [EM026MEC08]

The Energy Research Centre offers a structured Master's Programme in Energy and Development Studies, specifically aimed at non-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 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.

#### Professor and Convener:

H Winkler, MSc *Berkeley* MA PhD *Cape Town*

#### Compulsory Course

Number	Course	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	0
<b>END5050X</b>	Master's journal paper.....	0	9
	Approved electives.....	60	9
	Total credits.....	<b>200</b>	

### Elective Courses (60 credits must be selected from the following list)

Number	Course	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 Computational Mechanics [EM026MEC01]

The Department offers the following courses in Computational Mechanics. This area of study is truly interdisciplinary and is available to all postgraduate students in the Faculty.

#### Professor and Convener:

BD Reddy, OMB BSc(Eng) *Cape Town* PhD *Cantab* FRSSAf FSAAE MASSAF

#### Compulsory Courses

Number	Course	NQF Credits	HEQSF Level
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Number	Course	NQF Credits	HEQSF Level
<b>MEC5010Z</b>	Dissertation.....	120	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	0
<b>END5050X</b>	Master's journal paper.....	0	9

**Elective courses**

Select courses to the value of 60 credits:

Number	Course	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.....	<b>180</b>	

**Master of Philosophy specialising in Engineering Management [EM027MEC02]**

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.

**Programme Convener:**

CB Shaw, BSc HDE MPhil(EngMan) PhD *Cape Town*

**Core Course**

Number	Course	NQF Credits	HEQSF Level
<b>MEC5095Z</b>	Minor Dissertation.....	60	9
<b>MEC5097Z</b>	Dissertation Preparation .....	0	0

**Select courses to the value of 120 credits**

Select courses to the value of 120 credits:

Number	Course	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.....	<b>180</b>	

\*Please note that certain courses run every alternate year and courses will only run if there are sufficient students registered for the course.

**Research Entities**

See Centres and Units Established in the Faculty of Engineering & the Built Environment.

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- Blast Impact & Survivability Research Unit (BISRU)
- Centre for Materials Engineering (CME)
- Centre for Research in Computational & Applied Mechanics (CERECAM)
- Energy Research Centre (ERC)
- Sasol Advanced Fuels Laboratory

**Doctor of Philosophy [ED001]**

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

**Core Course**

Number	Course	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.

# 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 research on urban issues - both theoretical and applied - across the University of Cape Town. The research applied projects operate at the level of the global South, the African continent, South Africa, and the Cape Town region. Africa-wide projects include State of the City Reports, understanding African urbanism, support to the Association of African Planning Schools, and the MISTRA Urban Futures Project. The policy arm of WIEGO (Women in Informal Employment, Globalising and Organizing) is based in ACC. The ACC drives a national programme on the space economy of South Africa. Applied research aims to address complex, intractable urban problems and challenges. This is undertaken in a manner that advances novel ways of thinking about and understanding urbanism across the global South, yet is rooted in the realities of African urban spaces. Applied research is primarily done in the CityLab initiative, in which multi-year research on the advancement of sustainable human settlement is conducted. The CityLab incorporates the Cape Urban Observatory, which supports empirically grounded policy- and decision-making by providing robust spatially and temporally referenced data at multiple scales. The Observatory provides a platform for identifying, accessing, sharing, analysing, and disseminating data from public sources on a range of themes, spanning the social and natural sciences. The ACC supports a Master programme in Urban Infrastructure and Design, which seeks to equip a new generation of built environment professionals with the knowledge to conduct sustainable urban development in a fast changing world. Finally, the ACC convenes public forums for engagement on critical urban related public policy issues.

#### Professor and Director:

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

#### Associated Academic Staff:

O Crankshaw, BSc(Hons) BA(Hons) MA PhD *Wits*

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

N Odendaal, BA *UNISA* NDip(Trp) *ML Sultan* RTPI PhD *Wits*

S Oldfield, BA(Hons) *Syracuse* MA(Geography) PhD *Minnesota*

S Parnell, BA(Hons) HDE MA PhD *Wits*

G Pirie, (Deputy Director)

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

MB van Ryneveld, PrEng CEng BSc(Eng) *Cape Town* PhD *Wits* FSAICEMICE

HB von Blottnitz, BSc(Eng) *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTH Aachen* MSAICHe MSESSA

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

**Finance Manager:** I Najaar

**Senior Secretary:**

M Waglay

## 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, AMD 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 waste water 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, micro- 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:

C J Fenner, BSc(Hons) *Rhodes* PhD *Cape Town*

M Johnstone-Robertson, BSc (Eng)Chem *PhD Cape Town*

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

RP van Hille, BSc(Hons) PhD *Rhodes*

S Tai, BScHons *UMIST* MSc(Biochemical Engineering) PhD(Industrial Microbiology *TU Delft*)

### Technical Staff:

L Mekuto, NDip Biotechnology *CPUT*

J Mwase, MSc *Cape Town*

E Ngoma, BTech *TUT*

S Rademeyer NDip (Chem Eng) *CPUT*

N Caive, NDip *CPUT*

N van Wyk, BSc(Hons) MSc *Stell*

### Postdoctoral Researchers:

M Fagan, BSc(Eng) *Cape Town* PhD *Cantab*

J A Filho, BSc(Eng) *Envir. Lutheran Univ Brazil* MSc DSc *Rio Grande do Sul*

M Griffiths, MSc *Cantab* PhD *Cape Town*

R Huddy, BSc(Hons) PhD *Cape Town*

A Kotsiopoulos, BSc(Eng) PhD *Cape Town*  
 T Louw, BSc(Eng) *Pret PhD Nebraska*  
 R Pott, BSc(Eng) *Cape Town PhD Cantab*  
 S Savvi, MSc PhD *Witwatersrand*

**Research Associates:**

C Bryan, BSc(Hons) *Nottingham PhD Bangor*  
 C Garcian, BSc(Eng) PhD *Cape Town*

**Administrative Staff:**

SH Jobson, BA *Rhodes HDE Cape Town*  
 C Mazzolini, BA Print Journalism *Cape Town*  
 L Mostert, BSc(Eng) *Cape Town*  
 Website : [www.ceber.uct.ac.za](http://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:**

CT O'Connor, PrEng BSc *Unisa STD Natal BSc(Hons) PhD Cape Town DEng Stell FSAIMM FSAICHe FSAAE FRSSAF*  
 ME Dry, MSc *Rhodes PhD Bristol*  
 E van Steen, MSc(Eng) *Eindhoven PhD Karlsruhe FSAICHe FSAAE*  
 M Claeys, Dipl.Ing. (Chem Eng) Dr.-Ing. *Karlsruhe*  
 W Böhringer, DiplChem *Karlsruhe*  
 S Roberts, BSc(Eng)Chem MSc(Eng)Chem *Cape Town*  
 P Levecque, MSc(Eng) Bio PhD *LEUVEN*  
 N Hussain, BSc (Eng) Chem MSc (Eng) Chem *Cape Town MSACIhE*  
 O Conrad, Dipl Chem Dr. rer. nat. Chem *Westfaelische Wilhelms- Universitaet Muenster*  
 S Blair PhD Materials Chemistry *Simon Fraser (Canada)*  
 S Tanaka BSc(Eng) MSc(Eng) *Kyoto*

**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* MSAIMM  
 F Ebobisse Bille, BSc(Hons) *Yaounde* 'I *Cameroon* PhD *Pisa*  
 I Govender, BSc *UDWHDE UNISA* BSc(Hons) PhD *Cape Town*  
 S Skatulla, Dipl Ing *Karlsruhe* PhD *Adelaide*

**Associate members:**

TJ Cloete, MIng *Stell*  
 T Franz, PhD *Bremen*  
 AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* MSAICHe  
 AG Malan, BEng(Mech) MEng *Pret* PhD *Swansea*  
 GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE  
 RB Tait, BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE  
 JE van Zyl, PrEng, BEng MEng *RAU* PhD *Exeter* MSAICE MASCE FWISA

**Senior Research Officer:**

AT McBride, MSc, PhD, *Cape Town*

**Administrative Assistant:**

Ms OJ Goodhind

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 and materials processing, producing, manufacturing and user industries and undertakes extensive research programmes, which prepare candidates for the degrees of MSc(Eng) in Materials Engineering and PhD. Of particular significance is the BSc(Hons) in Materials Science that is specifically designed for graduates with degrees in Physics, Chemistry or Geology. We promote quality research by maintaining international liaisons and publication in reputable journals. The Centre also aims to support and assist both large and developing industries through research projects, practical solutions and human resource development.

**Professor and Director:**

RD Knutsen, BSc PhD *Cape Town*

**Associated Academic Staff:**

SL George, BSc(Eng) MSc(Eng) PhD *Cape Town*  
 C Mshumi BSc(Hons) *Cape Town*  
 RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE



**Visiting Lecturers:**

T Becker, BSc(Eng) MSc(Eng) PhD *Cape Town*  
 M Topic, BSc *Belgrade* PhD *Cape Town*

**Senior Technical Officers:**

LA Matthews, BSc(Eng) MSc(Eng) *Cape Town*  
 P Park-Ross, BSc(Hons) *Cape Town*

**Part-time Technical Officer:**

T Newins

**Secretary:**

Mrs B Glass

**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 and Electrical Engineering; geology and physics. The main focus of research is on the processes of froth flotation and comminution, arguably two of the most important unit operations in mineral beneficiation. Research is conducted through industrial, laboratory and computational studies. The Centre enjoys extensive support from local and international mining companies as well as statutory funding agencies. The Centre has an excellent reputation in its field and has strong links with a number of international research institutes. The Centre is a research partner in a highly successful collaborative venture with the Julius Kruttschnitt Mineral Research Centre, University of Queensland.

**Professor and Director:**

DA Deglon, BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMM

**Associated Academic and Research Staff**

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

J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM

PJ Harris, BSc(Hons) PhD *Witwatersrand*

S Lambert, BSc(Eng) BSc(Hons) *Strathclyde*

DJ Bradshaw, BSc(Eng) PhD *Cape Town*

M Powell, BSc PhD *Cape Town*

I Govender, BSc *UDW* HDE *UNISA* BSc(Hons) PhD *Cape Town*

MC Harris, MSc(Eng) *Cape Town*

A Mainza BSc(Eng) *UNZA* PhD *Cape Town*

J Sweet, BSc(Eng) MSc *Cape Town* MSAIMM

A van der Westhuizen, BIng *Stell* MSc(Eng) *Cape Town* MSAIMM

M Becker MSc *Cape Town* PhD *Pret*

L Bbosa, MSc *Cape Town*

P Bepswa, BSc(Eng) *Cape Town*

K Corin, MSc PhD, *Cape Town*

B McFadzean, MSc PhD *NNMU*

J Waters, BTech *Cape Technikon*

JG Wiese, MSc *Cape Town*

**Administrative Staff:**

Mrs B Andersen, BA *Cape Town*

Ms H Sundström  
Ms N Davies

### **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.

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

K le Roux, BA(Hons) *Natal* HDE MPhil *Cape Town* PhD *Witwatersrand*

#### **Associated Academic Staff:**

BI Collier-Reed, Pr Eng MSc(Eng) PhD *Cape Town* MSAIMechE  
TS Craig, PhD *Cape Town*  
AE Deacon, MSc *Stell*  
B Kloot, BSc(Eng) *Wits* MSc(Eng) PhD *Cape Town*  
N Wolmarans, BSc(Eng) MSc(Eng) PGDipEd(HES) *Cape Town*

#### **Administrative Staff:**

Ms Z Geyer, BA *Cape Town* BSc *UWC*

### **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

Dr 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:**

O Conrad, Dipl Chem Dr. rer. Nat. Chem *Westfaelische Wilhelms- Universitaet Muenster*

### **Energy Research Centre (ERC)**

The Energy Research Centre was formed by amalgamating two existing energy research groups housed within the Faculty, namely the Energy Development Research Centre (EDRC) and the Energy Research Institute (ERI) and is currently situated in the Department of Mechanical Engineering.

The ERC is a multi-disciplinary Centre that conducts high quality, targeted and relevant research as well as offering postgraduate opportunities at the 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:**

HL Trollip, BSc (Elec Eng) MSc (Elec Eng) *Wits*

**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:**

AC Stone, MSc (Energy Studies) *Cape Town*

**Research Staff:**

F Ahjum, MSc(Eng) *Cape Town*

K Altieri, MPP *Princeton University*, PhD *Rutgers*

B Batidzirai, BSc(Eng)Elec *UZ*, MSc (Energy) *Utrecht*, PhD *Utrecht*

MJ Bouille BSc, BSc (Hons) *Rhodes* MPhil *Cape Town*

A Boyd, MSc *Cape Town* MEng Structural Eng Architecture *Edinburgh*

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 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* *Netherlands*

M Senatla, MSc(Eng) *Cape Town*

D Sparks, MSc PhD *Cape Town*

A Stewart, MSc(Eng) *Cape Town*

AC Stone, MSc(Energy Studies) *Cape Town*

M Torres Gunfaus, MSc Industrial Engineering *Germany*

HL Trollip, BSc (Elec Eng) *Wits*, MSc (Elec Eng) *Wits*

**Operations Manager:**

Ms F Babalwa

**Administrator, Postgraduate & Human Resources:**

Ms F Harribi

**Assistant Administrator:**

Ms B Matubatuba

**Postgraduate Programme Coordinator:**

Ms J Burton BA(Hons)*Rhodes*, MSc(Eng) *Cape Town*

**Publications & Media Staff:**

R Drummond, BSocSc MRCP *Cape Town* AAA DipCEA MSAPI MIEA

T 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:**

GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* Hon FSAIMechE MASME FSAAE

**Honorary Professor:**

D Karagiozova, PhD *Ukrainian Academy of Science*

**Associated Academic Staff:**

S Chung Kim Yuen, BSc(Eng) MSc PhD *Cape Town*

TJ Cloete, MEng *Stell*

R Govender, BSc(Eng) MSc(Eng) PhD *Cape Town*

GS Langdon, BEng PhD *Liverpool* MIMechE CEng

**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 fFSAAE

**Associated Academic Staff:**

T-A Craig BSc(Hons) MSc PhD(Chem) *Cape Town*

M Rodriguez-Pascual BSc MSc *Barcelona* PhD *Delft*

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 programme specializing in Sustainable Minerals Resource Development, which will be offered from 2014. The programme will be delivered jointly with the University of Zambia, as part of the Education for Sustainable Development in Africa project of the United Nations, and will include 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 Program (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.

**Professor and Director:**

J-P Franzidis BSc(Eng) MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM

**Associated Academic Staff:**

DA Deglon BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMM (Director of Postgraduate Studies)

STL Harrison BScHons *Cape Town* PhD *Cantab* MSAICHe SASM FSAIMM FSAAE ASSAf FWISA

AE Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAICHe FSAIMM MASSA fFSAAE

HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *UNISA* MSc(Eng) *Cape Town* Dr.-Ing. *RWTHAachen* MSAICHe

DL Reid, MSc *Wellington* PhD *Cape Town*  
 N Isafiade BSc(Hons) *Ilorin* MSc(ChemEng) *Ife* PhD *Cape Town*  
 M Becker BSc(Hons) MSc *Geology Cape Town* PhD *Pret*  
 I Govender (Physics)  
 J Petersen BSc(Eng) *Wits* PhD *Cape Town* MSAIMM  
 A Mainza BSc(Eng) UNZA PhD *Cape Town*  
 A Buffler, MSc PhD HDE *Cape Town*  
 B Cohen, BSc(Eng) PhD *Cape Town*

**Research Staff:**

Dr JL Broadhurst, BSc(Hons) MSc *Port Elizabeth* PhD *Cape Town*

**Finance and Administrative Officer:**

Mrs M van der Fort

## Other entities

### Continuing Professional Development

**Co-ordinator:**

Ms H Tait, BHE *Stell*

**Administrator:**

Ms S Jemaar

The CPD programme offers short courses, workshops and conferences. These provide a means for the 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 entrance requirements to CPD courses. In some cases, some prerequisite knowledge may be required. A certificate of attendance or of successful completion (where an examination is passed) is normally issued. Some courses may be undertaken outside of working hours, while others may require attendance for a number of days on a full-time basis. Courses may also be run on an in-house basis for companies, if requested.

In terms of the agreements between the Engineering Council of South Africa (ECSA) and other international engineering bodies, South African registered professionals are obliged to keep abreast of developments and knowledge in their fields of expertise in order to maintain and demonstrate their competence. All ECSA registered persons are required to undertake and record CPD activities as a prerequisite to renewal of their professional registration. Most of the courses offered by the CPD Programme are registered with ECSA for CPD points.

The CPD web address is [www.cpd.uct.ac.za](http://www.cpd.uct.ac.za).

## Geographical Information Systems Unit

**Administrators:**

Mr N Lindenberg, BSc(Hons) *Cape Town*  
 Mr T Slingsby, MSc(Eng) *Cape Town*

The UCT GIS Laboratory acts as a consulting 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:**

Mrs 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; and
- 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

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

### Departments Established in the Faculty of Commerce

#### Accounting

**Associate Professor and Head of Department:**

M Graham, BBusSc MCom *Cape Town CA(SA) ACMA*

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

#### Finance and Tax

**Associate Professor and Head of Department:**

C West, MCom PhD *Cape Town CA(SA)*

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 FTX.

#### School of Economics

**Director of the School:**

E Muchapondwa, BSc MSc *Zimbabwe PHL PhD Göteborg*

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

#### School of Management Studies

**Head of Department:**

A Schlechter, BSc(Hons) MA PhD *Stell*

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

### Centre and Department Established in the Faculty of Humanities

#### Centre for African Studies

**Associate Professor and Director:**

H Garuba, MA PhD *Ibadan*

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

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

## **Sociology**

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

D Cooper, BSc(Eng) *Cape Town* MSocSc PhD *Birmingham*

The Sociology Department is housed in the Robert Leslie Social Sciences Building, located on the University Avenue.

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

## **Philosophy**

### **Professor and Head of Department:**

D Benatar, BSocSc(Hons) PhD *Cape Town*

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

## **Department Established in the Faculty of Law**

### **Commercial Law**

#### **Professor and Head of Department:**

A Rycroft, BA *Rhodes* LLB *Natal* LLM *London* Attorney of the High Court

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 CML.

## **Department Established in the Faculty of Health Sciences**

### **Human Biology**

#### **Associate Professor and Head of Department:**

L A Kellaway, Bsc(Hons) MSc PhD *Cape Town*

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

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

The Department of Human Biology also collaborates at an undergraduate level with departments in the Faculty of Engineering & the Built Environment, particularly Electrical Engineering and

Mechanical and Materials Engineering. Courses offered are listed in the section (Undergraduate Courses - HUB).

## Departments and Unit Established in the Faculty of Science

### Astronomy

**Professor of Astronomy and Head of Department:**

R C Kraan-Korteweg, Diploma PhD Phil II *Basle*

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

### Chemistry

**Professor and Head of Department:**

S A Bourne, BSc(Hons) PhD *Cape Town* CChem MRSC MSACI

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

### Computer Science

**Associate Professor and Head of Department:**

S Berman, BSc(Hons) *Rhodes* MSc PhD *Cape Town*

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

### Electron Microscope Unit

**Professor and Director:**

B T Sewell, MSc *Witwatersrand* PhD *Lond*

The Electron Microscope Unit is housed in the RW James Building at 9 University Avenue and provides scanning and transmission electron microscopy facilities for staff and research students in all faculties. The Unit is equipped with two scanning and three transmission electron microscopes including a modern field emission TEM and SEM. Associated preparative, darkroom, light microscopy and library facilities are also provided. Enquiries regarding the use of these facilities are welcome.

Aspects of electron microscopy are offered to any University member who wishes to make use of the Unit's facilities for the purpose of research. The Unit is also able to provide information and advice on a wide range of microscopy related topics. More detailed information is available at <http://sbio.uct.ac.za/webemu>

### Environmental and Geographical Science

**Professor and Head of Department:**

M E Meadows, BSc(Hons) *Sussex*, PhD *Cantab*, FSSAG

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

## **Geological Sciences**

### **Associate Professor and Head of Department:**

S H Richardson, BSc(Hons) *Cape Town* PhD *MIT*

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

## **Mathematics and Applied Mathematics**

### **Professor and Head of Department:**

H-P Kunzi, MSc PhD *Berne*

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

## **Physics**

### **Professor and Head of Department:**

A Buffler, MSc PhD HDE *Cape Town*

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

## **Statistical Sciences**

### **Associate Professor and Head of Department:**

F Little, MSc PhD *Cape Town*

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

## COURSES OFFERED

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

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

### Course Codes

<b>ACC</b>	Accounting
<b>APG</b>	Architecture, Planning and Geomatics
<b>AST</b>	Astronomy
<b>CAS</b>	Centre for African Studies
<b>CHE</b>	Chemical Engineering
<b>CIV</b>	Civil Engineering
<b>CON</b>	Construction Economics and Management
<b>EEE</b>	Electrical Engineering
<b>END</b>	Faculty of Engineering & the Built Environment
<b>MEC</b>	Mechanical Engineering
<b>PBL</b>	Public Law
<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 AAAAnnnnB, where

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

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

The following suffixes are used:

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

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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.

## Lecture timetable

The lecture timetables are published separately by the department concerned from where they are obtainable at Registration. The lecture periods are shown at the back of this handbook.

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### ACC2022F MANAGEMENT ACCOUNTING I

18 NQF credits at level 6

**Convener:** Mr J Anthony/Mrs J Gevers

**Prerequisites:** ACC1006 Financial Accounting (or approved equivalent).

**Course outline:** This course introduces 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%.

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### APG2018X GEOGRAPHIC INFORMATION SYSTEMS CAMP

4 NQF credits at level 6

**Convener:** Associate Professor Julian Smit

**Prerequisites:** APG1016F/S.

**Co-requisites:** APG2015F.

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

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

**Assessment:** Project 100%.

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### APG3012S GEOMATICS III

24 NQF credits at level 7

**Convener:** Associate Professor J Smit.

**Prerequisites:** **BSc Geomatics Students:** MAM1000W OR MAM1018F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F, APG2016W, APG2017X, APG2018X,

**BSc Hons in GIS students:** APG2018X, APG4007F.

**Course outline:** This course develops an understanding of: the nature and concept of satellite and airborne remote sensing: the nature of remote sensing, optical radiation models, sensor models, data models spectral transforms, spatial transforms, thematic image classifications and remote sensing for

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decision support. The course also introduces airborne laser scanning (ALS), application and sensor systems for ALS, photogrammetry, geometry of images, image measurement and co-ordinate refinement, stereo restitution, camera calibration and photogrammetric applications.

**DP requirements:** Completion of practical assignments with a minimum of 50%, a test average of 35% or more and an 80% attendance record.

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

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### APG4007F PRINCIPLES OF GIS

24 NQF credits at level 8 **Convener:** Mr 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.

**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%).

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### APG4008S ADVANCED GIS

24 NQF credits at level 8

**Convener:** Associate Professor J Smit

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

**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%).

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### APG4009F COMPUTING FOR GIS

18 NQF credits at 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.

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### APG4020F PLANNING THEORY & PRACTICE



8 NQF credits at level 8

**Convener:** Dr T Winkler

**Prerequisites:** 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.

**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 level 8

**Convener:** Dr N Odendaal

**Prerequisites:** 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.

**DP requirements:** None

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

#### **APG4022F PLANNING PROJECT A**

32 NQF credits at level 8

**Convener:** Dr T Winkler

**Prerequisites:** 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.

**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.

#### **APG4023S URBAN ECONOMIC DEVELOPMENT PROCESSES**

12 NQF credits at level 8

**Convener:** Professor V Watson

**Prerequisites:** 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.

**DP requirements:** None

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

#### **APG4024S PLANNING & GOVERNMENTAL SYSTEMS**

12 NQF credits at level 8

**Convener:** Dr N Odendaal

**Prerequisites:** None

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**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.

**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 level 8

**Convener:** Ms F Ogle

**Prerequisites:** 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.

**DP requirements:** None

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

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### APG4026S PLANNING PROJECT B

32 NQF credits at level 8

**Convener:** Dr N Odendaal

**Prerequisites:** APG4022F

**Course outline:** The project focuses on planning within the large metropolitan context and on plan implementation.

**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%.

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### APG4028F ASPECTS OF CITY DESIGN

*Elective for students in BAS(Hons)*

12 NQF credits at level 8

**Convener:** Associate Professor H Comrie

**Prerequisites:** None

**Course outline:** The course focuses on historically conceptualised concepts of urban structure and performance at the local area scale. It includes: Introduction to city planning: conceptual framework; role of the planner; issues of planning; approach of the programme. Aspects of city design: the need for design and a design approach to planning; the process of design; exploration of fundamental ideas. Historical case studies: framework of evaluation; overseas case studies; local case studies.

**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 in BAS(Hons)*

12 NQF credits at level 8

**Convener:** Ms T Katzschner

**Prerequisites:** 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.

**DP requirements:** None

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

---

**APG4030F HISTORY & THEORY OF LANDSCAPE ARCHITECTURE A**

12 NQF credits at level 8

**Convener:** Mr C Hindes

**Prerequisites:** 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.

**DP requirements:** None

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

---

**APG4031F LANDSCAPE TECHNIQUES I**

12 NQF credits at level 8

**Convener:** Ms J McLachlan

**Prerequisites:** None

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

**DP requirements:** None

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

---

**APG4032S LANDSCAPE DESIGN**

12 NQF credits at level 8

**Convener:** Mr C Hindes

**Prerequisites:** 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.

**DP requirements:** None

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

---

**APG4033S LANDSCAPE TECHNIQUES II**

8 NQF credits at level 8

**Convener:** Dr J Raxworthy

**Prerequisites:** APG4031F or permission of course convener.

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

**DP requirements:** None

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

---

**APG4034F TERRAIN ANALYSIS**

12 NQF credits at level 8

**Convener:** Mr S Masson

**Prerequisites:** APG4029F or permission of course convener.

**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.

**DP requirements:** None

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

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**APG4035F PLANNING TECHNIQUES I**

12 NQF credits at level 8

**Convener:** Ms J McLachlan

**Prerequisites:** None

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**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.

**DP requirements:** None

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

---

### APG4036F LOCAL AREA LANDSCAPE ARCHITECTURE PROJECT

32 NQF credits at level 8

**Convener:** Mr C Hindes

**Prerequisites:** 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.

**DP requirements:** None

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

---

### APG4037S METRO LANDSCAPE PROJECT

36 NQF credits at level 8

**Convener:** Mr C Hindes

**Prerequisites:** 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.

**DP requirements:** None

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

---

### APG4038S PLANNING TECHNIQUES II

12 NQF credits at level 8

**Convener:** Dr T Winkler and Mr A Rhodes

**Prerequisites:** 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).

**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.

---

### APG4039F ADVANCED HISTORY & THEORY OF ARCHITECTURE

12 NQF credits at level 8

**Convener:** Mr M Fraschini

**Prerequisites:** 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.

**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%.

---

### APG4041S ADVANCED BUILDING TECHNOLOGY

12 NQF credits at level 8.

**Convener:** Mr F Carter

**Prerequisites:** 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.

**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 ARCHITECTURAL DESIGN STUDIO I

48 NQF credits at level 8

**Convener:** Mr F Carter

**Prerequisites:** 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.

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

**Assessment:** Oral presentation of architectural design project/s.

---

### APG4043S ARCHITECTURAL DESIGN STUDIO II

48 NQF credits at level 8

**Convener:** Mr F Carter

**Prerequisites:** APG4042F

**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.

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

**Assessment:** Oral presentation of architectural design project/s.

---

### APG4044S PROFESSIONAL PRACTICE

12 NQF credits at level 8

**Convener:** Mr T Boxall

**Prerequisites:** 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.

**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 level 8

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**Convener:** Mr C Hindes

**Prerequisites:** None

**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.

**DP requirements:** None

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

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### APG4048S ARCHITECTURE RESEARCH METHOD & PROJECT

12 NQF credits at level 8

**Convener:** Professor I Low

**Prerequisites:** 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.

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

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

---

### APG4049F ASPECTS OF HISTORY & THEORY

12 NQF credits at level 8

**Convener:** Associate Professor N Coetzer

**Prerequisites:** 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.

**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 GEOINFORMATICS PROJECT

40 NQF credits at level 8

**Convener:** Associate Professor Julian Smit

**Prerequisites:** None

**Course outline:** This project aims to provide an opportunity for students 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, submit completed reports and posters at the end of the year, with an oral presentation of their project mid-year, as well as for the final assessment towards the end of the year. This will include presentation of the project plan, execution of the project, and presentation of the result in written, poster and oral form.

**DP requirements:** None

**Assessment:** Coursework 75%, Examination 25%

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### APG4051Z SELECTED TOPICS IN APPLIED SCIENCE

0 NQF credits at level 8

**Course outline:** Only for students who have been granted credit and exemption for courses taken elsewhere.

**DP requirements:** None

**Assessment:** None

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**APG5000W** DISSERTATION: GEOMATICS

180 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** 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.

**DP requirements:** None

**Assessment:** Submission of dissertation (100%).

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**APG5001W** DISSERTATION: GEOMATICS 120

120 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** APG5061Z

**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.

**DP requirements:** None

**Assessment:** Submission of dissertation (100%).

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**APG5020F** REGIONAL PLANNING PROJECT

32 NQF credits at level 9

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

**Prerequisites:** APG4026S

**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.

**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 level 9

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

**Prerequisites:** 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.

**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 level 9

**Convener:** Ms T Katzschner

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**Prerequisites:** 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%.

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### APG5025F HISTORY & THEORY OF LANDSCAPE ARCHITECTURE B

*Elective for students in BAS(Hons)*

12 NQF credits at level 9; 26 lectures

**Convener:** Dr J Raxworthy

**Prerequisites:** 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.

**DP requirements:** None

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

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### APG5026F LANDSCAPE CONSTRUCTION & PRACTICE

12 NQF credits at level 9

**Convener:** Mr B Robinson

**Prerequisites:** 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).

**DP requirements:** None

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

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### APG5029F LANDSCAPE ARCHITECTURE PROJECT

36 NQF credits at level 9

**Convener:** Dr J Raxworthy

**Prerequisites:** 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.

**DP requirements:** None

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

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### APG5030W GEOGRAPHICAL INFORMATION SYSTEMS PROJECT

40 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** APG5031F, APG5043F

**Course outline:** On the recommendations of the supervisor and the agreement of the Head of Department, a student may be permitted to enter into a programme of individual study guided by the



supervisor. The program will involve the student in about 360 hours of work and a written report must be submitted.

**DP requirements:** None

**Assessment:** Project report(s) (100%).

### **APG5031F DATA ACQUISITION & CONCEPTS OF GIS**

28 NQF credits at level 9

**Convener:** TBA

**Course outline:** This course aims to develop an advanced understanding of data acquisition and concepts of GIS. Topics include: definition of GIS; GIS application areas, raster and vector structures, maps and map analysis; review of co-ordinate systems and reference surfaces; map projections; introduction to global positioning system (GPS); spatial data sources-digitising and data formatting, spatial analysis, remote sensing and image processing, and stereo and rectified images.

**DP requirements:** None

**Assessment:** June examination 3 hours (100%).

### **APG5032S TECHNICAL ISSUES IN GIS**

28 NQF credits at level 9; 40 hours on GIS software and related technologies

**Convener:** TBA

**Course outline:** This course covers technical issues in GIS. Topics include: map projections, co-ordinate systems and transformations; vector and raster data structures and algorithms; digital elevations models, TIN and general digital terrain applications in environmental and temporal studies; database concepts of GIS; and error modelling and data uncertainty: design and presentation of spatial data. Research design and methodology.

**DP requirements:** None

**Assessment:** November examination 4½ hours.

### **APG5033Z MANAGEMENT ISSUES IN GIS**

28 NQF credits at level 9

**Convener:** TBA

**Course outline:** This course covers management issues in GIS. Topics include application areas; land information systems and cadastral data bases; decision support systems; artificial intelligence; system planning, design and implementation; and national and international data exchange standards.

**DP requirements:** None

**Assessment:** June examination 3 hours (100%).

### **APG5034Z SURVEYING FOR RESEARCH PURPOSES**

12 NQF credits at level 9; 2 week block course including lectures, practical assignments, and technical reports.

**Convener:** TBA

**Prerequisites:** None

**Course outline:** This course aims is to provide a basic understanding of graphical and spatial concepts and skills of plane surveying, to teach problem solving skills in relation to practical surveying problems; to equip students with group work skills; to equip students with simple technical report writing skills. Content includes use and testing of levelling instruments, levelling calculation using the rise and fall method. Steel tapes: corrections for temperature, tension, catenary. EDM: principal of electronic distance measurement, corrections for refraction. Reduction of distances: slope, sea level, scale enlargement. Angular measure; the mapping/projection plane; the SA co-ordinate system; joins and polars, orientation, traverses. Setting up theodolites, observing procedures. Planning and execution of a tacheometric survey using electronic instrumentation. Fundamentals of mapping and cartography. Horizontal setting out: offsets, reference-grid, right angles, staking out. Vertical alignment: longitudinal sections, cross sections and volume

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calculations, sight rails, profiles, batter boards. GPS field data collection. Types and Sources of errors. Course outcomes: After completing this module the student should be able to: demonstrate understanding of graphical and spatial concepts, carry out basic site work from collecting spatial data to presentation of the results; set out works and perform area and volume calculations; use the Global Positioning System for basic data collection purposes; work in a team; produce technical reports and comment on accuracies achieved.

**DP requirements:** Completion of practical assignments to the satisfaction of the course convener.

**Assessment:** Practical assignments count 70%, examination 3 hours 30%.

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### **APG5040Z** LAND, TENURE & LAW

20 NQF credits at level 9; one week block lectures

**Convener:** TBA

**Course outline:** This course covers land and tenure within the context of overarching city problems. Topics include: Different approaches internationally to land and tenure issues. Current legal framework in SA in relation to tenure. Land markets - formal: investment cycles, sources of land, decision-making drivers; informal: invasions, informal sales, illegal tenure, and occupation. Housing markets: shelter strategies, delivery systems, secondary markets, subsidy access modes. Land, tenure and social dynamics: migration, household structures, household economies / livelihoods, gender and youth, economic participation, HIV/AIDS. Political dynamics and power relations: leadership structures and modes, participation, patronage, clientelism. Fiscal/financial aspects.

**DP requirements:** None

**Assessment:** Three hour exam 40%; assignment 60%

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### **APG5043F** DATABASE MODELLING & GEO-STATISTICS

28 NQF credits at level 9; 40 hours on GIS software and related technologies

**Convener:** TBA

**Prerequisites:** None

**Course outline:** This course aims to develop an advanced understanding of database modelling and geo-statistics. Topics include: relational, object-relational and object oriented database concepts; knowledge based systems; general digital terrain models; applications in environmental and temporal studies; advanced interpolation techniques; and error modelling and data uncertainty.

**DP requirements:** None

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

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### **APG5044F** WEB GIS

18 NQF credits at level 9; 48 lectures, 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 level 9

**Convener:** TBA

**Prerequisites:** 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.

**DP requirements:** None

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

### **APG5046S ENVIRONMENTAL MANAGEMENT**

18 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** 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%).

### **APG5047S GEO-INFORMATICS**

18 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** 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%).

### **APG5050Z DISSERTATION MCPUD**

120 NQF credits at level 9

**Convener:** Associate Professor H Comrie

**Prerequisites:** APG5055F

**Course outline:** The course consists of a project on an approved subject usually chosen by the student. Fieldwork is an integral requirement of the course.

**DP requirements:** None

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

### **APG5051Z DISSERTATION MCRP**

120 NQF credits at level 9

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

**Prerequisites:** APG5020F

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

**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.

### **APG5052S DISSERTATION MLA**

120 NQF credits at level 9

**Convener:** Dr J Raxworthy

**Prerequisites:** APG5029F

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

**DP requirements:** None

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

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### APG5055F URBAN DESIGN PROJECT

35 NQF credits at level 9

**Convener:** Associate Professor H Comrie

**Prerequisites:** APG4026S

**Course outline:** This course consists of urban design projects through which descriptive, explanatory, evaluative and interventive design skills are developed. Fieldwork is an integral requirement of the course.

**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

25 NQF credits at level 9; 32 lectures

**Convener:** Associate Professor H Comrie

**Prerequisites:** 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.

**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 level 9

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

**Prerequisites:** 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 level 9

**Convener:** Assoc Prof N Coetzer

**Prerequisites:** 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 level 9

**Convener:** TBA

**Prerequisites:** 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

### **APG5071S DISSERTATION: CONSERVATION**

60 NQF credits at level 9

**Convener:** Assoc Prof S Townsend

**Prerequisites:** 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

### **APG5073F LAW OF CONSERVATION & DEVELOPMENT**

12 NQF credits at level 9

**Convener:** Assoc Prof S Townsend

**Prerequisites:** 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:** 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.

### **APG5074F CONSERVATION DISCIPLINES & PRACTICE**

8 NQF credits at level 9

**Convener:** Assoc Prof S Townsend

**Prerequisites:** 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.

### **APG5076S CONSERVATION DEVELOPMENT & IMPACT ASSESSMENT I**

*Available to repeat students only*

8 NQF credits at level 9

**Convener:** TBA

**Course outline:** This studio work course 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

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current composition of the environment and assessments of heritage resources and develops the student's ability to assess the impacts of development on the environment and its significance; and is intended to give experience in working with other professional disciplines.

**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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### APG5077F CONSERVATION DEVELOPMENT & IMPACT ASSESSMENT

20 NQF credits at level 9

**Convener:** Emeritus Professor F Todeschini

**Prerequisites:** 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 level 9.

**Convener:** Associate Professor A van Graan

**Prerequisites:** 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 DISSERTATION DESIGN

120 NQF credits at level 9

**Convener:** Assoc Prof N Coetzer

**Prerequisites:** 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.

**DP requirements:** None

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

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### APG5080F HISTORY OF CONSERVATION

20 NQF credits at level 9

**Convener:** Assoc Prof S Townsend

**Prerequisites:** 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.

### **APG5081S RESEARCHING & ASSESSING HERITAGE RESOURCES**

20 NQF credits at level 9

**Convener:** Assoc Prof S Townsend

**Prerequisites:** 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%).

### **APG6000W THESIS GEOMATICS**

360 NQF credits at 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%.

### **APG8000W THESIS**

360 NQF credits at 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%

### **AXL4202F RACE, CULTURE & IDENTITY IN AFRICA**

24 NQF credits at level 8

**Convener:** Associate Professor N Shepherd

**Prerequisites:** 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, 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

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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 IN AFRICA

24 NQF credits at level 9

**Convener:** Associate Professor N Shepherd

**Prerequisites:** 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.

**Assessment:** Two essays (25% each) 50%; major project 50%.

**NOTE:** Attendance at seminars is compulsory; failing which students' papers may not be marked.

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

12 NQF credits at 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%).

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*Entrance is limited to the MPhil specialising in Sustainable Mineral Resource Development*

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### **CHE4055Z** PRACTICAL TRAINING IN SUSTAINABLE DEVELOPMENT

0 NQF credits at 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%

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*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 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*

### **CHE5000W** DISSERTATION CHEMICAL ENGINEERING

180 NQF credits at 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%.

### **CHE5002W** DISSERTATION CHEMICAL ENGINEERING

120 NQF credits at level 9

**Convener:** None

**Prerequisites:** 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%.

### **CHE5022Z** INTRODUCTION TO CATALYSIS

16 NQF credits at level 9

**Convener:** Professor E van Steen

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

**DP requirements:** None

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

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

8 NQF credits at level 9.

**Convener:** Professor Klaus Möller

**Prerequisites:** 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

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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 & MODELLING II**

8 NQF credits at 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.

**DP requirements:** None

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

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### **CHE5040Z FUELS & CHEMICALS FROM OIL**

12 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent four year BSc(Hons)

**Course outline:** The purpose of the course is to impart a basic understanding of the underlying principles of industrial chemical production processes and to develop an intuitive understanding of how things are done and why they are done the way they are done in the fuel/chemical industry including basic economic and environmental considerations. The course back bone is a crude oil refinery. The major individual processes and how they are integrated are the examples or carriers for the above understanding; comprising crude distillation, solvent deasphalting, thermal cracking processes, catalytic cracking, all of hydro processing ranging from hydrofining to deep hydrocracking, sweetening, reforming, alkylation, isomerisation, sulphur management, octane and cetane numbers and steam cracking.

**DP requirements:** None

**Assessment:** Class test and final examination 3 hours.

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### **CHE5041Z INSTRUMENTAL ANALYSIS PART A**

4 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent four year BSc (Hons)

**Course outline:** This course aims to develop an advanced understanding of instrumental analysis. Topics include: introduction to instrumental measurements; amplification of signals; noise; temperature measurement; pressure measurement; and evaluation of analytical data.

**DP requirements:** None

**Assessment:** Examination and project.

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### **CHE5042Z INSTRUMENTAL ANALYSIS PART B**

4 NQF credits at level 9

**Course outline:** This course aims to build on an advanced understanding of instrumental analysis. Topics include: chromatographic methods; chromatographic separation; peak broadening; column efficiency; instrumentation for GC; instrumentation for HPLC; detectors; and quantitative analyses.

**DP requirements:** None

**Assessment:** Examination 1 hour.

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### **CHE5043Z INSTRUMENTAL ANALYSIS PART C**

4 NQF credits at level 9

**Course outline:** This course aims to build on an advanced understanding of instrumental analysis. Topics include: spectroscopic methods; electromagnetic radiation; optical instrumentation; quantitative absorption measurements. Categorized into three broad classes, viz. elemental analysis

(AAS, AES, XRF), structural determination (XRD, IR, LEED) and surface characterisation (AES, UPS, XPS).

**DP requirements:** None

**Assessment:** Examination 2 hours.

### **CHE5045Z FUELS & CHEMICALS FROM COAL & SYNGAS**

12 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent four year BSc(Hons)

**Course outline:** The purpose of the course is to impart a basic understanding of the underlying principles of industrial chemical production processes and to develop an intuitive understanding of how things are done and why they are done the way they are done in the fuel/chemical industry including basic economic and environmental considerations and features of R&D in the chemical industry. The course is structured around South Africa's coal liquefaction to fuels and chemicals process as the back bone. The major individual processes and how they are integrated are the examples or carriers for the above understanding; comprising coal gasification, syngas gas clean-up and coal gasification by-products, chemistry of phenolics, Fischer-Tropsch synthesis, Fischer-Tropsch product separation and purification as well as other syngas based processes, e.g. methanol synthesis and hydroformylation and manufacture of hydrogen.

**DP requirements:** 30% class mark.

**Assessment:** Class test and final examination 3 hours.

### **CHE5047Z INTRODUCTION TO MOLECULAR MODELLING**

8 NQF credits at 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.

### **CHE5048Z CRYSTALLISATION & PRECIPITATION**

12 NQF credits at 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 crystallisation methods and supersaturation, particle size distribution (PSD), crystal morphology, mother liquor inclusions, uptake of impurities, primary nucleation, growth mechanisms and growth rate expressions, the population balance equation, agglomeration and special considerations for precipitation.

**DP requirements:** None **Assessment:** Assignments and Projects

### **CHE5049Z CHEMICAL ENGINEERING TOPICS FOR SCIENTISTS**

*Not offered to Chemical Engineering graduates*

16 NQF credits at 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 & DYNAMICS**

8 NQF credits at level 9; 24 lectures.

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**Convener:** Professor STL Harrison

**Prerequisites:** 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.

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### **CHE5052Z** MOLECULAR BIOLOGY & BIOCATALYSIS

8 NQF credits at level 9

**Convener:** Dr CJ Fenner

**Prerequisites:** 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 level 9

**Convener:** Dr RP van Hille

**Prerequisites:** 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.

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### **CHE5055Z** RESEARCH COMMUNICATION & METHODOLOGY

16 NQF credits at level 9

**Convener:** Professor STL Harrison

**Prerequisites:** 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.

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### **CHE5056Z** BIOLEACHING OF SULPHIDE MINERALS

8 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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%).

### **CHE5057Z FUNDAMENTALS OF HYDROMETALLURGY**

12 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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%.

### **CHE5058Z LEACHING HYDROMETALLURGY**

12 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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%.

### **CHE5059Z HYDROMETALLURGICAL SEPARATION PROCESSES**

12 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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%.

### **CHE5060Z SOLVENT EXTRACTION**

8 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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.

### **CHE5062Z ELECTROWINNING/REFINING: PRACTICE, MODELLING & CONTROL**

8 NQF credits at level 9

**Convener:** Associate Professor J Petersen

**Prerequisites:** 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.

**DP requirements:** None

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

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

8 NQF credits at level 9

**Convener:** Associate Professor J Petersen**Prerequisites:** 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

8 NQF credits at level 9.

**Convener:** Professor STL Harrison**Prerequisites:** 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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**CHE5066Z** COMPUTING FOR ENGINEERS

8 NQF credits at level 9

**Prerequisites:** BSc(Eng).**Course outline:** This advanced computing course for engineers covers: Delphi IDE and VCL, introduction to Object-Oriented Programming (OOP), inheritance and polymorphism, interfaces, modelling in Delphi, numerical routines, reaction kinetics, CAPE-Open wizard, and Aspen blocks.**DP requirements:** None**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

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**CHE5069Z** ADVANCED THERMODYNAMICS & SEPARATION PROCESSES

8 NQF credits at level 9

**Prerequisites:** 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 level 9

**Convener:** Professor STL Harrison**Prerequisites:** 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.

### **CHE5072Z FUNDAMENTALS OF PROCESS MODELLING**

4 NQF credits at 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.

### **CHE5073Z ESSENTIAL TECHNICAL TOOLS**

16 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** This course aims to develop an advanced understanding of the essential technical tools. Topics include: problem solving, risk assessment, sampling theory and practice, comparative statistics for minerals engineers, mass balancing and data reconciliation using Microsoft Excel, Project Management and Microsoft Project.

**DP requirements:** Attain no less than 50% for the year mark.

**Assessment:** Examination and year mark.

### **CHE5074Z ADVANCED COMMINUTION I**

16 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** This course covers comminution principles related to equipment and operating characteristics such as power draw, classification principles, etc. It also covers survey and measurement of comminution process circuits.

**DP requirements:** 50% for the year mark.

**Assessment:** Examination and year mark.

### **CHE5075Z ADVANCED COMMINUTION II**

16 NQF credits at level 9

**Prerequisites:** At least 65% in CHE5074Z. BSc(Eng) or equivalent.

**Course outline:** This course covers comminution theory (rock breakage, ore characterisation, etc.). It includes steady state models of unit operations (crushers, screens, cyclones, mills). The use of recycle streams and circuit optimisation using relevant tools such as simulation is also included.

**DP requirements:** 50% for the year mark.

**Assessment:** Examination and year mark.

### **CHE5076Z CONCEPTUAL FRAMEWORK OF MINERALS BENEFICIATION**

8 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** This course aims to develop the conceptual framework of minerals beneficiation and includes: The economics of mined commodities, with examples taken from the relevant mining sub-industry (e.g. from the Platinum or Gold industries). Mining, Smelting and Refining theory and practice for engineers not practising in these fields. It also provides an introduction to project analysis (issues such as viability and sensitivity).

**DP requirements:** Completion of all assignments.

**Assessment:** Examination and year mark.

### **CHE5077Z** INTRODUCTION TO HYDROMETALLURGY

8 NQF credits at level 9

**Prerequisites:** BSc(Eng) or equivalent.

**Course outline:** This course provides an advanced introduction to the fundamentals of equilibrium and redox chemistry and thermodynamics in aqueous solution; and includes an introduction to pH-Eh diagrams, leach kinetics and electro-kinetics; unit operations in hydrometallurgical processes: leaching, precipitation, solvent extraction and electrowinning; flow sheets of typical processes: Cu, Ni, Au, PGMs; mass balancing in hydrometallurgical circuits; hydrometallurgy in the environment and various engineering disciplines.

**DP requirements:** None

**Assessment:** Examination 40%, assignment 60%.

### **CHE5078Z** ADVANCED NUMERICAL METHODS FOR ENGINEERS

16 NQF credits at level 9

**Prerequisites:** 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).

### **CHE5079Z** INTEGRATED ANALYSIS OF MINERAL BENEFICIATION SYSTEMS

16 NQF credits at level 9

**Prerequisites:** CHE5075Z and CHE5081Z.

**Course outline:** The course is in the form of a classical engineering design project, including individual and group exercises. The main exercise is grounded in an expansion-type project, where the data are collected from an existing operation and used to calibrate unit process models. An optimisation study is then performed on the existing operation. The work is carried out in a studio environment.

**DP requirements:** None

**Assessment:** Year mark.

### **CHE5080Z** ADVANCED FLOTATION I

16 NQF credits at level 9

**Prerequisites:** Chemical or Metallurgical Engineering Degree or Diploma

**Course outline:** This advanced course in flotation includes: flotation principles (sub-processes, floatability, entrainability, flotation chemistry); steady-state models of batch and continuous flotation cells, and their limitations; introduction to analytical procedures (analysis of minerals, reagents, sulphur, etc.); introduction to flotation cell characterisation (gas dispersion, residence time distribution); and an introduction to flotation circuit characterisation (plant surveys, nodal analysis).

**DP requirements:** 50% for the year mark.

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

### **CHE5081Z** ADVANCED FLOTATION II

16 NQF credits at level 9

**Prerequisites:** CHE5073Z, CHE5074Z, CHE5076Z, at least 65% in CHE5080Z.

**Course outline:** This advanced course in flotation includes: modelling and simulation of flotation cells and circuits; and the optimisation of flotation circuit performance.



**DP requirements:** 50% for the year mark.

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

### **CHE5082Z** DISSERTATION PREPARATION

*DP requirement for entry to CHE5002W*

0 NQF credits at 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

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

8 NQF credits at level 9

**Convener:** Professor STL Harrison

**Prerequisites:** 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.

### **CHE5084Z** MINOR DISSERTATION (MINERALS BENEFICIATION)

*For MEng Candidates only*

60 NQF credits at level 9

**Course outline:** Candidates will undertake a project of a developmental, review or practical nature on a research topic/problem selected in consultation with the Programme Convener. The work will involve the preparation of a research project/proposal, a literature review, data collection (possibly including empirical research), analysis of findings, drawing conclusions, making recommendations and the preparation of a minor dissertation.

**DP requirements:** None

**Assessment:** Research project report.

### **CHE5085Z** HYDROGEN TECHNOLOGY

8 NQF credits at level 9; block release

**Convener:** P Levecque

**Prerequisites:** BSc (Eng) or equivalent four years BSc (Hons)

**Course outline:** This course in hydrogen technology includes: The background to sustainable energy, hydrogen production and the hydrogen economy. Basic concepts of electrochemical energy conversion, fuel cell thermodynamics and electrochemistry. Overview of electrochemical engineering aspects of fuel cells. Elements of polymer electrolyte fuel cells and fuel cell stacks and their respective operation and durability; and the design and cost considerations for fuel cell systems.

**DP requirements:** None

**Assessment:** Coursework 50%, Examination 50%

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**CHE5086Z ELECTROCHEMICAL CHARACTERIZATION TECHNIQUES FOR FUEL CELLS**

4 NQF credits at level 9; block release

**Convener:** P Levecque

**Prerequisites:** BSc (Eng) or equivalent four year 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 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 level 9; block release

**Convener:** Professor 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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**CHE6000W THESIS**

360 NQF credits at 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%.

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**CHE6001W ENGINEERING EDUCATION THESIS**

360 NQF credits at 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%.

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**CIV5000W DISSERTATION CIVIL ENGINEERING**

180 NQF credits at 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%.

### **CIV5000Z DISSERTATION CIVIL ENGINEERING**

120 NQF credits at level 9

**Prerequisites:** 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 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).

### **CIV5002Z STRUCTURAL CONCRETE PROPERTIES & PRACTICE**

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Associate Professor H Beushausen

**Prerequisites:** 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.

**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)

### **CIV5006Z ADVANCED STRUCTURAL CONCRETE ENGINEERING I**

*Not offered in 2015*

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16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Associate Professor H Beushausen

**Prerequisites:** 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 level 9

**Convener:** As per programme requirement

**Prerequisites:** 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 FOR CIVIL ENGINEERS

12 NQF credits at level 9

**Convener:** Associate Professor H Beushausen

**Prerequisites:** 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:** Examination 100%

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### CIV5030Z CIVIL ENGINEERING PROJECT

20 NQF credits at level 9

**Convener:** As per programme requirement

**Prerequisites:** Completion of appropriate postgraduate courses.

**Course outline:** On the recommendation of the supervisor and with the agreement of the Head of Department, a student registered for an MSc(Eng) may be permitted to enter into a programme of individual study on a specialised topic. A statement of objectives must be agreed upon, and the course of study will be guided by the supervisor. The programme will involve the student in about 200 hours of work, and a written report must be submitted. The written report will be examined, and a further oral examination may be held. Details of project topics are available from the Department.

**DP requirements:** None

**Assessment:** Written project 100%

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

*Not offered in 2015*

4 NQF credits at 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 characterisation; 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%

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**CIV5041Z BRIDGE ANALYSIS & DESIGN**

*Not offered in 2015*

16 NQF credits at level 9; 40 hours (1 week block lectures).

**Convener:** Associate Professor H Beushausen

**Prerequisites:** 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**

*Not offered in 2015*

10 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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**

*Not offered in 2015*

8 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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 characterisation; application to sizing settling tanks (classes 1 and 2 settling); effect of flocculation;

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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**

*Not offered in 2015*

8 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** CIV5032Z, CIV5046Z

**Course outline:** This advanced course in sewage sludge treatment includes: an introduction to sewage sludge reuse and disposal guidelines in South Africa; characterisation 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%

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

*Not offered in 2015*

20 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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%

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

*Not offered in 2015*

12 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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 (OHOs), nitrification by

autotrophic nitrifying organisms (ANOs) in aerobic systems; modifications for application to anoxic-aerobic systems; kinetics of RBCOD conversion to short chain fatty acids (SCFA) in the anaerobic reactor, kinetics of SCFA uptake, P release and substrate storage under anaerobic conditions and substrate utilisation (growth) and P uptake and aerobic conditions by PAO's; model presentation in Petersen matrix format; links to and simplifications of kinetics for steady state BNR models; programming, modelling and simulation of BNR activated sludge systems with the pre-coded UCTOLD and UCTPHO programmes and the ASIM or AQUASIM shell packages. Filamentous organism type and identification, control by means of kinetic and metabolic selection; and causes and control of filamentous organism proliferation in BNR systems.

**DP requirements:** None

**Assessment:** Examination 100%

### **CIV5050Z INTEGRATED WASTEWATER TREATMENT PLANT DESIGN**

*Not offered in 2015*

20 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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%

### **CIV5051Z AQUATIC CHEMISTRY PART A**

*Not offered in 2015*

14 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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%

### **CIV5052Z AQUATIC CHEMISTRY PART B**

*Not offered in 2015*

14 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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 2015*

10 NQF credits at level 9

**Convener:** Professor G Ekama

**Prerequisites:** 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 level 9; 40 hours (1 week block lectures).

**Convener:** Professor E Pieterse

**Prerequisites:** 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 urbanisation 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.

**DP requirements:** Complete all assignments

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

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**CIV5065Z** URBAN RENEWAL

20 NQF credits at level 9; 40 hours (1 week block lectures).

**Convener:** Professor E Pieterse

**Prerequisites:** 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.

**DP requirements:** None

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

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**CIV5072Z** COMMUNITY PARTICIPATION IN URBAN MANAGEMENT

*Not offered in 2015*

20 NQF credits at level 9

**Convener:** TBA

**Prerequisites:** Any suitable four-year degree



**Course outline:** This course aims to develop an understanding of community participation in urban management. Topics include: Historical analysis. The theoretical basis for participation. The structure of the participation process. Types of community structures. The interaction between community organizations and government. Community participation in urban upgrading. The development of an upgrading methodology for informal settlements. Management and institutional development for low-income communities and informal settlements. Participatory project planning.

**DP requirements:** None

**Assessment:** Examination 100%

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

*Not offered in 2015*

16 NQF credits at level 9

**Convener:** Professor A Zingoni

**Prerequisites:** 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 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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### **CIV5104S PLATE & SHELL STRUCTURES PART B**

*Not offered in 2015*

16 NQF credits at level 9

**Convener:** Professor A Zingoni

**Prerequisites:** 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 2015*

16 NQF credits at level 9

**Convener:** Associate Professor H Beushausen

**Course outline:** This course covers advanced topics in concrete materials and includes: cements, cement extenders, admixtures and aggregates for concrete; concrete deterioration and durability; deterioration mechanisms and processes; performance of concretes in aggressive environments; achievement of durable concrete; and protection of concrete. Case studies, laboratory sessions, and site visits are included.

**DP requirements:** None

**Assessment:** Examination and projects.

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### **CIV5107Z INTEGRATED URBAN WATER MANAGEMENT**

20 NQF credits at level 9; 40 hours (1 week block lectures).

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**Convener:** Professor N Armitage

**Prerequisites:** 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 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.

**DP requirements:** Complete all assignments

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

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### **CIV5108Z** ADVANCED MECHANICS OF MATERIALS

16 NQF credits at level 9

**Convener:** Dr S Skatulla

**Prerequisites:** 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*

0 NQF credits at 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

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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.

**DP requirements:** None

**Assessment:** Coursework 100% (Laboratory report)

### **CIV5111Z GROUND IMPROVEMENT TECHNIQUES**

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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, vibroreplacement); hydraulic methods (groundwater lowering, preloading, electro-osmosis); physical/chemical methods (admixtures, grouting, freezing); and inclusions.

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

### **CIV5112S STABILITY AND DESIGN OF STEEL STRUCTURES**

16 NQF credits at level 9

**Convener:** Dr S Skutulla

**Prerequisites:** 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%

### **CIV5113Z STRUCTURAL DYNAMICS WITH APPLICATIONS**

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Professor P Moyo

**Prerequisites:** 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

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5114Z FOUNDATION DESIGN**

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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

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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.

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

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### **CIV5115Z BRIDGE MANAGEMENT & MAINTENANCE**

20 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Professor P Moyo

**Prerequisites:** 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 is introduced. Linkages between bridge management, maintenance and rehabilitation of bridges is discussed. Key to this course are practical bridge inspections and case studies

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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### **CIV5116Z DURABILITY & CONDITION ASSESSMENT OF CONCRETE STRUCTURES**

20 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Associate Professor H Beushausen

**Prerequisites:** 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.

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

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

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### **CIV5118Z SAFETY OF SPECIAL STRUCTURES**

*Not offered in 2015*

20 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Professor P Moyo

**Prerequisites:** 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:**

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

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### **CIV5119Z STRUCTURAL PERFORMANCE ASSESSMENT & MONITORING**

*Not offered in 2015*

20 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Professor P Moyo

**Prerequisites:** 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.

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5120Z REPAIR & REHABILITATION OF CONCRETE STRUCTURES**

*Not offered in 2015*

20 NQF credits at level 9; 40 hours (1 week block lectures).

**Convener:** Associate Professor H Beushausen

**Prerequisites:** BScEng

**Course outline:** This course deals with the repair and rehabilitation of concrete structures 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; and practical and contractual aspects. Strengthening systems; FRP design and application are also covered.

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5121Z DESIGN & MODELLING OF WATER DISTRIBUTION SYSTEMS**

16 NQF credits at level 9

**Convener:** Professor JE Van Zyl

**Prerequisites:** 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%

### **CIV5122Z ADVANCED SOIL MECHANICS**

*Not offered in 2015*

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Ms FC Chebet

**Prerequisites:** 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

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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.

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

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### **CIV5123Z** CONTAMINATED LAND AND REMEDIATION

*Not offered in 2015*

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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.

**DP requirements:** None

**Assessment:** Course work 30%, examination 70%

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### **CIV5124Z** GEOSYNTHETICS ENGINEERING

*Not offered in 2015*

16 NQF credits at level 9

**Convener:** Dr D Kalumba

**Prerequisites:** 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%

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### **CIV5125Z** LATERAL EARTH SUPPORTS

*Not offered in 2015*

16 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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 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.

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5126Z** SLOPE STABILITY

*Not offered in 2015*

12 NQF credits at level 9; 40 hours (1 week block lectures)

**Convener:** Dr D Kalumba

**Prerequisites:** 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.

**DP requirements:** None

**Assessment:** Course work 50%, examination 50%

### **CIV5128Z** WATER PRESSURE MANAGEMENT IN WATER DISTRIBUTION SYSTEMS

20 NQF credits at 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%

### **CIV6000W** THESIS

360 NQF credits at 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%.

### **CML6056F** TELECOMMUNICATIONS LAW

12 NQF credits at 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.

### **CML6058S** ELECTRONIC TRANSACTIONS LAW

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12 NQF credits at level 9

**Course outline:** This course aims to develop an advanced understanding of electronic transactions law. Topics include: Electronic transactions, their meaning and importance International sources of the law governing electronic transactions. Domestic sources of the law governing electronic transactions. Electronic transacting and the doctrine of functional equivalence. Electronic signatures. Electronic government. Electronic transactions including online gaming, online auctions, online dating services, online provision of adult content, online sale of restricted substances. Electronic payment methods. Consumer protection. Spam. Data privacy. Communication privacy and workplace privacy. Electronic damage. Electronic crime. Security standards. ISPs and their liability. Online dispute resolution. Taxing electronic commerce.

**DP requirements:** None

**Assessment:** Examination counts 50-75% Year mark counts 25-50% and is based on the Tests and Projects.

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### CON4030F PROPERTY STUDIES II

16 NQF credits at level 8

**Convener:** K Evans

**Prerequisites:** 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%.

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### CON4032F MEASUREMENT & DESIGN APPRAISAL III

*No additional assessment.*

12 NQF credits at level 8

**Convener:** K Le Jeune

**Prerequisites:** 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.

**DP requirements:** 40% subminimum in both course work and examination

**Assessment:** Year mark 80% (2 tests 20% each; major assignment); June exam 4 hours 20%.

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### CON4033W APPLIED CONTRACT LAW II

16 NQF credits at level 8

**Convener:** T Boxall

**Prerequisites:** 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**

*This course is not eligible for additional assessment.*

20 NQF credits at level 8

**Convener:** K Le Jeune

**Prerequisites:** 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 examination 4 hours 35% (24% oral examination, 11% portfolio submission).

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**CON4035X PRACTICAL TRAINING**

0 NQF credits at 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 level 8; 2 lectures per week, 1 studio session as required

**Convener:** K Le Jeune

**Prerequisites:** 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 15%; Simulated Office project 20%; 3 assignments 5%)  
November examination 3 hours 50%.

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**CON4038F ADVANCED CONSTRUCTION MANAGEMENT**

16 NQF credits at level 8

**Convener:** M Massyn

**Prerequisites:** 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 level 8; 2 lectures per week, field trips, tutorials, seminars

**Convener:** M Massyn

**Prerequisites:** 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:** 50% subminimum in examination

**Assessment:** November examination- presentation of portfolio and oral 100%.

### CON4041S ADVANCED PROPERTY STUDIES A

16 NQF credits at level 8

**Convener:** Dr M Mooya

**Prerequisites:** 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 level 8

**Convener:** Professor K Cattell

**Prerequisites:** 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 level 8

**Convener:** T Boxall

**Prerequisites:** 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 level 8

**Convener:** T Boxall

**Prerequisites:** 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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### CON4047W RESEARCH REPORT

*This course is not eligible for additional assessment.*

32 NQF credits at level 8

**Convener:** Professor PA Bowen/Associate Professor KA Michell

**Prerequisites:** 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:** Research Proposal

**Assessment:** November examination - Research report 100%.

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### CON4048S ADVANCED PROPERTY STUDIES C

16 NQF credits at level 8

**Course level:** TBA

**Prerequisites:** 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.

## 188 COURSES OFFERED

**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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### CON4049S CONSTRUCTION INNOVATION

16 NQF credits at level 8

**Convener:** Dr A Windapo

**Prerequisites:** 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.

**Assessment:** Year mark 50% (essay 10%; project 40%); November examination - 2 hours 50%.

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### CON5006Z PROPERTY DEVELOPMENT

20 NQF credits at 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 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 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 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 level 9

**Convener:** Associate Professor KA Michell

**Prerequisites:** 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 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 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%.

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### CON5018Z HUMAN RESOURCE MANAGEMENT & INTERPERSONAL COMMUNICATION

20 NQF credits at 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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### CON5021Z PROPERTY PORTFOLIO MANAGEMENT

20 NQF credits at level 9; one week block lectures

**Convener:** Associate Professor F Viruly

## 190 COURSES OFFERED

**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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### CON5022Z TOTAL QUALITY MANAGEMENT IN A PROJECT ENVIRONMENT

20 NQF credits at level 9; one week block lectures

**Convener:** I. Jay

**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 level 9

**Convener:** I Jay

**Prerequisites:** 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 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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### CON5029Z PROJECT RISK MANAGEMENT

20 NQF credits at level 9; one week block release lectures

**Convener:** Dr N-T 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 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%.

### **CON5036Z INTRODUCTION TO RESEARCH**

4 NQF credits at 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%.

### **CON5037Z RESEARCH METHODOLOGY**

6 NQF credits at level 9; half week block lectures

**Convener:** I Jay

**Prerequisites:** 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%.

### **CON5038Z PROPERTY DEVELOPMENT & FINANCE**

20 NQF credits at 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%.

### **CON5039Z PROJECT IMPLEMENTATION & MANAGEMENT**

20 NQF credits at 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 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 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 level 9

**Convener:** Professor P Bowen

**Prerequisites:** 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 amortisation.

**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 level 9

**Convener:** Professor P Bowen

**Prerequisites:** 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 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 level 9

**Convener:** K. Evans

**Prerequisites:** 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 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 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%.

### **CON6009W THESIS**

360 NQF credits at level 10

**Convener:** TBA

## 194 COURSES OFFERED

**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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### EEE4106Z INTRODUCTORY NUCLEAR PHYSICS & RADIATION FOR POWER SUPPLY

16 NQF credits at 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 level 8

**Convener:** Ms 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

16 NQF credits at 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 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 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 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; independent system operators; market systems. Environmental regulation: environmental impact analysis; environmental management plans; and monitoring.

**DP requirements:** None

**Assessment:** Coursework 30%, examination 70%.

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**EEE5000W DISSERTATION ELECTRICAL ENGINEERING**

180 NQF credits at 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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**EEE5002W DISSERTATION ELECTRICAL ENGINEERING**

120 NQF Credits at level 9.

**Prerequisites:** EEE5103Z 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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**EEE5004Z MINOR DISSERTATION**

60 NQF credits at level 9

## 196 COURSES OFFERED

**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 2015*

16 NQF credits at level 9

**Prerequisites:** 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

20 NQF credits at level 9

**Convener:** Prof M Inggis

**Prerequisites:** 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 synthetic aperture radar; interferometry; subsidence monitoring; polarimetry; scatterometers; altimeters; lidar and ground penetrating radar applications.

**DP requirements:** None

**Assessment:** Examination 3 hours.

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### EEE5025Z WIRELESS DATA NETWORKS & SYSTEMS

15 NQF credits at level 9

**Convener:** Dr O Falowo

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** This course aims to develop an advanced understanding of wireless data networks and systems. Topics include: Wireless access technologies: history of wireless communication and future trends, protocols and standards, cellular concept and cellular system fundamentals, GSM and general packet radio service, 3G wireless networks (UMTS and CDMA2000), 3.5G and 4G. Wireless LAN, bluetooth and heterogeneous wireless networks. Radio resource management: call admission control, bandwidth allocation, and handover algorithms, performance evaluation of radio resource management algorithms; and mobility management in wireless networks.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** Examination 50% and year mark 50% of final grade.

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### EEE5026Z CONVERGENT TELECOMMUNICATION & DATA NETWORKS

15 NQF credits at level 9

**Convener:** Dr A Murgu

**Prerequisites:** EEE3084W or equivalent.

**Course outline:** 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 Virtualisation: principles and requirements; network virtualisation 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%

### **EEE5027Z NETWORK & INTERNET SECURITY**

15 NQF credits at level 9

**Convener:** Dr A Murgu

**Prerequisites:** 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; virtualization 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%.

### **EEE5029Z BROADBAND NETWORKS**

15 NQF credits at level 9

**Convener:** Mr N Ventura

**Prerequisites:** 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**

20 NQF credits at level 9

## 198 COURSES OFFERED

**Convener:** Associate Professor M Dlodlo

**Prerequisites:** 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%.

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### EEE5033Z ADVANCED TOPICS IN COMMUNICATIONS & NETWORKS

12 NQF credits at level 9

**Convener:** Associate Professor M Dlodlo

**Prerequisites:** EEE3084W, EEE3086F or equivalent.

**Course outline:** This course aims to introduce students to advanced topics within their research areas in communication and networks, not covered in existing courses.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** June Examination 50%, year mark 50%.

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### EEE5034Z SPECIAL TOPICS IN ELECTRICAL ENGINEERING

8 NQF credits at level 9

**Convener:** Associate Prof M Dlodlo

**Prerequisites:** EEE3084W, EEE3086F or equivalent.

**Course outline:** This course aims to introduce students to specialised topics in their research areas in electrical engineering, in order to understand subjects that are important to communication and networks, but are not covered in existing courses.

**DP requirements:** 80% attendance and satisfactory completion of coursework.

**Assessment:** June Examination 50%, year mark 50%.

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### EEE5103Z DISSERTATION PREPARATION

0 NQF credits at 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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### EEE5105Z FUNDAMENTALS RADAR SIGNAL & DATA PROCESSING

20 NQF credits at level 9

**Convener:** Dr A Mishra

**Prerequisites:** 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 RADAR & ELECTRONIC PROTECTION MATHEMATICS

20 NQF credits at level 9

**Convener:** Associate Professor D O'Hagan

**Prerequisites:** 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 and electronic protection 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 MULTITARGET MULTISENSOR TRACKING & DATA FUSION

*Not offered in 2015*

20 NQF credits at level 9

**Convener:** Associate Professor D O'Hagan

**Prerequisites:** 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

## 200 COURSES OFFERED

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%.

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### EEE5110Z CLUTTER & DETECTION IN CLUTTER

*Not offered in 2015*

20 NQF credits at 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 & IMAGING RADAR***Not offered in 2015*

20 NQF credits at level 9

**Convener:** Associate Professor D O'Hagan**Prerequisites:** 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 level 9

**Convener:** Associate Professor D O'Hagan**Prerequisites:** 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 & 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**

5 NQF credits at 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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**EEE5115Z SPECIAL TOPICS IN RADAR B***Not offered in 2015*

5 NQF credits at 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

## 202 COURSES OFFERED

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 2015*

5 NQF credits at level 9

**Convener:** Emeritus Professor BJ Downing

**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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### EEE5117Z SPECIAL TOPICS IN RADAR D

10 NQF credits at 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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### EEE5118Z SPECIAL TOPICS IN RADAR E

10 NQF credits at 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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### EEE5119Z INTRODUCTION TO RADAR SYSTEMS

20 NQF credits at level 9

**Convener:** Associate Professor D O'Hagan

**Prerequisites:** 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 angle domains; 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 level 9

**Convener:** Associate Professor D O' Hagan

**Prerequisites:** 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

20 NQF credits at 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%

### EEE5122F COMPUTATIONAL ELECTRONICS I

20 NQF credits at 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,

## 204 COURSES OFFERED

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 level 0; 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, Wannier 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 level 9; block release

**Convener:** Dr 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%

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### EEE5125Z SPACE APPLICATIONS FOR SUSTAINABLE DEVELOPMENT

15 NQF credits at level 9; block release

**Convener:** Dr 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 level 9; block release

**Convener:** Dr 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%

### **EEE5127Z SPECIAL TOPICS IN SPACE TECHNOLOGY**

5 NQF credits at level 9

**Convener:** Dr 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%

### **EEE5128Z NUCLEAR REACTOR THEORY AND DESIGN**

20 NQF credits at 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 OPERATION AND SAFETY**

20 NQF credits at 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 level 9

**Convener:** Emeritus Professor CT Gaunt

## 206 COURSES OFFERED

**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%.

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### EEE5131Z MICROWAVE FILTERS: TECHNOLOGIES AND PRACTICAL DESIGN

20 NQF credits at level 9

**Convener:** Associate Professor Riana 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%

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### EEE5132Z SPECIAL TOPICS IN RADAR F

20 NQF credits at level 9

**Convener:** Emeritus Professor Barry Downing

**Prerequisites:** 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 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 level 9

**Convener:** Dr 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 level 9

**Convener:** Dr P Martinez

**Prerequisites:** 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 & ERROR-CONTROL CODING**

20 NQF credits at level 9

**Course 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 level 9

**Course level:** 9

**Convener:** Dr A Murgu

**Prerequisites:** MAM2083F/S, EEE2036S, EEE3086F, or equivalents.

**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 the relevance 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 level 9

**Convener:** Prof. A Baghai-Wadji

**Prerequisites:** 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 level 9

**Convener:** Mr N Ventura**Prerequisites:** Postgraduate standing in Electrical Engineering or background in undergraduate communication engineering course work.**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 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 30%, Examination 70%

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**EEE5139Z WIRELESS DATA NETWORK CONVERGENCE**20 NQF credits at level 9**Convener:** Associate Professor M Dlodlo**Prerequisites:** 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 advanced students to 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 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%

### **EEE6000W** THESIS

360 NQF credits at 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%.

### **END5035Z** MANAGEMENT OF TRANSPORT SUPPLY & DEMAND

20 NQF credits at level 9; 40 lectures (block contact time over one week)

**Convener:** Associate Professor R Behrens

**Prerequisites:** 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%.

### **END5036Z** LOCAL AREA TRANSPORT PLANNING, MANAGEMENT & DESIGN

20 NQF credits at 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 people with movement disabilities in local area movement networks.

**DP requirements:** None

**Assessment:** Assignments 75% and class test 25%.

### **END5038Z** INTEGRATED LAND USE - TRANSPORT PLANNING

20 NQF credits at level 9; 40 lectures (block contact time over one week)

**Convener:** Associate Professor R Behrens

**Prerequisites:** 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;

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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 level 9; 40 lectures (block contact time over one week).

**Convener:** Associate Professor MVanderschuren

**Prerequisites:** 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%.

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### END5040W DISSERTATION TRANSPORT STUDIES

180 NQF credits at 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.

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

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### END5041W DISSERTATION TRANSPORT STUDIES

120 NQF credits at level 9

**Prerequisites:** None

**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%.

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### END5042Z SUSTAINABLE URBAN SYSTEMS

20 NQF credits at level 9

**Convener:** Associate Professor H Von Blottnitz

**Prerequisites:** Four-year degree, registered honours students accepted, subject to approval of HOD

**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 level 9

**Convener:** Dr M Brown-Luthango

**Prerequisites:** 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%

### **END5047Z TRANSPORT DEMAND ANALYSIS & PROJECT ASSESSMENT**

20 NQF credits at level 9; 40 lectures (block contact time over one week)

**Convener:** Associate Professor M Vanderschuren

**Prerequisites:** 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%.

### **END5048Z TRANSPORT MODELLING**

20 NQF credits at level 9

**Convener:** Associate Professor M Zuidgeest

**Prerequisites:** 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%.

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

16 NQF credits at level 9

**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

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ethics; research communication and related technical skills; experimental practice; structuring, writing and presentation of scientific outputs. The assignments include: oral presentation of seminars, scientific and technical writing tasks, experimental design tasks and literature review. The final examination comprises the compilation and presentation of the final report which is a complete research proposal.

**DP requirements:** Completion of all assignments and the final report.

**Assessment:** Assignments and final report.

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### END5050X MASTER'S JOURNAL PAPER REQUIREMENT

0 NQF credits at 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

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### END5070Z PUBLIC TRANSPORT POLICY & REGULATION

20 NQF credits at level 9

**Convener:** Associate Professor R Behrens

**Prerequisites:** 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%

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### END5071Z PUBLIC TRANSPORT SYSTEM DESIGN AND OPERATIONS MANAGEMENT

20 NQF credits at level 9

**Convener:** Associate Professor M Zuidgeest

**Prerequisites:** 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%.

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### END5127Z DISCRETE CHOICE MODELLING

20 NQF credits at level 9.

**Convener:** Associate Professor M Zuidgeest

**Prerequisites:** 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 multi-nomial 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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### MEC3045F EXPERIMENTAL METHODS

12 NQF credits at level 7

**Convener:** Dr SL George

**Prerequisites:** None

**Course outline:** This course aims to develop an advanced understanding of experimental methods. The topics included in this course are terminology, standards, data analysis, uncertainty. Dimensional Analysis. Displacement, strain, pressure, flow and temperature measurements. Classical flow visualization techniques using electrical measurement techniques will be investigated as well as non-destructive evaluation techniques.

**DP requirements:** Attend all practical sessions and submit, within seven days of the session, if required, a written report; write the class test; pass the final examination; satisfactorily achieve each of the ECSA ELO's associated with the course.

**Assessment:** Class test 10%; Laboratory/practical reports 20%; Examination 70%.

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### MEC3060F MATERIALS UNDER STRESS

8 NQF credits at level 7

**Convener:** Dr SL George

**Prerequisites:** MEC2042F

**Course outline:** This course in materials under stress aims to develop an advanced understanding of Elasticity and the importance of modulus in engineering design. Topics include: The influence of bond strength and crystal structure. Plastic flow in crystals and polycrystals by dislocation movement. Strengthening mechanism in metals and alloys. Annealing and heat treatment procedures. Design for safety, stress concentration and residual stress considerations. Failure in metals. Ductile and brittle fractures. Critical flaw size for crack propagation. Fracture toughness of materials. Stress conditions for fatigue and creep deformation. Fracture mechanics; and failure analysis and failure case studies.

**DP requirements:** 35% minimum for class record (2 class tests). Students must attend both class tests. Practical must be attended, completed and handed in on time and a minimum of 50% must be achieved.

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

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**MEC4088Z MANUFACTURING WITH MATERIALS**

12 NQF credits at level 8

**Convener:** Professor RD Knutsen

**Prerequisites:** MEC2042F or co-registration of BSc(Hons) MatSc

**Course outline:** This course aims to develop an advanced understanding of manufacturing materials. Topics include: Modelling deformation during processing. Manufacturing process selection. Net shape casting processes. Forming processes, joining processes and machinability of materials. Surface engineering. Injection moulding, blow moulding and extrusion of polymeric materials. Manufacturing and business strategy. Case studies in product manufacture.

**Lecture times:** 3 Lectures per week.

**DP requirements:** None

**Assessment:** Projects, class tests, September examination 3 hours.

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**MEC4096Z MANUFACT & PROPS OF COMPOSITES**

12 NQF credits at level 8

**Convener:** Dr C Woolard

**Prerequisites:** 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:** TBA

**Assessment:** Class tests, examination 3 hours

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**MEC4097S MANUFACTURE & PROPERTIES OF CERAMICS**

8 NQF credits at level 8

**Convener:** Ms C Mshumi

**Prerequisites:** 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 level 8

**Convener:** Professor RD Knutsen

**Prerequisites:** 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**

8 NQF credits at level 8

**Convener:** Professor RD Knutsen

**Prerequisites:** 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%); 2hour examination (70%).

### MEC4100F MANUFACTURE & PROPERTIES OF POLYMERS

12 NQF credits at level 8

**Convener:** Dr C Woolard

**Prerequisites:** MEC2042F or BSc(Hons) MatSccandidate

**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

### MEC4114F EXPERIMENTAL TECHNIQUES IN MATERIALS SCIENCE

16 NQF credits at level 8.

**Convener:** Professor BeSonderegger

**Prerequisites:** 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%

### MEC5010W DISSERTATION MECHANICAL ENGINEERING

120 NQF credits at level 9

**Prerequisites:** 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%.

### MEC5024S STRUCTURAL IMPACT

12 NQF credits at level 9

**Convener:** Professor G Nurick, 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.

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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) 100%

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### **MEC5036Z** MANAGING FOR PERF IMPROVEMENT

20 NQF credits at level 9

**Prerequisites:** Registration for a postgraduate qualification

**Course outline:** This course aims to develop an advanced understanding of managing for performance improvement. Topics include: Productivity: definition and importance. Productivity models, measurement and quality. People and productivity. The nature of quality, costs of quality and Kaizen, and 14000; organising and managing for quality, quality engineering, quality assurance and control; ISO9000 series, techniques of quality control, vendor rating; process capability, precontrol and advanced techniques; total quality management, quality friction development. Just-in-Time; human factors in quality, the zero defects approach; computer use in quality systems. Job design, BPR and work improvement. Value analysis and simultaneous/concurrent engineering. Theory of constraints. Total productive maintenance. Continuous productivity; and improvement programmes.

**DP requirements:** None

**Assessment:** Assignments, project report(s), examination.

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### **MEC5037Z** OPERATIONS MANAGEMENT PROJECT

20 NQF credits at level 9.

**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 OF OPERATIONAL SYSTEMS

40 NQF credits at level 9

**Course outline:** This course aims to develop an advanced understanding of the design and management of operational systems. Topics include: viable systems modelling; the nature and characteristics of operational systems; core operational decision areas; the operations management process; socio-technical systems. Input from the Professional Communication Studies unit is included.

**DP requirements:** None

**Assessment:** Position papers, portfolio of projects.

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### **MEC5047W** DISSERTATION ENGINEERING MANAGEMENT

180 NQF credits at 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 level 9 **Convener:** Mr D Findeis

**Prerequisites:** 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.

### **MEC5056Z ENERGY EFFICIENCY & DEMAND SIDE MANAGEMENT**

20 NQF credits at level 9

**Convener:** Mr A Hibberd

**Prerequisites:** Registration for the MSc(Eng) in Sustainable Energy Engineering

**Course outline:** This course aims to develop an advanced understanding of energy efficiency and demand side management. Topics include: Energy use patterns in the commercial, industrial, mining, transport and domestic sectors. Energy efficiency trends. Energy efficiency management and technologies used in heating and electrical equipment as well as in buildings. Analysis of energy balances, energy audits, efficiency economics and tariff structures. Local case studies and international experience of energy efficiency. Two written reports will be required, one long paper on agreed topic and the other a group project detailing an economically optimal energy efficiency plan for a given scenario.

**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:** Submission of long paper, and group report by the respective published deadline dates.

**Assessment:** Long paper (on agreed topic or selected from a supplied list) 25%, Group report 25%, 3-hour examination.

### **MEC5059Z ENERGY MODELING**

20 NQF credits at level 9.

**Convener:** Mr A Stone; M Senatla (Co-Convener)

**Prerequisites:** 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, price projections, energy supply planning, policy planning, climate change mitigation assessment and integrated resource planning. Different types of models such as simulation and optimisation models will be outlined. Linkages between energy modelling, energy statistics and scenario planning will be discussed. Examples of existing energy modelling software and modelling systems will be demonstrated. Important considerations in energy modelling, such as energy-economic relationships or technology advances, will be discussed. Students will engage in exercises 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.

**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

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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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### **MEC5063Z** AN INTRODUCTION TO FINITE ELEMENTS

12 NQF credits at 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 level 9

**Convener:** Professor BD Reddy

**Prerequisites:** 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 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 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.

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### **MEC5067Z** NONLINEAR MATERIAL BEHAVIOUR

12 NQF credits at level 9

**Convener:** Dr S Skatulla

**Prerequisites:** 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

### **MEC5069Z COMPUTATIONAL FLUID DYNAMICS**

12 NQF credits at level 9

**Convener:** Professor AG Malan

**Prerequisites:** MEC3033F, MEC3044S and MAM2082F.

**Course outline:** This course provides an introduction to 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 review of the required mathematical tools, followed by the development of the Reynolds Transport equations and 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.

### **MEC5070W DISSERTATION MATERIALS ENGINEERING**

180 NQF credits at 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%.

### **MEC5071W DISSERTATION MATERIALS ENGINEERING**

120 NQF credits at level 9

**Prerequisites:** 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%.

### **MEC5087Z ENERGY MARKETS & GOVERNANCE**

20 NQF credits at level 9

**Convener:** Dr B Rennkamp

**Prerequisites:** 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

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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%.

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### **MEC5088Z ENERGY, POVERTY & DEVELOPMENT**

20 NQF credits at level 9

**Convener:** Ms L Tait

**Prerequisites:** 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 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.

**Practicals:** A dataset will be provided and students need to analyse energy use and poverty trends. **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:** The three written papers, the questionnaire and presentation account for 60% of the overall course mark and the examination contributes 40%.

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### **MEC5090Z ENERGY & CLIMATE CHANGE**

20 NQF credits at level 9

**Convener:** Dr D Sparks

**Prerequisites:** Registration for either/or both MPhil in Energy and Development Studies and MSc Sustainable Energy Engineering

**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:** None

**Assessment:** Project, examination

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### **MEC5093W DISSERTATION ENERGY AND DEVELOPMENT STUDIES**

180 NQF credits at 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 level 9

**Convener:** Dr C Shaw

**Prerequisites:** 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

12 NQF credits at level 9

**Convener:** Professor C Redelinghuys

**Prerequisites:** Relevant Degree

**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.

### **MEC5000W** DISSERTATION MECHANICAL ENGINEERING

180 NQF credits at 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%.

### **MEC5049S** ADVANCED REFRIGERATION

0 NQF credits at level 0

**Convener:** Dr 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-

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ammonia-hydrogen system; and aspects of combined compression/absorption cycle: comparison of performance.

**DP requirements:** None

**Assessment:** Examination 3 hours.

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### **MEC5051Z** MECHANICAL ENGINEERING PROJECT

20 NQF credits at level 9

**Prerequisites:** Completion of appropriate postgraduate courses.

**Course outline:** On the recommendation of the supervisor and with the agreement of the Head of Department, a student registered for a 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.

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### **MEC5060W** DISSERTATION SUSTAINABLE ENERGY ENGINEERING

180 NQF credits at 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** DISSERTATION SUSTAINABLE ENERGY ENGINEERING

120 NQF credits at level 9

**Prerequisites:** MEC5097Z DP.

**Course outline:** The purpose of the dissertation, which complements the course work that is a requirement of the degree, is to afford the student the opportunity to demonstrate his/her ability to conduct independent research. Although the student will work under the direction of a supervisor, the quality and content of the work must be a reflection of the ability of the candidate. The subject chosen for the dissertation will be by mutual agreement between supervisor and student and should incorporate elements of the course work 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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### **MEC5068Z** TOPICS IN COMPUTATIONAL & APPLIED MECHANICS

12 NQF credits at level 9

**Convener:** Dr AT McBride

**Prerequisites:** 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 100%.

### **MEC5075Z NEW & RENEWABLE ENERGY TECHNOLOGIES**

20 NQF credits at level 9. **Convener:** Dr A Madhlopa

**Prerequisites:** 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%.

### **MEC5089Z ENERGY PROJECT**

20 NQF credits at 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%.

### **MEC5091Z INTRODUCTION TO ENERGY POLICY & SUSTAINABLE ENERGY ENGINEERING**

20 NQF credits at level 9

**Convener:** Professor H Winkler

**Prerequisites:** 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.

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**Assessment:** 70% coursework (50% long paper, 20% class assignments), 30% examination.

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### MEC5092W DISSERTATION ENERGY & DEVELOPMENT STUDIES

120 NQF credits at level 9

**Prerequisites:** MEC5097Z.

**Course outline:** The purpose of the dissertation, which complements the coursework 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.

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

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### MEC5097Z DISSERTATION PREPARATION

0 NQF credits at level 0

**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

12 NQF credits at level 9

**Convener:** Associate Professor FJ Kahlen.

**Prerequisites:** CHE3063F or MEC4048F or EEE3055F

**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 minimum of 50% each is required for project and theory examination.

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### MEC6000W THESIS MECHANICAL ENGINEERING

360 NQF credits at 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 PHD IN ENG MANAGEMENT**

360 NQF credits at 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 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 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 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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**MEC6006W ENGINEERING EDUCATION THESIS**

360 NQF credits at 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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**PBL5045S ENVIRONMENTAL LAW FOR NON-LAWYERS**

15 NQF Credits at level 9

**Course co-ordinator(s):** Associate Professor A Paterson

**Entrance requirements:** Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree.

**Course outline:** The inclusion of an environmental right in South Africa's Constitution has led to the emergence of many environmental laws and court decisions in the past 15 years. These

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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).

**Lectures:** 2 double lectures per week.

**DP requirements:** Satisfactory attendance of lectures and completion of essay.

**Assessment:** Essay (50%), written examination (50%).

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### **PBL5046S CLIMATE LAW AND GOVERNANCE**

15 NQF Credits at level 9

**Course co-ordinator(s):** Professor J Glazewski

**Entrance 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).

**Lectures:** 2 double lectures 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.

**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-Jurgen Bathé 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: CHE1005

W, CIV1004W, CON1004W, CON1011F, CON1012S, CON1018W, CON1019F/S, EEE1004W, MEC1002W and MEC1004W.

Class medals are also awarded to each of the second, third and (where applicable) fourth years of study to students with the best weighted average in core, core-elective, elective and optional courses in the following programmes:

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

## Prizes

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

### General

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

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

## **Architecture, Planning and Geomatics**

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

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

**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:** R750 for the best student in Design and Theory Studio II.

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

**The Carl Borekenhagen 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:** Awarded to the BAS(Hons) student who produces the best essay.

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

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

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

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

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

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

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

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

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

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

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

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

**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**

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

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

**Association of South African Quantity Surveyors Gold Medal:** The Faculty nominates a candidate for this national award for the best quantity surveying graduate at any accredited South African university offering a degree in quantity surveying. Awards are not necessarily made each year.

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

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

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

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

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

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

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



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

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

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

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

**Mbata, Walters and Simpson Prize:** R1000 for the best all round student in third year of study for the BSc(Construction Studies) degree.

**Old Mutual Corporate Real Estate Prize:** R500 voucher for the best all round student in the second year of study for the BSc(Property Studies) degree.

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

**Synergy Income Fund Limited Prize:** (R1500) for the best student collectively in the subjects of Property Investment, Finance and Portfolio Management (CON2024S, CON3034F and CON4048S)

## Engineering

### General

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

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

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

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

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

## **Chemical Engineering**

**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 in project and practical courses.

## **Civil Engineering**

**Aurecon Best overall Achievement Prizes:** R2500, R1500, R1000 for the three best performing students.

**Aurecon Prize for Water Engineering:** R2000 to the student achieving the highest aggregate score in Water Engineering courses (CIV2040S, CIV3043F, CIV3044F, 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:** R500 for the best results for final examinations 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 project.

## SCHOLARSHIPS, PRIZES, MEDALS AND DEAN'S MERIT LIST 235

**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:** R1250 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:** R1000 for the best student in EEE3017W.

**Peralex Electronics prize:** R1000 for the best student in EEE4001F.

**Peralex Electronics prize:** R1000 for the best student in EEE4084F.

**Siemens Prize:** R2500 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

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

**AAT Composites Award:** (R1000) for best project for 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.

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

**SASOL Achievement Medal:** and R1000 for the best third year student in the course MEC3050W, 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 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. The outcome of the inspection visit and report will be made known when it is available.

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.



## Lecture periods

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

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