



UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT (POSTGRADUATE)

2019

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

GENERAL INFORMATION

Officers in the Faculty

Academic

Dean of the Faculty

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

Personal Assistant to the Dean

M Scheepers

Deputy Deans

Associate Professor S Chowdhury, PrEng BEE(Hons) PhD (Eng) *Kolkata* MIET SMIEEE MIE SMSAIEE

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

Professor MA Khan, MSc(Eng) PhD *Cape Town* SMIEEE

Professor M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* MSAICE MSASITS

Heads of Departments

Architecture, Planning and Geomatics

TBC

Chemical Engineering

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

Civil Engineering

Professor P Moyo, Pr Eng BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang* FSAAE MISAICE MIABSE MISHMII

Construction Economics and Management

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

Electrical Engineering

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

Mechanical Engineering

Professor GS Langdon, BEng PhD *Liverpool* MIMechE Ceng

Academic Administration

Faculty Manager (Academic Administration)

G Valodia, BA Hons HDE *Cape Town*

Undergraduate Manager (Academic Administration)

TBC

Postgraduate Manager (Academic Administration)

TBC

Administrative Assistants

D Botha, BPrimEd *Wits*
 R Carlse, BSocSc LLB *Cape Town*
 B Cleenwerck, BSocSc LLB *Cape Town*
 N Hartley, NDip Bus Mgmt *College of Cape Town*
 C Hewitson, BSocSc PGDip LIS *Cape Town*
 L Williams, BA *Cape Town*

Senior Secretary - Receptionist

TBC

Clinical Psychologist

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

Communications, Marketing and Development**Manager**

M Hilton

Finance**Faculty Finance Manager**

B Daubenton, HND Civil Engineering Structures *Cape Technikon*

Assistant Faculty Finance Manager

S Kriel, BCom *Cape Town*

Senior Finance Officer

M Sigonyela, BSocSc *Cape Town*

Finance Officer

A Burmeister, BA LLB *UNISA*

Human Resources**Human Resources Officer**

Y Banda, BA Personnel Management *Johannesburg*

IT and Facilities**Manager**

S Niekerk, NDip Information Technology *Cape Technikon*

Student Councils

The Engineering & the Built Environment Student Council in the Faculty represents the interests of the student body. The EBESC and its counterparts in other faculties are concerned with promoting the academic and social interests of the students they represent. A Faculty Postgraduate Student Council represents the specific interests of postgraduate students.

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. or visited at www.pgfo.uct.ac.za.

Distinguished Teachers

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

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

Fellows in the Faculty

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

Emeritus 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 A Mainza	(Chemical Engineering)
Professor G Nurick	(Mechanical Engineering)
Emeritus Professor CT O'Connor	(Chemical Engineering)
Professor E Pieterse	(African Centre for Cities)
Emeritus Professor H R��ther	(Architecture, Planning and Geomatics)
Professor E van Steen	(Chemical Engineering)
Professor V Watson	(Architecture, Planning and Geomatics)
Professor A Zingoni	(Civil Engineering)

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 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 Mechanical & Mechatronic Engineering	13982
Bachelor of Science in Engineering in Mechanical Engineering	13977
Bachelor of Science in Engineering in Mechatronics	13980
Bachelor of Science in Geomatics	TBC
Bachelor of Science in Property Studies	11693
Bachelor of Architectural Studies Honours	66569
Bachelor of City Planning Honours	94845
Bachelor of Landscape Architecture Honours	TBC
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
Postgraduate Diploma in Power Plant Engineering	TBC
Master of Architecture	3977
Master of Architecture Professional	TBC
Master of City and Regional Planning	94631
Master of Engineering	67426
Master of Geotechnical Engineering	97913
Master of Landscape Architecture	TBC
Master of Philosophy	TBC
Master of Science in Engineering	10681
Master of Science in Project Management	13854
Master of Science in Property Studies	11697
Master of Transport Studies	97727
Master of Urban Design	98987
Doctor of Architecture	19272
Doctor of Philosophy	TBC
Doctor of Science in Engineering	10687

NOTE: By virtue of inclusion on the Institution's DHET approved Programme and Qualification Mix (PQM), all qualifications included in this Handbook are accredited by the Council on Higher Education's permanent sub-committee - the Higher Education Quality Committee. Where a SAQA ID has not been provided, the qualification is awaiting the SAQA ID. The higher education sector has undergone an extensive alignment to the Higher Education Qualification sub Framework and thus all institutions are awaiting the finalisation of the process and completion of the awarding of SAQA ID's. Please consult Handbook 2 or the HEQsF Programme and Qualification Mix (PQM) on the Institutional Planning Department's website, as approved by the Department of Higher Education and Training, for a list of all UCT's accredited qualifications.

Term Dates for 2019

1st Semester

1st Quarter	11 February to 12 April
Mid-term break	13 April to 22 April
2nd Quarter	23 April to 9 June

Mid-year Vacation

10 June to 14 July

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2nd Semester

3rd Quarter

Mid-term Break

4th Quarter

15 July to 23 August

24 August to 1 September

2 September to 24 December

Lecture periods

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

Lecture timetable

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

Key to Course Abbreviations, Codes and Terminology Guide to the Credit System

Course Codes

ACC	Accounting
APG	Architecture, Planning and Geomatics
AST	Astronomy
AXL	African & Gender Studies, Anthropology & Linguistics
BIO	Biological Sciences
BUS	Management Studies
CEM	Chemistry
CHE	Chemical Engineering
CIV	Civil Engineering
CML	Commercial Law
CON	Construction Economics and Management
CSC	Computer Science
ECO	Economics
EEE	Electrical Engineering
EGS	Environmental & Geographical Sciences
END	Faculty of Engineering & the Built Environment
GEO	Geological Sciences
HST	Historical Studies
HUB	Human Biology
INF	Information Systems
MAM	Mathematics & Applied Mathematics
MEC	Mechanical Engineering
POL	Political Studies
PBL	Public Law
PHI	Philosophy
PHY	Physics
SOC	Sociology
STA	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

The following example shows how this works:

CIV2031S Structural Engineering

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

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

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

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

Courses: Guide To Terminology

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

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.

POSTGRADUATE DIPLOMAS

Qualification	Plan Code	Qual Code
*Postgraduate Diploma in Power Plant Engineering	MEC11	EG010

***Postgraduate Diploma in Power Plant 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 Candidates for the Postgraduate Diploma shall not be admitted unless they are proficient in English and
- hold an approved three-year degree or advanced diploma of the University or of any other university recognised for the purpose; or
 - have passed minimum admission requirements 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
 - have 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 diploma.

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, candidates must register annually unless granted leave of absence by Senate.
- FGA4.2 Candidates 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.
- FGA4.3 Candidates must register or reregister by not later than February if taking only second semester courses.

Obtaining the Postgraduate Diploma

- FGA5 Candidates shall comply with the curriculum requirements prescribed by Senate and shall complete approved coursework of not less than 120 credits.

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.

Readmission

- FGA7 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the diploma, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned. Candidates 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.

Examination

- FGA8 Candidates shall complete such examinations as are prescribed for the advanced level coursework.

Award of the Postgraduate Diploma

- FGA9.1 The Postgraduate Diploma is not awarded with Distinction.
- FGA9.2 The University does not undertake to reach a decision on the award of the Postgraduate Diploma by any specific date.

HONOURS DEGREES

Qualification	Qual Code	Plan Code
Bachelor of Science Honours <i>in</i> Geographical Info Systems	EH001	APG07
Bachelor of Science Honours <i>in</i> Construction Management	EH002	CON02
Bachelor of Science Honours <i>in</i> Property Studies	EH003	CON03
Bachelor of Science Honours <i>in</i> Quantity Surveying	EH004	CON05
Bachelor of Science Honours <i>in</i> Materials Science	EH005	MEC04
Bachelor of Architectural Studies Honours	EH006	APG01
Bachelor of Science Honours <i>specialising in</i> Nuclear Power	EH007	EEE08
Bachelor of City Planning Honours	EH009	APG03
Bachelor of Landscape Architecture Honours	EH008	APG06

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 Candidates for the degree may be considered if they are proficient in English and
- are graduates of the Bachelor of Architectural Studies degree of this University; or
 - hold any three-year bachelor's degree recognised by the Senate as equivalent to the Bachelor of Architectural Studies degree of this University; or
 - have 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 Candidates may apply for entry into the degree if they:
- have, 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;
 - are 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, students may not renew their registration if they fail 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. Candidates 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. Students gain entry to final assessment by satisfactory performance of the duly performed (DP) requirements. Students may be refused permission (DPR) to sit for the examination or review if they fail to satisfy the Senate that they have satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.
- FHA6.2 A DP certificate may be withheld unless: all parts of each studio work project, tutorial or other assignment are completed to an acceptable standard submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in sections of the course.
- FHA6.3 Assessment by formal examination may be by means of a written examination, term paper or presentation. An external examiner is appointed for each course assessed by examination.

Degree Awarded in the First Class

- FHA7 The degree will be awarded in the first class to a candidate who has obtained first class passes in both Studio work I and II and an additional first class pass in either History and Theory of Architecture or Advanced Building Technology and has

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successfully completed all other courses required for the degree.

Bachelor of City Planning Honours

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

Minimum Admission Requirements

- FHB1 Candidates may be considered for the degree if they are proficient in English and
- are graduates of the University or of another University recognized by the Senate for the purpose; or
 - have 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
 - have 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 Bachelor of City Planning Honours.

Selection

- FHB2 Admission into the BCP Hons is limited and by application. Selection is based on an applicant's academic record which for graduates of three-year undergraduate programmes, would normally be expected to reflect marks in HEQSF Level 7 courses, which would qualify the applicant for entry into the appropriate Honours programme i.e. in the range 65% and above, together with their responses to certain departmental requirements set by the Programme Convenor, which may vary from time to time. Entry into the programme is limited by the space available.

Duration of Degree

- FHB3 The minimum duration of the Bachelor of City Planning Honours degree is one year of full-time study. The curriculum for the degree could extend over a maximum of two academic years of study.
- FHB4 Subject to the provisions of the rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate. Candidates must register or re-register by not later than the end of Registration Week for all courses or, if any of the courses begin earlier, by not later than the date on which the first course starts.

Readmission Requirements

- FHB5 Except by permission of the Senate, candidates may not renew their registration if they, fail to complete courses to the value of not less than 50% of the total credits for which they are registered in the year concerned. With respect to studio work, the completion of APG4022F is a prerequisite for registration in APG4026S.

Obtaining the Degree and Validity of Credits

- FHB6.1 The curriculum comprises two semesters, each consisting of a studio course and five non-studio courses in the first semester and four non-studio courses in the

second semester. Candidates shall comply with the curriculum requirements prescribed by Senate, which are published in the Programmes of Study and Courses Offered section of this Handbook.

- FHB6.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities shall not be carried forward for credit except by special permission of Senate.
- FHB7 Assessment by formal examination may be by means of a written examination, term paper or presentation. An external examiner is appointed for each course assessed by examination.

Degree Awarded in the First Class

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

Bachelor of Landscape Architecture Honours

An honours degree in landscape architecture that provides advanced vocational and discipline-specific knowledge, skills and competencies related to the practice of landscape architecture, including landscape and urban design, history and theory, digital representation techniques and constructed ecology. The course of study extends the base of knowledge through graduate study with particular emphasis on landscape 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 landscape architecture. It is a prerequisite qualification for admission into the Master of Landscape Architecture.

Minimum Admission Requirements

- FHB1 Candidates may be considered for the Bachelor of Landscape Architecture Honours (BLA(Hons)) if they are proficient in English and
- (a) are graduates of the Bachelor of Architectural Studies degree of this University; or
 - (b) hold any three-year bachelor's degree recognised by the Senate as equivalent to the Bachelor of Architectural Studies degree of this University; or
 - (c) have 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, but related Bachelors' degrees, will be required to undertake the 'Introduction to Spatial Design' (ISD) short course (EZ002APG02), which is offered by the Continued professional development Unit in the faculty in the format of a 4-week, 5-days-a-week intensive workshop. Students without requisite computer skills for IDS will also be required to undertake the week long 'Introduction to Design Computing' (IDC), immediately before ISD. Staff teaching in ISD both help potential applicants reach an appropriate level of design skill to enter the BLA(Hons), though completion of the ISD does not guarantee entry to the BLA(Hons).

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Selection

FHB2 Admission into the BLA(Hons) is limited and by application. Each application is considered on individual merit and selection is based on committee perusal of the following:

- a. Academic record reflecting marks achieved in HEQF level 7 courses;
- b. A preferable minimum average of 65%;
- c. A portfolio of previous design and creative work; and
- d. An interview and possible drawing test

Selection is at the discretion of the Admissions Committee.

Duration of Degree

FHB3 The minimum duration of the Bachelor of Landscape Architecture Honours is one year of full-time study.

The BLA(Hons) can also be undertaken over two years of part-time study

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

Readmission Requirements

FHB5 Except with permission of Senate, students may not renew their registration if they fail 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

FHB6.1 The curriculum comprises two semesters, with two intensive quarter-long studio courses in the first semester and a full semester studio course in the second, accompanied by three additional subjects each semester. A candidate shall comply with the curriculum requirements prescribed by Senate, which are published in the Programmes of Study and Courses Offered section of this Handbook.

FHB6.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities shall not be carried forward for credit except by special permission of Senate.

FHB7 Assessment by formal examination may be by means of a written examination, term paper or presentation. An external examiner is appointed for each course assessed by examination.

Degree Awarded in the First Class

FHB8 The degree will be awarded in the first class to a candidate who has obtained first class passes in either Landscape Architecture Studio I or II, and Landscape Architecture Studio III, and an additional first class pass in a non-studio subject and has successfully completed all other courses required for the degree in the minimum period of one year.

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 Candidates for the degree shall not be admitted unless they are proficient in English and
- (a) are graduates of the BSc in Construction Studies degree of this University; or
 - (b) hold a 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) have in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

Selection

- FHC2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors' Degree in Construction Studies or equivalent with a Grade Point Average (GPA) of at least 65% is the normal academic prerequisite for admission. Applicants may be required to attend an interview and/or write an entrance examination.

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

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

Duration

- FHC3 Candidates must be registered for a minimum of one academic year.

Registration Requirements

- FHC4.1 Subject to the provisions of the Rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FHC4.2 Candidates 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 Candidates must register or reregister by not later than February if taking only second semester courses.

Curriculum

- FHC5.1 Candidates:
- (i) must comply with the curriculum and course requirements prescribed by Senate which are published in the Programmes of Study and Courses

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- Offered sections of this Handbook; and
(ii) must complete approved coursework of not less than 144 credits.

FHC5.2 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 candidates are registered.

FHC5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidates 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, candidates 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 candidates may not withdraw from a course which they are 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, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have 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, candidates are required to satisfy the assessor that they have satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate. The result is published as an ungraded 'pass' (PA) or 'duly performed certificate refused' (DPR).

Review

FHC7.5 Assessment by review consists of a review by the internal examiner(s) of the course

work completed by means of written and/or oral class tests, tutorials, term papers, notebooks or other course assignments.

Supplementary Examinations

FHC8 Senate may permit candidates to take a supplementary examination in a course, subject to supplementary examinations being offered by the department concerned.

Readmission Requirements

FHC9 Except by permission of the Senate candidates may not renew their registration

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

Award of the Degree with Distinction

FHC10 In order to be considered for the award of the degree with distinction, candidates 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 Candidates shall not be admitted to the degree unless they are proficient in English and

- (a) are graduates of the BSc degree of this University; or
- (b) hold 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) have 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) have 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 Candidates must be registered for a minimum of one academic year.

Registration Requirements

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

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FHG4.2 Candidates 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 Candidates:

- (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 not less than 144 credits.

FHG5.2 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 candidates are registered.

FHG5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidates 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, candidates 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 candidates may not withdraw from a course which they are 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, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate.

Formal Examination

FHG6.2 Assessment by formal examination may be by means of written and/or oral examination, tutorials, class tests, term papers, notebooks or other course assignments. An external examiner is appointed for each course assessed by examination.

Duly Performed (DP) Certificate

FHG6.3 A DP certificate may be withheld unless (i) all parts of each project, tutorial and other assignments are completed to an acceptable standard and submitted for assessment at stipulated times; (ii) there is satisfactory attendance (as prescribed by Senate) and satisfactory participation in all sections of the course.

Readmission Requirements

FHG7 Except by permission of the Senate candidates may not renew their registration

- (i) if they, in the courses recognised for the degree fail to pass courses of not less than 50% of the total credits for which they are registered in the year concerned;

- (ii) if they, in courses recognised for the degree fail 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, candidates must complete the degree in one year and obtain at least 75% for the research 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 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the BSc degree of this University; or
- (b) hold 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) have 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 Bachelors' 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 Candidates must be registered for a minimum of one academic year.

Registration Requirements

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

FHM4.2 Candidates 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 Candidates:

- (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 not less than 144 credits.

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- FHM5.2 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 candidates are registered.
- FHM5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidates 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, candidates 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 candidates may not withdraw from a course which they are 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, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have 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 candidates may not renew their registration
- (i) if they, in the courses recognised for the degree fail to pass courses of not less than 50% of the total credits for which they are registered in the year concerned;
 - (ii) if they in courses recognised for the degree fail to complete a course after having been registered for it twice.

Award of the Degree in the First Class

- FHM8 To be considered for the award of the degree in the first class, candidates 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 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the BSc degree of this University; or
- (b) hold 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) have 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 Bachelors' 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 Candidates must be registered for a minimum of one academic year.

Registration Requirements

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

FHN4.2 Candidates 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

FHN5.1 Candidates:

- (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 not less than 148 credits.

FHN5.2 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 candidates are registered.

FHN5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidate shall inform the Head of the Department in writing of any clash of courses (lectures/tutorials/practicals etc.) arising from adherence to this

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Rule immediately it becomes apparent that such a clash exists. Except with the permission of the Head of Department, candidates 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

FHN5.4 Except by permission of Senate candidates may not withdraw from a course which they are 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, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have 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 candidates may not renew their registration

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

Award of the Degree in the First Class

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

Exemption from or Modification of Rules

FHN9 Any exemption or deviation from the rules requires the approval of Senate.

Bachelor of Science Honours in Property Studies

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

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

Minimum Admission Requirements

- FHP1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates of the BSc in Property Studies degree of this University; or
 - (b) hold 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) have in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

Selection

- FHP2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors' Degree 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 candidates holding a BSc Property Studies degree from this university will be determined by taking into account all core, elective core and elective courses completed while registered for that degree, whether required for the degree or not.

Duration

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

Registration Requirements

- FHP4.1 Subject to the provisions of the Rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FHP4.2 Candidates 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 Candidates:
- (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 not less than 144 credits.
- FHP5.2 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 candidates are registered.
- FHP5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidates 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

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permission of the Head of Department, candidates 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 candidates may not withdraw from a course which they are 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, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have 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, candidates are required to satisfy the assessor that they have satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate. The result is published as an ungraded 'pass' (PA) or 'duly performed certificate refused' (DPR).

Review

FHP7.5 Assessment by review consists of a review by the internal examiner(s) of the course work completed by means of written and/or oral class tests, tutorials, term papers, notebooks or other course assignments.

Supplementary Examinations

FHP8 Senate may permit candidates to take a supplementary examination in a course offered by a department, subject to supplementary examinations being offered by the department concerned.

Readmission Requirements

FHP9 Except by permission of the Senate candidates may not renew their registration
(i) if they, in the courses recognised for the degree fail to pass courses of not

- less than 50% of the total credits for which they are registered in the year concerned;
- (ii) if they, in courses recognised for the degree fail to complete a course after having been registered for it twice.

Award of the Degree with Distinction

FHP10 To be considered for the award of the degree with distinction, candidates 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 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the BSc in Construction Studies degree of this University; or
- (b) hold 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) have in any other manner attained a level of competence which in the opinion of the Senate is adequate for the purpose of admission.

Selection

FHQ2 Selection is based on an applicant's academic record and experience. Completion of the Bachelors' Degree 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 degree or not.

Duration

FHQ3 Candidates must be registered for a minimum of one academic year.

Registration Requirements

FHQ4.1 Subject to the provisions of the Rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.

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FHQ4.2 Candidates 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 Candidates must register or reregister by not later than end of registration week if taking only second semester courses.

Curriculum

FHQ5.1 Candidates:

- (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 not less than 164 credits.

FHQ5.2 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 candidates are registered.

FHQ5.3 When registering for courses candidates shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. Candidates 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, candidates 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 candidates may not withdraw from a course which they are repeating

Recognition of Courses

FHQ6 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Method of Assessment

General

FHQ7.1 Courses are assessed by formal examination, by review or by satisfactory performance of the duly performed certificate (DP) requirements. If a course is assessed by formal examination or review, students may be refused permission (DPR) to present themselves for the examination or review if they fail to satisfy the Senate that they have 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, candidates are required to satisfy the assessor that they have 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 candidates to take a supplementary examination in a course offered by a department, subject to supplementary examinations being offered by the department concerned.

Readmission Requirements

FHQ9 Except by permission of the Senate candidates may not renew their registration

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

Award of the Degree with Distinction

FHQ10 To be considered for the award of the degree with distinction, candidates 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	ProgCode		
Master of Architecture	Architecture	APG01	EM006		
Master of City & Regional Planning	City and Regional Planning	APG03	EM031		
Master of Urban Design	Urban Design	APG12	EM030		
MSc in Property Studies	Property Studies	CON03	EM013		
MSc in Project Management	Project Management	CON06	EM014		
Master of Landscape Architecture	Landscape Architecture	APG06	EM015		
Master of Architecture (Professional)	Architecture	APG01	EM021		
Master of Geotechnical Engineering	Geotechnical Engineering	CIV08	EM028		
Master of Transport Studies	Transport Studies	CIV06	EM029		
Master of Engineering in Civil Infrastructure and Maintenance	Civil Infrastructure and Maintenance	CIV07	EM033		
Master of Structural Engineering and Materials	Structural Engineering and Material	CIV04	EM032		
Master of Engineering Specialising in	Water Quality Engineering	CIV02	EM017		
	Structural Engineering & Materials	CIV04			
	Transport Studies	CIV06			
	Civil Infrastructure Management and Maintenance	CIV07			
	Radar	EEE06			
	Nuclear Power	EEE08			
	Telecommunications	EEE09			
	Master of Science in Engineering Specialising in	Geomatics		APG08	EM023/ EM024
		Chemical Engineering		CHE01	
Civil Engineering		CIV01			
Civil Infrastructure Management & Maintenance		CIV07			
Geotechnical Engineering		CIV08			
Structural Engineering & Materials		CIV04			
Water Quality Engineering		CIV02			
Electrical Engineering		EEE01			

	Mechanical Engineering	MEC01	
	Materials Engineering	MEC03	
	Sustainable Energy Engineering	MEC07	
Master of Philosophy Specialising in	Architecture & Planning	APG02	EM025/ EM026/ EM027
	Conservation of the Built Environment	APG05	
	Electrical Engineering	EEE01	
	Sustainable Mineral Resource Development	CHE05	
	Civil Engineering	CIV01	
	Transport Studies	CIV06	
	Construction Economics & Management	CON01	
	Radar	EEE06	
	Space Studies	EEE07	
	Nuclear Power	EEE08	
	Mechanical Engineering	MEC01	
	Engineering Management	MEC02	
	Energy & Development Studies	MEC08	
	Engineering Education	CIV09/EEE04/MEC09	

Master of Architecture

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

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

Minimum Admission Requirements

FMAA1 Except with permission of the Senate, candidates for the degree must be a BAS Hons graduate of this University, or as a graduate of another University, hold 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 Candidates 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, candidates must register annually unless granted leave of absence by Senate.

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

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

Obtaining the Degree

FMAA5. Candidates shall present a dissertation (180 credits) incorporating any or all of the
1 following:

- (a) a research project of a theoretical or practical nature;
- (b) a critical review of a specified topic based on 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. The candidate's supervisor shall submit written evidence to the Faculty
2 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. Candidates shall work under the guidance of a supervisor appointed by Senate and
1 shall be required to attend at the University for a minimum period of at least one month per annum for supervision purposes for as long as they continue to be candidates for the degree.

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

Progress Report

FMAA7. Candidates 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. Except by permission of the Senate, candidates may not renew their registration if
1 they fail to make progress with their research project or dissertation to the satisfaction of Senate.

FMAA8. Candidates required by the Faculty Examination Committee to correct their
2 research dissertation shall complete the corrections within six months of the date of the Committee's decision. Candidates required to revise their research dissertation shall complete the revisions within one year of the date of the Committee's decision. Failing which they shall not be permitted to continue with or reregister for their degrees without the special permission of Senate.

Submission of Dissertation and Paper

FMAA9. Candidates hoping to graduate in either April or December, must consult the EBE
1 website for the deadlines to submit the 'intention to submit' and the dissertation for examination.

FMAA9. After consultation with the supervisor, candidates shall submit their dissertation via
2 PeopleSoft for examination.

- FMAA9.3 Candidates 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 in order to graduate. The Paper requirement is intended to develop 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. The deadline for submission is on the EBE website.
- FMAA9.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

Examination and Ethics Clearance

- FMAA10.1 Examination is by dissertation unless otherwise stated. The dissertation must be satisfactory in arrangement and expression and must be typewritten or printed. Each candidate must comply with such other requirements as the Board of the Faculty of Engineering and the Built Environment, on the recommendation of the Director of the School of Architecture, Planning and Geomatics, may prescribe.
- FMAA10.2 Candidates may be required to present themselves for an oral examination.
- FMAA10.3 Candidates may not submit their dissertation for examination more than twice.
- FMAA10.4 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

Publication

- FMAA11.1 When presenting the dissertation candidates 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 Masters' degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for statutory registration as a Candidate Architect with the South African Council for the Architectural Profession (SACAP), in terms of the Architectural Professions Act 2000 (Act No 44 of 2000). To attain registration as Professional Architect, the candidate must complete a two-year period of practical experience in an architectural office and pass a registration exam set by SACAP.

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

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

Minimum Admission Requirements

FMAB1 Except with permission of the Senate, candidates for the degree must be a BAS(Hons) graduate of this University, or a graduate of another University, and hold 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. Additionally 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 Candidates shall present a 60 credit Research Paper in the form of Theory and Technology Studies in the first semester.

FMAB4.2 Candidates 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. Except by permission of the Senate, candidates who fail the Design Dissertation, on
1 repeating the course, shall be required to select a new topic.
- FMAB5. Candidates who fail a Research Paper will be allowed to repeat that component in
2 the following year.
- FMAB5. Candidates will be allowed to repeat a course only once.
3

Method of Assessment

- FMAB6. Satisfactory performance of the duly performed certificate (DP) requirements
1 applies to all courses. Students gain entry to final assessment by satisfactory performance of the duly performed (DP) requirements. Students may be refused permission (DPR) to sit for the examination or review if they fail to satisfy the Senate that they have satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.
- FMAB6. A DP certificate may be withheld unless: all parts of each studio work project,
2 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. Assessment by formal examination may be by means of a written or oral
3 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 candidates who obtain the degree in
the first academic year of study with a first for the Design Dissertation and a minimum of 70% for the Theory and Technology Studies course.

Ethics Clearance

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

Master of Urban Design

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

The Degree of Master of Urban Design 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 MUD degree curriculum comprises one year of full-time study, open to Honours or Masters-level graduates in Architecture, Landscape Architecture, or Planning from any recognised institution approved by Senate. However, in terms of rule FMB6.1, BAS(Hons); MLA and BCP(Hons) graduates from the University who have completed prescribed work in the theory of City Planning and Urban Design while registered

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for that degree, may obtain exemption from courses in the first semester of the curriculum for the MUD degree. All students entering the programme must do so in the first semester of the year.

Minimum Admission Requirements

- FMB1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are Honours or Masters' graduates in Architecture, Landscape Architecture and Planning of the University or of another University recognised by the Senate for the purpose; or alternatively, could be graduates from Honours or Master's in Planning or a similar discipline with design training evidenced in a portfolio which is part of the application and to the satisfaction of the Selection Committee.
 - (b) have passed at any University or at any Institution recognised by the Senate for the purpose, such examinations are, in the opinion of the Senate, equivalent to the examinations prescribed for the BAS(Hons), MArch(Prof), MLA and BCP(Hons) degrees at the University; or
 - (c) have 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.

Selection

- FMB2 Selection is based on an applicant's academic record and where an applicant holds a one-year BAS(Hons); one-year M.Arch(Prof), two-year MLA degree or the Bachelor of City Planning Honours, in order to be considered for entry into the MUD 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. Applicants without a design background will be required to apply for the 'Introduction to Spatial Design (ISD) short course (EZ002APG02) before applying for the one-year MUD.

Duration

- FMB3 The curriculum for the degree shall extend over a minimum of one (full-time) academic year of study or two years extended-time.

Registration Requirements

- FMB4.1 Subject to the provisions of the rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FMB4.2 Candidates 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 Candidates must register or reregister by not later than end of registration week if taking only second semester courses.
- FMB4.4 Candidates registration for the second semester shall be provisional until they complete the work of the first semester.

Obtaining the Degree

FMB5 Candidates 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 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Readmission

FMB7 Except by permission of the Senate, candidates may not renew their registration if they, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned. With respect to studio-work, the first semester Urban Design Studio is a pre-requisite for the Urban Design Research Project. Students may only commence with the Urban Design Research Project once the first semester courses, Theory of Urban Design I; Urban Design Studio and Research Methods for Urban Design have been completed.

Submission of Dissertation and Ethics Clearance

FMB8.1 Candidates 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. 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 candidates will at best get a pass (third class) result.

FMB8.2 Candidates must submit a digital copy of the dissertation to Vula by the date determined by the department. There are dedicated examiners assigned to each student, but the work is presented in an oral defence to a panel, which consists of internal and external examiners.

FMB8.3 No dissertation 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, candidates 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 Candidates who obtain first class passes for both the Urban Design Studio and the Urban Design Research Project as well as for either the Theory of Urban Design I

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or the Urban Design Theory II courses, 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 Masters' degrees in Handbook 3 of this series.)

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

In South Africa at present there exists a strong need to produce professional planners capable of operating at both the city and regional scales. The study of city and regional planning has therefore been integrated in a single comprehensive programme. The MCRP degree programme has been structured to accommodate the basic differences and overlaps between the city and regional planning stream, and the 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 Candidates shall not be admitted for the degree unless they are proficient in English and are graduates from the Bachelor of City Planning Honours degree at UCT.

Selection

FMC2 Graduates of the Bachelor of City Planning Honours degree from this University will be eligible to apply for the Master of City and Regional Planning.

Duration

FMC3 The curriculum for the degree shall extend over a minimum of one academic year of study.

Registration Requirements

FMC4.1 Subject to the provisions of the rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.

FMC4.2 Candidates 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 Candidates 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 Candidates registration for the second semester shall be provisional until they complete the work of the first semester.

Obtaining the Degree

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

Courses Completed at this or another University/Institution

- FMC6.1 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Readmission

- FMC7 Except by the permission of Senate, candidates may not renew their registration if they fail to complete courses not less than 50% of the total credits for which they are registered, or if they fail to make progress with their dissertation APG5051Z to the satisfaction of the Senate. APG5020F and APG5023F are pre-requisites for APG5051Z.

Submission of Dissertation and Ethics Clearance

- FMC8.1 Candidates 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. Detailed procedures for the dissertation will be made available to candidates at the time of registration. These procedures will give the dates for various stages, critically, the final date for submission. In exceptional cases the programme convener may allow a late submission, but in such cases a candidate will at best get a pass (third class) result.
- FMC8.2 Candidates must submit a digital copy of the dissertation to Vula by the date determined by the department. The work is presented in an oral defence to a panel, which consists of external and internal examiners.
- FM8.3 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

Publication

- FMC9.1 When presenting any written work for examination candidates 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 Candidates who obtain first class passes in APG5020F; APG5023F; APG5024S as well as APG5051Z can 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 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 Masters' degrees in Handbook 3 of this series.)

This degree is offered through the Faculty for specialisations in Minerals Beneficiation (Department of Chemical Engineering), Civil Infrastructure Management and Maintenance, Structural

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Engineering and Materials, Transport Studies and Water Quality Engineering (Department of Civil Engineering) Radar, Nuclear Power and Telecommunications (Department of Electrical Engineering).

Minimum Admission Requirements

- FMD1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates of the Faculty or of an engineering or geomatics programme of any other university recognized for the purpose; or
 - (b) hold an appropriate BSc Hons degree; or
 - (c) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
 - (d) have 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) have 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

- 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 Candidates shall be registered for the degree for a period of not less than one year.

Registration Requirements

- FMD4.1 Subject to the provisions of the rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FMD4.2 New candidates must register by not later than the date on which their first course starts. Continuing candidates must reregister by no later than February.

Obtaining the Degree

- FMD5 Candidates shall undertake advanced study by coursework of a minimum of 135 credits and a project of 45 credits.

Courses Completed at this or another University/Institution

- FMD6.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FMD6.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Examination and Ethics Clearance

- FMD7.1 Candidates 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 Candidates shall not be permitted to submit their minor dissertations for examination more than twice.
- FMD7.3 Candidates may be required to present themselves for an oral examination.
- FMD7.4 No dissertation 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertations to the satisfaction of Senate).
- FMD8.2 Except by permission of the Senate, MEng (in Transport Studies) candidates may not renew their registration if they, in the courses recognised for the degree fail to complete a course after having been registered for it twice.

Submission of Minor Dissertation

- FMD9.1 Candidates hoping to graduate in either April or December, must consult the EBE website for the deadlines to submit the 'intention to submit' and the dissertation for examination.
- FMD9.2 After consultation with the supervisor, candidates shall submit their dissertation via PeopleSoft for examination.
- 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 Masters' degree in the Faculty of Engineering & the Built Environment.

Publication

- FMD10 When presenting a dissertation, candidates 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 Distinctions can be awarded in three categories:

degree with distinction

requires an average of 75% in the coursework and a distinction in the dissertation, both external examiners must recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

dissertation with distinction

the dissertation can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

coursework with distinction

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requires an average of at least 75% for all the coursework only.

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.

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 Masters' degrees in Handbook 3 of this series.)

A qualifying degree in landscape architecture provides learners with the knowledge, values and skills to enter the profession of landscape architecture. 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 is a pre-requisite for statutory registration as a Candidate Landscape Architect with the South African Council for the Landscape Architecture Profession (SACLAP), in terms of the Landscape Architectural Profession Act, Act 45 of 2000.

Minimum Admission Requirements

FMG1 Candidates shall not be admitted for the Master of Landscape Architecture (MLA) unless they are proficient in English and

- (a) are graduates holding the degree of Bachelor of Landscape Architecture Honours from the University, or;
- (b) have 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 Landscape Architecture Honours degree at the University; or
- (c) have 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.

Selection

FMG2 Each application is considered on individual merit, and selection is based on committee perusal of the following:

- a. A portfolio of design and creative work from previous BLA(Hons) studies;
- b. Academic record reflecting marks achieved in HEQF level 8 courses;
- c. A preferable minimum average of 65%;
- d. An interview.

Duration

FMG3 The degree programme shall extend over a minimum of one academic year of study.

Registration Requirements

- FMG4.1 Subject to the provisions of the rule on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FMG4.2 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses or if registering only for a thesis or dissertation.
- FMG4.4 Registration for the second semester shall be provisional until candidates complete the work of the first semester.

Obtaining the Degree

- FMG5 A candidate shall successfully complete the curriculum which comprises of two semesters, with:
 - a. Two intensive quarter-long studio courses in the first semester accompanied by two advanced course work and a number of research based subjects, that help prepare for;
 - b. The 120-credit design dissertation in second semester during which a candidate shall develop and present a design project, and develop it technically in an associated technology subject.

Recognition of Courses Taken at this or another Institution

- FMG6.1 The Senate may accept periods of attendance at this or another University or Institution recognised by the Senate for the purpose as part of the attendance of candidates qualifying them for admission to the degree , and may further accept examinations passed at this or another University or Institution approved by the Senate as exempting acandidates from examinations in and for the purpose of granting them credit for such courses prescribed for the degree as Senate may consider equivalent, provided that candidates for the degree attend the University as candidates for the full degree for at least one year.
- 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.

Method of Assessment

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.

Readmission

- FMG7 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they were registered in the year concerned.

A candidate who fails the design Dissertation, on repeating the course, shall be required to select a new topic.

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

Publication

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- FMG8.1 When presenting any written work for examination, candidates 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 at least one studio course and in the design dissertation, as well as in one other coursework subject, and who completes the programme in minimum prescribed time 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 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 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) hold a four-year bachelors' degree, or honours degree of the University or of any other university recognised by the Senate for the purpose; or
 - (b) hold an approved three-year degree and (i) have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
 - (c) have 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) have 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, candidates must register annually unless granted leave of absence by Senate.

- FMH4.2 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.
- FMH4.4 Candidates, other than one registering for the first time, must reregister by no later than February if registering only for the dissertation. Candidates registering for the degree for the first time and only for the dissertation, may register at any time during the year, but must register by May if the year is to be counted towards the minimum time for registration before submission for examination.

Obtaining the Degree

- FMH5.1 Candidates may obtain the degree in one of the three following ways:
- (i) by completing a dissertation (180 credits) which may incorporate any or all 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 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 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 of 120 credits and a minor dissertation of 60 credits. The deadline for submission is on the EBE website.

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 (180 credits); or
 - (b) if proceeding by research and coursework, prescribed courses of a minimum of 60 credits and a dissertation (120 credits);
 - (c) if proceeding by coursework and research, prescribed courses of a minimum of 120 credits and a minor dissertation of 60 credits.
- FMH7.2 Candidates shall not be permitted to submit their 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 Candidates shall submit written reports 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation to the satisfaction of Senate).
- FMH9.2 Candidates required by the Faculty Examination Committee to correct their research dissertation shall complete the corrections within six months of the date of the Committee's decision. Candidates required to revise their research dissertation shall complete the revisions within one year of the date of the Committee's decision. Failing which they shall not be permitted to continue with or reregister for their degrees without the special permission of Senate.

Submission of Dissertation and Paper

- FMH10.1 Candidates intending to submit a 120 or 180 credit dissertation in the hope of the award of the degree in either April or December, must, submit the 'intention to submit' and the dissertation for examination by the deadlines specified on the EBE website.
- FMH10.2 After consultation with the supervisor, candidates shall submit their dissertation via PeopleSoft for examination.
- FMH10.3 Candidates 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, to graduate. 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. The submission deadlines are on the EBE website.
- 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 their dissertations candidates 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:

for 180 credit dissertations, the degree can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction.

for 120 or 60 credit dissertations, distinctions can be awarded in three categories:

degree with distinction

requires an average of 75% in the coursework and a distinction in the dissertation, both external examiners must recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

dissertation with distinction

the dissertation can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

coursework with distinction

requires an average of at least 75% for all the coursework only.

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 Masters' 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 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the University with a four-year bachelor level or honours degree in a field related to the built environment; or
- (b) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or

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- (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
- (c) have 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) have 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 Candidates must be registered for the degree for at least two academic years.

Registration Requirements

FMHA4.1 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.

FMHA4.3 Except with the permission of the Senate, candidates may not withdraw from a course which they are repeating.

FMHA4.4 Candidates, other than those registering for the first time for the degree must reregister by no later than February if registering only for a dissertation or only for a project. Candidates who are registering for the degree for the first time and, only for a dissertation, may register at any time during the year, or by May if the year is to count towards the minimum time for registration before graduation.

Minimum Number of Courses

FMHA5 Candidates must register for at least two courses, other than the dissertation, per year except where only one course is required to complete the degree.

Obtaining the Degree

FMHA6 Candidates shall be required to complete advanced study by coursework (as prescribed) of a minimum value of 120 credits and a minor dissertation of a minimum 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 Candidates shall complete prescribed courses of 120 credits and a minor dissertation of 60 credits.
- FMHA8.2 Candidates may be required to present themselves for an oral examination.
- FMHA8.3 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMHA8.4 Candidates intending to submit a 60-credit dissertation in the hope of the award of the degree in either April or December, must, submit and 'intention to submit' and the dissertation for examination by the deadline on the EBE website.

Progress Report

- FMHA9 Candidates 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation and/or research project to the satisfaction of Senate).
- FMHA10.2 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail 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. Students gain entry to final assessment by satisfactory performance of the duly performed (DP) requirements. Students may be refused permission (DPR) to sit for the examination or review if they fail to satisfy the Senate that they have satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.
- FMHA11.2 A DP certificate may be withheld unless: all parts of each studio work project, tutorial or other assignment are completed to an acceptable standard and submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in all sections of the course.

Method of Assessment

- FMHA11.3 Assessment by formal examination may be by means of a written or oral examination or term paper. An external examiner is appointed for each course assessed by examination.

Publication

- FMHA12.1 When presenting their dissertations candidates 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

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

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

Master of Philosophy specialising in Engineering Management

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

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

Minimum Admission Requirements

FMHB1 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the University with a four-year bachelor level or honours degree in a related field; or
- (b) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
- (c) have 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) have 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 Candidates must be registered for the degree for at least two academic years.

Registration Requirements

FMHB4. Candidates must register or reregister by not later than the end of Registration
1 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.

FMHB4. Candidates must register or reregister by no later than February if taking only
2 second semester courses.

FMHB4. Except with the permission of the Senate, candidates may not withdraw from a
3 course which they are repeating.

FMHB4. Candidates, other than one registering for the first time for the degree must
4 reregister by no later than February if registering only for a dissertation or only for a project. Candidates registering for the degree for the first time and, only for a

dissertation, may register at any time during the year, or by May for the year to count towards the minimum time for registration before graduation.

Minimum Number of Courses

FMHB5 Candidates must register for at least two courses, other than the dissertation, per year except where only one course is required to complete the degree.

Obtaining the Degree

FMHB6 Candidates shall be required to complete advanced study by coursework (as prescribed) of a minimum of 120 credits and a minor dissertation of a minimum 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 Candidates shall complete prescribed courses of 120 credits and a minor dissertation of 60 credits.

FMHB8. 2 Candidates may be required to present themselves for an oral examination.

FMHB8. 3 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

FMHB8. 4 Candidates intending to submit a 60-credit dissertation in the hope of the award of the degree in either April or December, must, in the year in which the dissertation is to be submitted, must submit the ‘intention to submit’ and the dissertation for examination by the deadlines on the EBE website.

Progress Report

FMHB9 Candidates 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation to the satisfaction of Senate).

FMHB10 .2 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail 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. Students gain entry to final assessment by satisfactory performance of the duly performed (DP) requirements. Students may be refused permission (DPR) to sit for the examination or review if they fail to satisfy the Senate that they have satisfactorily attended and duly performed the required work set in the conditions for the award of a DP certificate.
- FMHB11 .2 A DP certificate may be withheld unless: all parts of each studio work project, tutorial or other assignment are completed to an acceptable standard and submitted for assessment at the stipulated times; there is satisfactory attendance (minimum of 80%), and a generally satisfactory participation in all sections of the course.
- FMHB11 .3 Assessment by formal examination may be by means of a written or oral examination or term paper. An external examiner is appointed for each course assessed by examination.

Publication

- FMHB12 .1 When presenting their project reports candidates 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 To be awarded the *degree* with distinction requires an average of 75% in the coursework and a distinction in the dissertation. To be awarded the *dissertation with distinction* requires a distinction in the dissertation only. To be awarded *coursework with distinction* requires the candidate obtaining an average of at least 75% for all coursework only.
- 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 Masters' degrees in Handbook 3 of this series.)

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

Minimum Admission Requirements

- FMP1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates of the University with a four-year bachelor level or honours degree in a related field; or
 - (b) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
 - (c) have 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) have 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 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.

FMP3.3 Except with the permission of the Senate, candidates may not withdraw from a course which they are repeating.

Minimum Number of Courses

FMP4 Candidates must register for at least two courses, other than the dissertation, per year except where only one course is required to complete the degree.

Obtaining the Degree

FMP5 Candidates shall be required to complete advanced study by coursework (as prescribed) of a minimum of 120 credits and a minor dissertation of a minimum 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 Candidates shall complete prescribed courses of 120 credits and a minor dissertation of 60 credits.

FMP7.2 Candidates may be required to present themselves for an oral examination.

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

FMP7.4 Candidates intending to submit a 60-credit dissertation in the hope of the award of the degree in either April or December, must, in the year in which the dissertation is to be submitted, inform the Hod in writing of such intention by the deadlines on the EBE website.

Progress Report

- FMP8 Candidates 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.
- FMP9.1 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of a value of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation and/or research project to the satisfaction of Senate).
- FMP9.2 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail 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. Students gain entry to final assessment by satisfactory performance of the duly performed (DP) requirements. Students may be refused permission (DPR) to sit for the examination or review if they fail to satisfy the Senate that they have 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 their minor dissertations candidates 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 To be awarded the *degree* with distinction requires an average of 75% in the coursework and a distinction in the dissertation. To be awarded the *dissertation with distinction* requires a distinction in the dissertation only. To be awarded *coursework with distinction* requires the candidate obtaining an average of at least 75% for all coursework only.
- 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 Masters' 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 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates of the University with a four-year bachelor level or honours degree and have achieved a level of numeracy satisfactory to the Senate*; or
 - (b) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework and have achieved a level of numeracy satisfactory to Senate*; or
 - (c) have 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 have achieved a level of numeracy satisfactory to the Senate*; or
 - (d) have 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 level 4 or better, or equivalent; 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 Candidates 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, candidates must register annually unless granted leave of absence by Senate.
- FMI4.2 New candidates must register by no later than the date on which their first course starts.
- FMI4.3 Continuing candidates must reregister by no later than February.

Minimum Courses

- FMI5 Candidates must register for at least two courses, other than the 120-credit dissertation or the 60-credit minor dissertation, per year, except where only one course is required to complete the degree.

Obtaining the Degree

- FMI6.1 Candidates may obtain the degree in one of the following ways:
- (a) by completing advanced coursework (as prescribed) of a minimum of 120 credits and a minor dissertation of a minimum of 60 credits; or
 - (b) by completing advanced study by coursework of a minimum of 60 credits and a dissertation (120 credits); or
 - (c) by completing a dissertation (180 credits).

Courses Completed at this or another University/Institution

- FMI7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FMI7.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Examination and Ethics Clearance

- FMI8.1 Candidates shall complete
- (a) prescribed courses of 60 credits and a dissertation (120 credits), or
 - (b) prescribed courses of 120 credits and a minor dissertation of 60 credits, or
 - (c) a dissertation of 180 credits.
- FMI8.2 Candidates shall not be permitted to submit their dissertation for examination more than twice.
- FMI8.3 Candidates may be required to present themselves for an oral examination.
- FMI8.4 No dissertation 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation to the satisfaction of Senate).
- FMI9.2 Candidates required by the Faculty Examination Committee to correct their research dissertation shall complete the corrections within six months of the date of the Committee's decision. Candidates required to revise their research dissertation shall complete the revisions within one year of the date of the Committee's decision. Failing which they shall not be permitted to continue with or reregister for their degrees without the special permission of Senate.
- FMI9.3 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail to complete a course after having been registered for it twice.

Submission of Minor Dissertation

- FMI10.1 After consultation with the supervisor, candidates shall submit their dissertation via PeopleSoft for examination.
- FMI10.2 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

Submission of Dissertation and Paper

- FMI11.1 Candidates intending to submit a dissertation in the hope of the award of the degree in either April or December, must submit their 'intention to submit' and the dissertation for examination by the deadlines on the EBE website.
- FMI11.2 After consultation with the supervisor, candidates shall submit their dissertation via PeopleSoft for examination.
- FMI11.3 Candidates 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 by the deadline on the EBE website, to graduate. The Paper requirement is intended to develop a candidate's skills in academic communication through exposure to the discipline of preparing a scholarly, succinct overview of the subject of the research topic, with due attention to structure, detail, clarity of expression and referencing.
- FMI11.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

Publication

- FMI12.1 When presenting their dissertations candidates 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 To be awarded the *degree* with distinction requires an average of 75% in the coursework and a distinction in the dissertation. To be awarded the *dissertation with distinction* requires a distinction in the dissertation only. To be awarded *coursework with distinction* requires the candidate obtaining an average of at least 75% for all coursework only.
- FMI13.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

Master of Science in Engineering

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

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

Minimum Admission Requirements

- FMM1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates of the Faculty or of an engineering or geomatics programme of any other university recognized for the purpose; or
 - (b) hold an appropriate BSc(Hons) degree; or
 - (c) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
 - (d) have 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) have 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, candidates must register annually unless granted leave of absence by Senate.
- FMM4.2 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.
- FMM4.4 Candidates, other than one registering for the first time for the degree must reregister by no later than February if registering only for the dissertation. Candidates registering for the degree for the first time and, only for the dissertation, may register at any time during the year, or by May if the year is to be counted towards the minimum time for registration before graduation.

Supervision

FMM5 Candidates 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 they continue to be candidates for the degree.

Obtaining the Degree

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

- (i) by completing a dissertation (180 credits) which may incorporate any or all 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 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 Candidates for the degree shall complete

- (a) a dissertation (180 credits) 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 of 60 credits (some programmes may require more) and a dissertation of 120 credits.

FMM8.2 Candidates may be required to attend an oral examination.

FMM8.3 Candidates shall not be permitted to submit their 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 Candidates 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation to the satisfaction of Senate).
- FMM10.2 Candidates required by the Faculty Examination Committee to correct their research dissertation shall complete the corrections within six months of the date of the Committee's decision. Candidates required to revise their research dissertation shall complete the revisions within one year of the date of the Committee's decision. Failing which they shall not be permitted to continue with or reregister for their degrees without the special permission of Senate.

Submission of Dissertation and Paper

- FMM11.1 Candidates intending to submit a dissertation in the hope of the award of the degree in either April or December must, submit the 'intention to submit' and the dissertation for examination by the deadlines on the EBE website.
- FMM11.2 After consultation with the supervisor, candidates shall submit their dissertation via PeopleSoft for examination.
- FMM11.3 Candidates 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, to graduate. 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. The deadline for submission is on the EBE website.
- FMM11.4 No dissertation or part thereof which has previously been submitted for examination for any degree at any university shall be accepted for a Masters' degree in the Faculty of Engineering & the Built Environment.

Publication

- FMM12.1 When presenting their dissertations candidates 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. A distinction is awarded as follows for the Master of Science:

1

for 180 credit dissertations, the degree can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction.

or 120 or 60 credit dissertations, distinctions can be awarded in three categories:

degree with distinction

requires an average of 75% in the coursework and a distinction in the dissertation, both external examiners must recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

dissertation with distinction

the dissertation can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

coursework with distinction

requires an average of at least 75% for all the coursework only.

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

2

Upgrading to PhD

FMM14. 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.

1

FMM14. Except with the permission of the Senate, candidates may not withdraw from a course which they are repeating.

2

Master of Science in Project Management

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

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

Minimum Admission Requirements

FMN1 Candidates shall not be admitted for the degree unless they are proficient in English and

- (a) are graduates of the University with a bachelor's degree of a minimum duration of four years, or, an honours degree; or
- (b) hold an approved three-year degree and (i) they have a minimum of five years of senior managerial experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
- (c) have 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) have in any other manner attained a level of competence which, in the

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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 Candidates 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, candidates must register annually unless granted leave of absence by Senate.

FMN4.2 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.

FMN4.4 Except with the permission of the Senate, candidates may not withdraw from a course which they are repeating.

FMN4.5 Candidates, other than one registering for the first time for the degree must reregister by no later than February if registering only for a project.

Minimum Number of Courses

FMN5 Candidates must register for at least two courses, other than the dissertation, per year except where only one course is required to complete the degree.

Obtaining the Degree

FMN6.1 Candidates may obtain the degree in one of the following ways:

- i. By completing advanced study by coursework (as prescribed and aligned with the topic of the dissertation) of a minimum of 80 credits AND a dissertation (120 credits) which may incorporate any or all the following:
 - design of all or part of a project to a specification involving advanced concepts and theoretical principles applicable to some branch of project management
 - a research project of a theoretical or practical nature
 - a critical review of a specified topic based upon a comprehensive search of the literature or available data
 - development of an item of equipment or a technique involving novel features or advanced design
 - any other study acceptable to the Faculty; or
- ii. By completing advanced study by coursework (as prescribed) of a minimum of 140 credits and a minor dissertation of 60 credits.

FMN6.2 The candidates 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, provided that this requirement shall not apply to a candidate who undertakes a structured programme of coursework to a value of 140 credits and a dissertation of 60 credits. The deadline is on the EBE website.

Courses Completed at this or another University/Institution

- FMN7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FMN7.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Examination and Ethics Clearance

- FMN8.1 Candidates shall complete prescribed courses to the value of 140 credits and a minor dissertation of 60 credits.
- FMN8.2 Candidates can only submit a dissertation twice for examination.
- FMN8.3 Candidates may be required to present themselves for an oral examination.
- FMN8.4 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMN8.5 Candidates intending to submit a 60-credit dissertation in the hope of the award of the degree in either April or December, must, submit the ‘intention to submit’ and the dissertation by the deadlines on the EBE website.

Progress Report

- FMN9 Candidates 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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their research project to the satisfaction of Senate).
- FMN10.2 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail to complete a course after having been registered for it twice.

Award of the Degree

- FMN11.1 For 120 or 60 credit dissertations, distinctions can be awarded in three categories:

degree with distinction
requires an average of 75% in the coursework and a distinction in the dissertation,

both external examiners must recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

dissertation with distinction

the dissertation can be awarded with distinction if both external examiners recommend that the dissertation be awarded with distinction, or if one recommends distinction and the other supports the distinction

coursework with distinction

requires an average of at least 75% for all the coursework only.

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

Master of Science in Property Studies

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

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

Minimum Admission Requirements

- FMO1 Candidates shall not be admitted for the degree unless they are proficient in English and
- (a) are graduates 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) hold an approved three-year degree and (i) they have a minimum of five years of senior managerial experience relevant to the field in which they propose to study, or (ii) who in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework; or
 - (c) have 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) have 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 Candidates 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, candidates must register annually unless granted leave of absence by Senate.

- FMO4.2 Candidates 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 Candidates must register or reregister by no later than February if taking only second semester courses.
- FMO4.4 Except with the permission of the Senate, candidates may not withdraw from a course which they are repeating.
- FMO4.5 Candidates, other than one registering for the first time for the degree must reregister by no later than February if registering only for a dissertation.

Minimum Number of Courses

- FMO5 Candidates must register for at least two courses, other than the dissertation, per year except where only one course is required to complete the degree.

Obtaining the Degree

- FMO6.1 Candidates may obtain the degree in one of the following ways:
- i. By completing advanced study by coursework (as prescribed and aligned with the topic of the dissertation) of a minimum of 80 credits AND a dissertation (120 credits) which may incorporate any or all the following:
 - design of all or part of a project to a specification involving advanced concepts and theoretical principles applicable to some branch of property studies
 - a research project of a theoretical or practical nature
 - a critical review of a specified topic based upon a comprehensive search of the literature or available data
 - development of an item of equipment or a technique involving novel features or advanced design
 - any other study acceptable to the Faculty; or
 - ii. By completing advanced study by coursework (as prescribed) of a minimum of 140 credits and a dissertation of a minimum of 60 credits.
- FMO6.2 The candidates 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, provided that this requirement shall not apply to a candidate who undertakes a structured programme of coursework to a value of 140 credits and a research project to a value of 60 credits. The deadline is on the EBE website.

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

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special permission of Senate.

Examination and Ethics Clearance

- FMO8.1 Candidates shall complete prescribed courses of 140 credits and a minor dissertation of 60 credits.
- FMO8.2 Candidates can only submit the dissertation for examination twice.
- FMO8.3 Candidates may be required to present themselves for an oral examination.
- FMO8.4 No dissertation involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.
- FMO8.5 Candidates intending to submit a 60-credit dissertation in the hope of the award of the degree in either April or December, must, submit the 'intention to submit' and the dissertation by the deadlines on the EBE website.

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, candidates may not renew their registration if they, in the courses recognised for the degree, fail to complete courses of a value of not less than 50% of the total credits for which they are registered in the year concerned (or if they fail to make progress with their dissertation to the satisfaction of Senate).
- FMO10.2 Except by permission of the Senate, candidates may not renew their registration if they, in the courses recognised for the degree fail to complete a course after having been registered for it twice.

Award of the Degree with Distinction

- FMO11.1 To be awarded the *degree* with distinction requires an average of 75% in the coursework and a distinction in the dissertation. To be awarded the *dissertation with distinction* requires a distinction in the dissertation only. To be awarded *coursework with distinction* requires the candidate obtaining an average of at least 75% for all coursework only.
- FMO11.2 The University does not undertake to reach a decision on the award of the degree by any specific date.

Professional Masters

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

The Professional Masters is offered by the Faculty through the Department of Civil Engineering with specialisations in Geotechnical Engineering, Civil Infrastructure Management and Maintenance, Structural Engineering and Materials and Transport Studies.

Minimum Admission Requirements

- FMP1 Candidates will not be admitted for the degree unless they are proficient in English and
- (a) are graduates 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) hold an approved three-year degree and (i) they have a minimum of five years' experience relevant to the field in which they propose to study, or (ii) they in addition to the standard programme requirement first complete a minimum of 144 credits of approved coursework and have achieved a level of numeracy satisfactory to Senate*; or
 - (c) have 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 have achieved a level of numeracy satisfactory to the Senate*; or
 - (d) have 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: Applicable to the Master of Transport Studies

- (i) a first year (one semester) University course in Mathematics (pure or applied) or Statistics
- (ii) Mathematics at National Senior Certificate level with a level 4 or better, or equivalent; or
- (iii) applicants without the required level of numeracy specified in (i) and (ii) above will be required to demonstrate a satisfactory level of numeracy in a test.

Selection

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

Duration

- FMP3 Candidates must be registered for the degree for at least one academic year.

Registration Requirements

- FMP4.1 Subject to the provisions of the rules on Readmission, below, candidates must register annually unless granted leave of absence by Senate.
- FMP4.2 New candidates must register by no later than the date on which his or her first course starts.
- FMP4.3 Continuing candidates must reregister by no later than February.

Minimum Number of Courses

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

Obtaining the Degree

- FMP6 A candidate shall be required to complete advanced study by coursework (as prescribed) of 135 credits and a research project to the value of 45 credits, or in the case of the MTrans degree, a minimum value of 140 credits and research projects of a minimum value of 50 credits.

Courses Completed at this or another University/Institution

- FMP7.1 For the purpose of granting credit for and/or exemption from a course prescribed as a curriculum requirement, the Senate may recognise a course or courses completed at this or another university or institution recognised for the purpose, provided that (i) such courses have not been counted for a qualification at the University or at any other institution and (ii) at least half the courses prescribed for the Degree shall be attended and passed at the University and (iii) the total period of attendance shall not be less than one year.
- FMP7.2 Course credits of more than 10 years standing, whether obtained in this Faculty, other faculties or other universities, shall not be carried forward for credit except by special permission of Senate.

Examination and Ethics Clearance

- FMP8.1 A candidate shall complete prescribed courses to the value of 140 or 135 credits and research reports to a value of 50 or 45 credits.
- FMP8.2 Candidates shall not be permitted to submit their research project reports for examination more than twice.
- FMP8.3 Candidates may be required to present themselves for an oral examination.
- FMP8.4 No research report involving human (or animal) subjects, where ethics clearance has not been obtained beforehand, will be examined.

Readmission

- FMP9.1 Except by permission of the Senate, a candidate may not renew his or her registration if he or she, in the courses recognised for the degree, fails to complete courses of a value of not less than 50% of the total credits for which he or she is registered in the year concerned (or if he or she fails to make progress with his or her project report to the satisfaction of Senate).
- FMP9.2 Except by permission of the Senate, a ProfM candidate may not renew their registration if they, in the courses recognised for the degree fail to complete a course after having been registered for it twice or, in the case of the research project reports, submits a report for re-examination and fails the examination.

Award of the Degree with Distinction

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

DOCTORAL DEGREES

Doctor of Architecture

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

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

Admission

- FDA1 The degree of Doctor of Architecture may be conferred upon:
- (a) holders of Bachelors' 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 Masters' 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 candidates for the Degree can be registered they 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 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
- (a) 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; and
 - (b) that the work submitted has not been accepted for a degree at this or any other university.
- FDA2.2 Senate may decide, having received the advice of a Committee of Assessors appointed for the purpose, either to accept or to refuse the application. If accepted, the Dean shall invite the applicant to formally apply and register as a candidate and examination of the work will proceed. If refused, the Dean shall inform the candidate in confidence and return the submitted material.

Requirements for the Award of the Degree

- FDA3.1 The work submitted shall comprise documentation of built and/or published work which shall constitute a substantial, original and important contribution to learning in the field of either architecture, planning, urban design or construction economics and management. A candidate may, in addition, submit any supporting collateral evidence. The work must be satisfactory in arrangement and expression.
- FDA3.2 No work will be accepted which has been accepted by another university for the purpose of obtaining a degree.
- FDA3.3 If, at the date of its presentation, any portion of the work submitted has not been

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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 purposes of research. The University may be prepared to waive the right so granted if the candidate subsequently arranges 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 candidates may be registered for the degree they 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; and
- (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 purposes of obtaining a degree.
- FDC3.3 The examination shall consist primarily of an assessment of the published work submitted by the candidate, but a candidate shall, if required by Senate, attend for written or oral examination on the subject of the work presented, and on any work undertaken under supervision.

Doctor of Philosophy

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

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

DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following postgraduate degree programmes:

Architecture
Geomatics
Landscape Architecture
City and Regional Planning
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

Professor and Director

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

Professors

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

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

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

Emeritus Professors

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

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

Associate Professors

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

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

JL Smit, BSc(Surv) PhD *Cape Town*, PS PS(ph) PGP (SA)

A Steenkamp, BArch MArch *Pretoria* PhD *Delft* PrArch

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

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

Emeritus Associate Professor

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

Senior Lecturers

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

K Ewing, BAS BArch *Cape Town* PhD *Glasgow*

K Fellingham, BArch *Witwatersrand* SM ArchS *MIT* PrArch (SA) ARB (UK) RIBA (UK)

C Hindes, BLA *Pretoria* MLArch

S Hull, BSc(Surv) *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *UNISA* PrL(SA)

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

T Katzschner, BSocSc MCRP *Cape Town*

M Louw, BArch *Pretoria* MPhil *Stellenbosch* PrArch(SA) MIArch

P Odera, BSc(Surv) MSc (Surv) *Nairobi* PhD (Earth and Planetary Sciences) *Kyoto*

SS Papanicolaou, BArch MPhil *Cape Town*

T Sanya, BArch *Makerere MIP Stuttgart PhD Oslo*

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

P Tumubweinee, BSc(Arch) *Witwatersrand Honors Witwatersrand M.Arch Pretoria*

Adjunct Senior Lecturer

N Roux, BFA *Rhodes MA Witwatersrand PhD Birkbeck*

Lecturers

C Abrahams, ND Arch *PTech BTech(Architecture) CPUT MArch(Prof) UCT*

S Le Grange, BArch *Cape Town M Urban Design UC Berkeley*

K Singh, BSc Land Surveying, MSc Land Surveying, *Kwazulu Natal*

S Spamer, BAS *Cape Town, B.Arch Cape Town*

M Toffa, BAS BArch *Cape Town MSc Architecture Leuven*

Part-Time Lecturers

R Cronwright, BA MC & RP MBA *Cape Town TRP(SA) MSA/TRP*

T Klitzner, BArch *Cape Town MLA Penn*

Honorary Researcher

H Wolff, BSc(Arch) *Pretoria BArch Cape Town*

Principal Technical Officer

J Coetzee, NHD (Building Tech)

D Matthee, NHD (Mechanical Eng) ND (Surveying)

Chief Technical Officer

M Wells

Departmental Manager

J Meyer

Photographic Technician

N Stanley

Administrative Officers

N Davids

M Joubert

Administrative Assistants

N Gihwala

N Pickover

M Waglay

Senior Secretaries

J Abrahams

M Mdluli

Print Room Manager

T Swarts

Departmental Assistant

C Ohlson

Laboratory Assistant
S Schroeder

Technical Assistant
S Matthews

IT Liaison
L Coetzee

Postgraduate Programmes

Honours Programmes

Bachelor of Architectural Studies Honours [EH006APG01]

Programme Convener:
TBC

An honours degree in architecture that provides students with advanced vocational and discipline specific knowledge, skills and competencies related to the history, theory, technology and practice of architecture. The course of study extends the base of knowledge of the student through graduate study with particular emphasis on architectural design. It is focused on developing creative and critical inquiry, reflective understanding and cultural, social and technical knowledge in preparation for self-motivated independent learning. The qualification introduces an honours degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for admission into the Master of Architecture (Professional).

Studio work Courses

Code	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:

Code	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)*

Code	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 Landscape Architecture II	12	9
APG4049F	Aspects of History & Theory I	12	8
APG4056F	Aspects of History & Theory II	12	8

Code	Course	NQF Credits	HEQSF Level
APG4058F	Special Topics in Architecture and Urban Studies.....	12	8
	*Approved elective.....	12	0

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

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

Bachelor of Landscape Architecture Honours [EH008APG06]

Programme Convener:

C Hindes, BLA *Pret* MLArch

An Honours degree in Landscape Architecture that provides students with advanced vocational and discipline-specific knowledge, skills and competencies related to the practice of landscape architecture, including landscape and urban design, history and theory, digital representation techniques and constructed ecology. The course of study extends the base of knowledge of the student through graduate study with particular emphasis on landscape 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 landscape architecture. It is a pre-requisite qualification for admission into the Master of Landscape Architecture.

Studio work Courses

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

Lecture Courses

Lecture courses focus on imparting values, knowledge, and skills of relevance to landscape architecture. Landscape skills and techniques are developed progressively throughout the duration of the study programme. Theory courses are accompanied by extensive reading lists and students are expected to undertake extensive structured reading. The courses are assessed through term papers, practicals, seminars and other forms of examination.

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

First Semester

Code	Course	NQF Credits	HEQSF Level
APG4028F	Aspects of City Design.....	12	8
APG4054F	Landscape Systems Analysis.....	20	8
APG4031F	Landscape Representation.....	12	8
APG4036F	Landscape Architecture Studio I.....	16	8
APG4057F	Landscape Architecture Studio II.....	16	8

80 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Second Semester

Code	Course	NQF Credits	HEQSF Level
APG4030S	History & Theory of Landscape Architecture I.....	12	8
APG4032S	Constructing Landscape Systems	20	8
APG4037S	Landscape Architecture Studio III.....	32	8
APG4047S	Plants & Design.....	12	8
	Total first year credits.....	152	

Students who do not have a design background must apply for the Introduction to Spatial Design short course (EZ002APG02), which is offered by the Continued Professional Development unit in the faculty. It is a 4-week, 5-days-a-week intensive workshop that provides an experiential snapshot of the design studio and its thinking, while developing core skills required for studying landscape architecture and urban design at a post-graduate level. The programme is run in an intense and immersive 4-week block before the start of the academic year. Each week will be run by a different design teacher and will have a different approach.

Bachelor of City Planning Honours [EH009APG03]

Associate Professor and Programme Convener:

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

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

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

Studio work Courses

Code	Course	NQF Credits	HEQSF Level
APG4022F	Planning Project A.....	32	8
APG4026S	Planning Project B.....	32	8

Non-Studio Courses

The following courses are compulsory:

Code	Course	NQF Credits	HEQSF Level
APG4020F	Planning Theory & Practice.....	8	8
APG4021F	Urban Infrastructure	12	8
APG4028F	Aspects of City Design	12	8
APG4029F	Natural Systems.....	12	8
APG4035F	Planning Techniques I.....	12	8
APG4023S	Urban Economic Development Processes.....	12	8
APG4024S	Planning & Governmental Systems.....	12	8
APG4025S	Regulatory & Legal Framework.....	12	5

Code	Course	NQF Credits	HEQSF Level
APG4038S	Planning Techniques II.....	12	8
	Total credits.....	168	

BSc(Hons) in Geographical Information Systems [EH001APG07]

Programme Convener:

SA Hull B.Sc(Surv) *UKZN* MSc(Eng) *Cape Town* PGCE *Unisa*

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

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

Core Courses

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

Master's Programmes

Master of Architecture

[EM006APG01]

Professor and Programme Convener:

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

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

- | |
|---|
| <ul style="list-style-type: none"> a) a research project of a theoretical or practical nature; b) a critical review of a specified topic based upon a comprehensive search of literature or available data; c) design of all or part of an architectural project or group of projects to a specification involving advanced concepts and theoretical principles; d) design of all or part of an architectural project or group of projects to a specification involving advanced concepts and theoretical principles; e) any other study acceptable to the Faculty of Engineering and the Built Environment. |
|---|

Master of Architecture (Professional)
[EM021APG01]

Programme Convener:
 TBA

A qualifying degree in architecture that provides students with the knowledge, values and skills to enter the profession of architecture and/or to pursue further qualifications in architecture or fields associated with the architectural profession and built environment. It is focused on developing independent critical enquiry in preparation for practice in a diverse and changing world. Students are given considerable freedom and support to develop a reflective, critical and speculative relationship to their work. The qualification introduces a master's degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for statutory registration as a Candidate Architect with the South African Council for the Architectural Profession (SACAP), in terms of the Architectural Professions Act 2000 (Act No 44 of 2000). To attain registration as Professional Architect, the candidate must complete a two-year period of practical experience in an architectural office and pass a registration exam set by SACAP.

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

Design Dissertation - Year Course

Studio work Course

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

Non-Studio Courses

Code	Course	NQF Credits	HEQSF Level
APG5088Z	Theory and Technology Studies	60	9
	Total credits per year	180	

Master of City and Regional Planning [EM031APG03]

City and Regional Planning is a recognised profession under the Planning Professions Act of 2003. It is a designated scarce skill in terms of the South African Government's Joint Initiative for Priority Skills Acquisition (JIPSA) as part of its accelerated economic growth programme. It responds to environmental, infrastructural and socio-economic priorities at national, provincial and local levels of governance.

The primary purpose of the Master's degree is to build on the Bachelor of City Planning Honours by expanding the learners' conceptual knowledge and skills to regional planning, to advanced environmental assessment, and to do in-depth research in the form of a 120 credit dissertation. It comprises theory courses, project work and a dissertation.

This is the degree necessary to enable professional qualification as a city and regional planner.

Master of City and Regional Planning
[EM031APG03]

Programme Convener:

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

City and Regional Planning is a recognised profession under the Planning Professions Act of 2003. It is a designated scarce skill in terms of the South African Government's Joint Initiative for Priority

Skills Acquisition (JIPSA) as part of its accelerated economic growth programme. It responds to environmental, infrastructural and socio-economic priorities at national, provincial and local levels of governance.

The primary purpose of the Master's degree is to build on the Bachelor of City Planning Honours by expanding the learners' conceptual knowledge and skills to regional planning, to advanced environmental assessment, and to do in-depth research in the form of a 120 credit dissertation. It comprises theory courses, project work and a dissertation.

This is the degree necessary to enable professional qualification as a city and regional planner.

This curriculum must be read together with the Degree Rules in the General Information section of this Handbook. Candidates for the MCRP degree are required to complete the core courses listed below, totaling 184 credits.

First Semester

Code	Course	NQF Credits	HEQSF Level
APG5020F	Regional Planning Project	32	9
APG5023F	Regional Planning Theory.....	20	9
APG5024F	Planning Techniques III	12	9

Second Semester

Code	Course	NQF Credits	HEQSF Level
APG5051Z	Dissertation MCRP.....	120	9
	Total credits per year	184	

Master of Urban Design [EM030APG12]

Programme Convener:

C Hindes, BLA *Pret* MLArch

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 two years by candidates who are employed.) For the completion of this degree students are required to complete a minimum of 156 credits at level 9 and 24 credits at level 8, as this degree consists of both level 8 and 9 courses.

First Semester

Code	Course	NQF Credits	HEQSF Level
APG5082F	Theory of Urban Design I	12	9
APG5083F	Urban Design Studio	48	9
APG4052F	Urban Design Representation.....	12	8
APG5084F	Research Methods for Urban Design	20	9
	*Approved Elective	12	8

Second Semester

Code	Course	NQF Credits	HEQSF Level
APG5085S	Urban Design Theory II	20	9
APG5086S	Urban Design Research Project.....	60	9
	Total credits.....	184	

Master of Landscape Architecture [EM015APG06]

Note: The structure of this degree has changed for 2019. This structure is valid for repeat and existing students only.

A qualifying degree in landscape architecture provides learners with the knowledge, values and skills to enter the profession of landscape architecture. 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 is a pre-requisite for statutory registration as a Candidate Landscape Architect with the South African Council for the Landscape Architectural Profession (SACLAP), in terms of the Landscape Architectural Profession Act, Act 45 of 2000.

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.

Note: The structure of this degree is changing in 2019. This structure is valid for repeat and existing students only.

First Year: First Semester

Code	Course	NQF Credits	HEQSF Level
APG4028F	Aspects of City Design	12	8
APG4054F	Landscape Systems Analysis.....	20	8
APG4031F	Landscape Representation	12	8
APG4036F	Landscape Architecture Studio I	16	8
APG4057F	Landscape Architecture Studio II	16	8

First Year: Second Semester

Code	Course	NQF Credits	HEQSF Level
APG4030S	History & Theory of Landscape Architecture	12	8
APG4032S	Constructing Landscape Systems	20	8
APG4037S	Landscape Architecture Studio III.....	32	8
APG4047S	Plants & Design.....	12	8
	Total first year credits.....	152	

Second Year: First Semester

Code	Course	NQF Credits	HEQSF Level
APG4053F	Landscape Architecture Practice	8	8
APG5025F	History & Theory of Landscape Architecture II.....	12	9
APG5026F	MLA Dissertation Technology	24	9
APG5029F	Landscape Architecture Studio IV.....	16	9
APG5087F	Landscape Research Methodology	12	9
APG5091F	Landscape Architecture Studio V.....	16	9
APG5092F	Landscape Innovation Seminar.....	8	9

Second Year: Second Semester

Code	Course	NQF Credits	HEQSF Level
APG5052S	Dissertation MLA	120	9
	Total second year credits	188	
	Total credits	340	

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

Programme Convener:

Dr Naomi Roux

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

This inter-disciplinary programme aims to equip graduates with a strong intellectual foundation in the field of built environment conservation, as well as the necessary professional skills in heritage resource management.

The programme is situated in a contemporary South African and global context in which heritage and conservation practices intersect powerfully with the politics of spatial transformation, urban change, social justice and development. Within this context, built environment professionals and managers are often required to work with or to take account of heritage and heritage resources. To do so productively requires a thorough technical and legal understanding of heritage resource management; but beyond this, the ability to grapple critically with the relationships between conservation, heritage, transformation and sustainable futures. We operate from the position that the built environment can only be understood as part of a network of social, political, commemorative, spatial, economic and other meanings. The programme aims to enable graduates to practice effectively in the field, supported by a thorough understanding of contemporary debates and issues in heritage and conservation.

First Year: first semester

Code	Course	NQF Credits	HEQSF Level
APG5074F	Conservation in Transformative Contexts.....	20	9
APG5080F	Introduction to Conservation.....	20	9

First Year: second semester

Code	Course	NQF Credits	HEQSF Level
APG5081S	Working with Heritage Resources.....	20	9
AXL5203S	Critical Issues in Heritage	24	9
	Total first year credits.....	84	

Second Year: first semester

Code	Course	NQF Credits	HEQSF Level
APG5077F	Conservation and Development in Practice.....	20	9
APG5078F	Research Methodologies	20	9

Second Year: second semester

Code	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

Code	Course	NQF Credits	HEQSF Level
APG5000W	Dissertation	180	9
END5050X	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

Code	Course	NQF Credits	HEQSF Level
APG5000W	Dissertation	180	9
END5050X	Master's journal paper	0	9

Doctoral Programmes

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

ED001 Doctor of Philosophy is a Research Degree

Core Course

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

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

Course Outlines**APG4007F INTRODUCTORY GIS**

24 NQF credits at HEQSF level 8

Convener: S Hull**Co-requisites:** APG4050W, APG4008F, APG4009F**Course outline:**

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

Lecture times: 4th period Mon-Fri. Practical once a week Fri 14h00-17h00

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

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

APG4008S ADVANCED GIS

24 NQF credits at HEQSF level 8

Convener: Associate Professor J Smit

Course entry requirements: BSc(Hons) in GIS students: APG2018X, APG4007F, APG4009F

Course outline:

This course builds on the theory and skills developed in the Introductory GIS course. The aim of this course is to provide students with advanced level GIS skills and knowledge including GIS management issues, GIS application design, Internet GIS and 3D modelling. Course Content: multidimensional GIS and advanced data structures, spatial data infrastructures and metadata, distributed GIS, digital cartography, GIS application design and development using software engineering tools, GIS project management, spatial analysis, copyright and privacy issues.

DP requirements: Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more) and an 80% attendance record.

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

APG4009F COMPUTING FOR GIS

18 NQF credits at HEQSF level 8

Convener: Dr G Sithole

Co-requisites: APG4007F, APG4050W

Course outline:

This course aims to provide students with the fundamental scripting and programming skills they will need to enhance GIS software and develop stand-alone GIS applications using general software environments. It also aims to provide students with the skills needed to interface between GIS applications and other software applications. Course Content: Structure and Syntax of Visual Programming Language, development of GIS functionality in general programming environments, customisation of GIS using scripting languages, extension of attribute management through external DB links and SQL

DP requirements: Completion of practical assignments to the satisfaction of the course convener (test average of 35% or more) and an 80% attendance record.

Assessment: Tests, practical assignments.

APG4020F PLANNING THEORY & PRACTICE

8 NQF credits at HEQSF level 8

Convener: Assoc Prof T Winkler

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4021F URBAN INFRASTRUCTURE

Elective for students in BAS(Hons)

12 NQF credits at HEQSF level 8

Convener: Dr N Odendaal

Course entry requirements: None

88 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4022F PLANNING PROJECT A

32 NQF credits at HEQSF level 8

Convener: Assoc Prof T Winkler and Dr Nancy Odendaal

Course entry requirements: None

Co-requisites: None

Course outline:

This course focuses on urban planning at the local and metropolitan scales and involves the development of descriptive, explanatory and, evaluative skills at both these scales. An introduction to visual and verbal communication techniques forms part of the course. Fieldwork is an integral requirement of the course.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: 100% of the final result is based on project work. Students are required to pass both Parts 1 and 2 of the course which each counts 50% of the total mark.

APG4023S URBAN ECONOMIC DEVELOPMENT PROCESSES

12 NQF credits at HEQSF level 8

Convener: Professor V Watson

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4024S PLANNING AND GOVERNMENTAL SYSTEMS

12 NQF credits at HEQSF level 8

Convener: Dr N Odendaal

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to develop an understanding of the political and institutional context of planning; systems of representation and administration; local government financing and budgeting; integrated development planning; negotiation and public participation; "package of plans" approaches; public-private partnerships; and plan monitoring and evaluation.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4025S REGULATORY & LEGAL FRAMEWORK

12 NQF credits at HEQSF level 5

Convener: F Ogle

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: 3- hour written examination counts 100%.

APG4026S PLANNING PROJECT B

32 NQF credits at HEQSF level 8

Convener: Dr N Odendaal and Assoc Prof T Winkler

Course entry requirements: APG4022F

Co-requisites: None

Course outline:

The project focuses on urban planning intervention at both local and metropolitan scales and on plan implementation. Fieldwork is an integral requirement of the course.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: 100% of the final result is based on project work. Students are required to pass both Parts 1 and 2 of the course which each count 50% of the total mark.

APG4028F ASPECTS OF CITY DESIGN

Elective for students in BAS(Hons)

12 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4029F NATURAL SYSTEMS

Elective for students BAS(Hons).

12 NQF credits at HEQSF level 8

Convener: T Katzschner

Course entry requirements: None

Co-requisites: None

90 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Course outline:

This course aims to explore the relationships between nature and settlements and thinking deeply about environment humanity relationships. Central issues are substantive knowledge relating to land systems, water systems, air systems, life systems and the related design and planning implications. Ecology, holism and a systems understanding are powerful tools for understanding ourselves and our world which are fundamental to the course. It is an attempt to teach the basics about living Earth communities and to cultivate a living understanding of the natural world.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4030S HISTORY & THEORY OF LANDSCAPE ARCHITECTURE A

12 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to provide an overview of major design paradigms in landscape architecture through history, and forms the vehicle through which ideas in landscape architectural design are discussed. Iconic designers, gardens and landscapes are identified, and the principles, approaches and ideas characteristic of these are studied.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4031F LANDSCAPE REPRESENTATION

12 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to explore the way that different landscape materials, such as plants and topography, are represented differently from their architectural counterparts, and involves combined analogue and digital methods. The second part of the course teaches specific digital technologies including Rhinoceros & Grasshopper, Revit, GIS and Photoshop.

Lecture times: Refer to departmental timetable for further detail.

DP requirements: None

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

APG4032S CONSTRUCTING LANDSCAPE SYSTEMS

20 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

The course aims to follow on from Landscape Systems Analysis and focusses on the design of an intervention in the form of ecosystem design, comprising both soft and hard landscape elements. An ecosystem analysis is undertaken in the chosen study area concluding with an understanding of ecosystems performance. An urban ecosystem is then designed to maximise the ecological, social and economic opportunities inherent in ecological systems. Standard landscape construction materials and systems are also introduced as part of a suite of constructed landscape elements.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4035F PLANNING TECHNIQUES I

12 NQF credits at HEQSF level 8

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable for further detail.

DP requirements: None

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

APG4036F LANDSCAPE ARCHITECTURE STUDIO I

16 NQF credits at HEQSF level 8

Convener: C Hindes

Course entry requirements: None

Co-requisites: None

Course outline:

Landscape design studios provide an opportunity for students to respond to a brief to develop speculative individual design projects that can range from the highly speculative to the pragmatic, and are assessed on a combination of factors including design ideas and outcome quality, representational aspects, theoretical underpinning and technical resolution. In this first quarter studio, students undertake an analysis-focused urban design project in teams with planning and urban design students.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4037S LANDSCAPE ARCHITECTURE STUDIO III

32 NQF credits at HEQSF level 8

Convener: C Hindes

Course entry requirements: APG4036F

Co-requisites: APG4034F or permission of course convener.

Course outline:

In landscape design studios, students respond to a brief to develop speculative individual design projects that can range from the highly speculative to the pragmatic, and are assessed on a combination of factors including design ideas and outcome quality, representational aspects, theoretical underpinning and technical resolution. Second semester studio undertakes a more developed studio project that lasts for the whole semester and involves a comprehensive professional process to design a local site with a social aspect, resulting in a technically-developed final package, using studio to develop skills in design development and documentation to meet SACLAP core competency requirements.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4038S PLANNING TECHNIQUES II

12 NQF credits at HEQSF level 8

Convener: Assoc Prof T Winkler and Mr A Rhodes

Course entry requirements: None

Co-requisites: None

92 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Course outline:

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

Lecture times: Refer to departmental timetable for further detail.

DP requirements: None

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

APG4039F ADVANCED HISTORY & THEORY OF ARCHITECTURE

12 NQF credits at HEQSF level 8

Convener: M Fraschini

Course entry requirements: None

Co-requisites: None

Course outline:

A survey of ideological and aesthetic terms of architectural theory and criticism by way of locating a close reading of contemporary texts within a broader social and cultural context. The course offers an advanced theoretical examination of the cultural and social role of design to enable evaluation and articulation of the interaction between theory and practice, and assessment of strategies for the making of architecture.

Lecture times: Refer to departmental timetable

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

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

APG4041S ADVANCED BUILDING TECHNOLOGY

12 NQF credits at HEQSF level 8

Convener: F. Carter

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to prepare students to understand the structural, constructional and material consequences and constraints on design decision-making. It investigates how the interaction of systems of structure, enclosure, environment, materials, and detailing informs spatial and formal expression in architecture. The course focuses on contemporary building and environmental technologies in relation to programmatic requirements and innovation.

Lecture times: Refer to departmental timetable

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

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

APG4042F ARCH DESIGN STUDIO I

48 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course covers a range of complex design problems involving issues of the public and private nature of the urban and suburban context that calls for appropriate analysis and creative invention in the making of architecture. The topic, focus, requirements and duration of projects will be determined by the studio convener.

Lecture times: Refer to departmental timetable

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 HEQSF level 8

Convener: I Low

Course entry requirements: APG4042F

Co-requisites: None

Course outline:

This course covers a range of complex design problems involving issues of the public and private nature of the urban and suburban context that calls for appropriate analysis and creative invention in the making of architecture. The topic, focus, requirements and duration of projects will be determined by the studio convener.

Lecture times: Refer to departmental timetable

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 HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course is an introduction to the knowledge and skills required to procure, administer and manage an architectural project. The course offers an opportunity to explore the essential elements of professional practice related to the role and function of the architect, differing modes of practice in the public and private sectors, the client-architect relationship, critical legislation influencing the role and conduct of architects, building procurement systems and conflict resolution. The course will also investigate the challenges facing the architectural profession, the meaning of professionalism and ethical and social problems within current architectural practice.

Lecture times: Refer to departmental timetable

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

Assessment: Written examination.

APG4047S PLANTS & DESIGN

12 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: 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.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4048S ARCHITECTURE RESEARCH METHOD

12 NQF credits at HEQSF level 8

Convener: Professor I Low

Course entry requirements: Bachelor of Architectural Studies

94 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Course outline:

This course is an investigation of practices and strategies that inform an analysis, synthesis and representation of ideas in architectural design research. The course offers a theoretical and practical introduction to research as an aspect of design by investigating activities that support and enhance architectural design, such as research proposal writing, case study analysis and the application of mapping, programming and siting studies in relation to architectural inquiry. It prepares students to undertake academic and design research in a critical and structured manner.

Lecture times: Refer to departmental timetable

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 I

12 NQF credits at HEQSF level 8

Convener: Associate Professor N Coetzer

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

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

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

APG4050W GEO-INFORMATICS PROJECT

40 NQF credits at HEQSF level 8

Convener: Associate Professor Julian Smit

Course entry requirements: None

Co-requisites: None

Course outline:

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

DP requirements: None

Assessment: Project report

APG4051Z SELECTED TOPICS IN APPLIED SCIENCE

0 NQF credits at HEQSF level 8

Course outline:

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

Lecture times: None

DP requirements: None

Assessment: None

APG4052F URBAN DESIGN REPRESENTATION

12 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to develop analytical and presentation skills (both manual/hand drawn and computer based) for use in the urban design studio. An innovative slant is necessitated by the dynamic nature of graphic software evolution and the breadth of communication options available to designers. Instruction is through both demonstration and the use of tutorials for independent development/combination of techniques to suit different design problems. It also an introduction to Geographical Information Systems (GIS).

The portfolio developed during the course of the semester needs to demonstrate an ability to successfully select and master appropriate communication/representation techniques in the context of presenting urban design work in a legible, graphic format.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based on the submission and presentation of projects and assignments through the semester as well as a final portfolio presentation.

APG4053F LANDSCAPE ARCHITECTURE PRACTICE

8 NQF credits at HEQSF level 8

Course outline:

This course aims to prepare students for the professional practice requirements of the South African Council for the Landscape Architectural Professions (SACLAP) candidate examination, and introduces different contractual arrangements and scenarios encountered in professional landscape architecture practice. It also introduces various legal, legislative and policy frameworks that form part of professional practice, notably environmental and planning laws and policies, at different levels of government.

APG4054F LANDSCAPE SYSTEMS ANALYSIS

20 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: None

Course outline:

The course focuses on developing an understanding of the composition and functioning of the urban landscape. Landscape ecology is initially used as the conceptual lens with which to identify and analyse the nature and performance of the landscape. The ideas of urban ecology and ecological urbanism are thereafter explored in order to understand the relationship between urban and ecological systems, with the purpose of identifying opportunities for ecosystem services and the development of productive and sustainable green infrastructure systems.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG4056F ASPECTS OF HISTORY & THEORY II

12 NQF credits at HEQSF level 8

Convener: Associate Professor N Coetzer

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims within the broad area of history and theory of architecture to provide an architectural elective course each year on a special topic.

Lecture times: Refer to departmental timetable.

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

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

APG4057F LANDSCAPE ARCHITECTURE STUDIO II

16 NQF credits at HEQSF level 8

Convener: Mr C Hindes

Course entry requirements: None

Course outline:

In landscape design studios, students respond to a brief to develop speculative individual design projects that can range from the highly speculative to the pragmatic, and are assessed on a combination of factors including design ideas and outcome quality, representational aspects, theoretical underpinning and technical resolution. The design process can be liberating for landscape designers, and in this second quarter studio, a series of art-inspired short exercises are used to represent the potentially invisible character of sites and thereby engage with them better through design, which is developed from abstract representations to resolved site designs in an intensive studio experience.

Lecture times: Refer to departmental timetable.

DP requirements: None.

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

APG5000W MASTERS DISSERTATION GEOMATICS

180 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

A research project of a theoretical or practical nature, a critical review of a specified topic based on a comprehensive search of the literature or available data, development of an item of equipment or a technique involving novel features or advanced design, any other study acceptable to the Faculty.

Lecture times: None

DP requirements: None

Assessment: Dissertation 100%

APG5001Z MASTERS DISSERTATION GEOMATICS

120 NQF credits at HEQSF level 9

Course outline:

A research project of a theoretical or practical nature, a critical review of a specified topic based on a comprehensive search of the literature or available data, development of an item of equipment or a technique involving novel features or advanced design, any other study acceptable to the Faculty.

Lecture times: None

DP requirements: None

Assessment: Dissertation 100%

APG5020F REGIONAL PLANNING PROJECT

32 NQF credits at HEQSF level 9

Convener: T Katzschner and Professor V Watson.

Co-requisites: APG5023F

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG5023F REGIONAL PLANNING THEORY

20 NQF credits at HEQSF level 9

Convener: T Katzschner and Professor V Watson.

Course entry requirements: None

Co-requisites: APG5020F

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG5024F PLANNING TECHNIQUES III

12 NQF credits at HEQSF level 9

Convener: T Katzschner

Course entry requirements: None

Co-requisites: None

Course outline:

The aim of this course is to provide students with experience in evaluating the environmental consequences of policies, programmes, plans and projects. Topics includes: the need and desirability for evaluating the environmental consequences of policies, plans and programmes, current and future environmental assessment tools, environmental impact assessment (EIA), strategic environmental assessment, sustainability assessment, public participation in environmental governance, biodiversity in impact assessment, social impact assessment, and environmental management plans.

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

DP requirements: None

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

APG5025F HISTORY & THEORY OF LANDSCAPE ARCHITECTURE II

Elective for students in BAS(Hons)

12 NQF credits at HEQSF level 9

Convener: Dr J Raxworthy

Course entry requirements: None

Co-requisites: None

Course outline:

This course explores a range of themes that characterise contemporary landscape architectural theory and practice, including the post-industrial, ecological urbanism and landscape infrastructure, exploring the similarities and differences between international and African readings of such themes. Comprising heavily illustrated lectures, this course aims to both provide precedents for students studio projects as well as develop a critical theoretical position that can inform their dissertations.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG5026S MLA DISSERTATION TECHNOLOGY

24 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course runs in parallel to the design dissertation and requires students to develop the technological aspects of their design project with specific attention to the physical manifestation of their design intervention. The course aims to provide an advanced exploration into the materiality and making of an aspect of the proposed landscape architectural intervention, as developed in the design dissertation.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG5029F LANDSCAPE ARCHITECTURE STUDIO IV

16 NQF credits at HEQSF level 9

Convener: Dr J Raxworthy

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

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

Course outline:

In landscape design studios, students respond to a brief to develop speculative individual design projects that can range from the highly speculative to the pragmatic, and are assessed on a combination of factors including design ideas and outcome quality, representational aspects, theoretical underpinning and technical resolution. During the first semester, this quarter long studio course involves collaboration with architecture staff and students on a highly speculative, landscape-focused series of smaller projects which are publicly exhibited.

Lecture times: Refer to departmental timetable

DP requirements: None

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

APG5051Z MCRP MINOR DISSERTATION

120 NQF credits at HEQSF level 9

Convener: Professor V Watson and T Katzschner

Course entry requirements: APG5020F

Co-requisites: None

Course outline:

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

Lecture times: None

DP requirements: None

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

APG5052S MLA DESIGN DISSERTATION

120 NQF credits at HEQSF level 9

Convener: Dr J Raxworthy

Course entry requirements: APG5029F

Co-requisites: None

Course outline:

Utilising a design research methodology, the landscape architecture design dissertation is the culmination of students studies and allows them to develop a project of their own, derived from their particular interests and on a site of their choosing. The project typically comprises a research 'study'

in support of their project and involves site analysis, design generation, representation and resolution components, culminating in an exhibition and presentation.

Lecture times: None

DP requirements: None

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

APG5061Z DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

The aim of this course is to allow the student to undertake preparatory work for the master's dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

Assessment: None

APG5071S RESEARCH PROJECT

60 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

Co-requisites: None

Course outline:

Students undertake a supervised research project on a conservation-related topic of their choice, resulting in a 25000-30000 word minor dissertation.

DP requirements: Satisfactory completion of all coursework

Assessment: 100% by examination of the dissertation

APG5074F CONSERVATION IN TRANSFORMATIVE CONTEXT

20 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to place the practice and theory of conservation in the context of transforming contemporary environments. It explores the relationships and tensions between conservation and future-oriented spatial and social change, through a variety of discourses and disciplines that are central to the study and practice of conservation. These may include, among others: historical archaeology, architectural history, landscape studies, urban conservation, adaptive design and reuse, and public engagement practices.

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.

APG5077F CONSERVATION AND DEVELOPMENT IN PRACTICE

20 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

100 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Co-requisites: None

Course outline:

This course builds on and brings together previous material covered in the degree, particularly the research strategies developed in APG5078F (Research Methodologies) and the hands-on research and assessment skills developed in APG5081S (Working With Heritage Resources). Students are required to select a case study site related to their dissertation topic, and to unpack the implications of an imagined proposed development project on this site. The course equips students with an understanding of the technical and pragmatic constraints on development, familiarity with legal frameworks, as well as an ability to recognise and critically assess the power structures and ideological discourses that underlie these frameworks and institutions. It provides an opportunity to work on primary research and technical analysis related to the dissertation project.

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.

APG5078F RESEARCH METHODOLOGIES

20 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to equip students to develop a research proposal for the minor dissertation to be written in the course of the second year. It includes input on academic research skills and methods, as well as an opportunity to develop and refine the research questions and methodological strategies for students' individual dissertations.

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.

APG5079W DESIGN DISSERTATION

120 NQF credits at HEQSF level 9

Convener: Associate Professor N Coetzer

Course entry requirements: BAS(Hons)

Co-requisites: APG5088Z

Course outline:

A design dissertation which integrates self-initiated, self-motivated architectural major design project produced under supervision of an individual design research inquiry, grounded in a sound methodological base that supports the production of a research document as a basis for informal design discussion in the major design project.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: 100% on presentation and examination of design dissertation

APG5080F INTRODUCTION TO CONSERVATION

20 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to provide an introduction to the intellectual, historical and legal frameworks that define the practice of conservation of the built environment. It provides a regional and global overview of the history of conservation; introduces students to some of the complexities of the

politics of heritage and conservation in postcolonial and decolonial contexts; and discusses some of the major policies and legislative frameworks that shape current conservation practice.

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 WORKING WITH HERITAGE RESOURCES

20 NQF credits at HEQSF level 9

Convener: Dr N Roux

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to bring together the theoretical, historical and legal frameworks covered in the previous three modules to develop a hands-on understanding of how these shape conservation practice. It introduces the basic primary research and interpretive skills required to understand and critically assess heritage resources, and equips students to apply the ideas encountered in previous courses to practical examples.

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%).

APG5082F URBAN DESIGN THEORY I

12 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

The course aims to focus on historical and contemporary concepts of urban space design. It aims to investigate the value of urban design through considering performance at a local area/precinct scale. This includes: Introduction urban design, key moments in the history of urban design, the role of urban design relative to other professions of the built environment; the value of theory and conceptual frameworks; the value of morphological and typological analysis, the role of urban design in the global South. The role of urban design is animated via case study analysis (both international and local) and reflection on urban design practice.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based on the submission of a final/theme paper that counts 100% of the examination mark.

APG5083F URBAN DESIGN STUDIO

48 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This studio-based course aims to focus on strategic urban design intervention at a sub-regional to local scale. Sites are selected for a simulated projects, which then becomes the subject of focused urban design exercises. Urban design intervention is considered at both a catalytic and responsive level. Exploration is initially via engagement in groups and then proceeds to individual exploration and presentation of design ideas. Physical place making is considered in the context of social, political and economic constraints. Refinement and synthesis of ideas requires continual review of

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strategies and ideas presented in the studio. Parallel studios aimed at synchronised overlap with studios in architecture, planning and landscape architecture is encouraged.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based on 30% group work analysis and 70% individual work project.

APG5084F RESEARCH METHODS FOR URBAN DESIGN

20 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to equip the students with the tools to develop a research proposal for the Urban Design Research Project which is to be completed 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, interview strategies, a bibliography and the relation of the proposed research project to urban design discourse.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based on the submission of a final paper that counts 100% of the examination mark.

APG5085S URBAN DESIGN THEORY II

20 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

This praxis-oriented, seminar-based course aims to offer students the opportunity to each identify appropriate urban design theories via a literature review and to relate theory to topical themes within the current urban design discourse. Learning happens both through independent reading and through engaging with lecturers and fellow students in discussing the relevance of the theories identified during seminars. Where appropriate, the relevance of theory is investigated and communicated via case study analysis. The widely recognized importance of reflective practice and the weak theoretical base of urban design is considered via selective engagement of part time tutors involved in practice and who engage in debate on theory whilst reflecting on the realities of contemporary practice.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based on 30% seminar presentations and 70% for the submission and assessment of a term paper.

APG5086S URBAN DESIGN RESEARCH PROJECT

60 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: APG5082F; APG5083F; APG4052F; APG5084F and one approved elective course.

Co-requisites: None

Course outline:

The research project aims to utilise the skills developed in the preceding course Research Methods for Urban Design. The aim of the research project is to develop and demonstrate integrated research and urban design skills, identify and address a well-defined urban design issue or question in the

context of a selected site, develop an ability to evaluate and analyse design orientated research findings according to explicit and well-defined criteria and to develop and defend a design response to the issue/question raised.

Lecture times: Refer to departmental timetable

DP requirements: None

Assessment: The assessment of this course is based 100% on the submission of a final research project and assessment by final portfolio presentation.

APG5088Z THEORY AND TECHNOLOGY STUDIES

60 NQF credits at HEQSF level 9

Convener: Associate Professor N Coetzer

Course entry requirements: None

Co-requisites: APG5079W

Course outline:

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

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

Assessment: Research paper (100%)

APG5089S ARTS OF SPACE

23 NQF credits at HEQSF level 9

Convener: Dr A Tomas

Course outline:

This course aims to bridge humanities and spatial and design sciences, by having as a starting point the notion that spatial transformation, and technical innovation, do not appear out of nowhere. They emerge from the crystallization of philosophical principles, or knowledge-making processes. This course therefore is about understanding the philosophical principles behind the spaces we have inherited, and how to tackle new methods to understand the coming into being of spatial and physical formations. The course is divided into three parts: 1) on the concept of design, in architecture, infrastructure and politics; 2) design of cities through planning, informal planning, counter-planning, and so on; 3) on design 'equipment', focused on methods and methodology. This course also aims to provide theoretical foundations for the practical component.

Lecture times: Refer to departmental timetable

DP requirements: Written course work and participation.

Assessment: 3 short 'response' papers to engage literature and visual materials brought into the class (30%), one long paper (40%), weekly journal reflecting on literature and new learning (20%), course participation and seminar presentation (10%).

APG5090W CITY RESEARCH STUDIO

23 NQF credits at HEQSF level 9

Convener: Dr A Tomas

Course entry requirements: None

Co-requisites: None

Course outline:

This course aims to ground students in city research practice. It will also frame thinking on the development and rigour of urban studies, which is immersed in good questions, exploration which tests and ground truths these ideas, as well as discovery that the research process must open up. The City Research Studio also provides students a chance to engage with the representation of analysis in scholarly as well as public forms. The Studio will help students engage in this propositional work in the research and writing and dissemination processes. These are essential elements for rigorous trans-disciplinary urban studies work in African and broader global southern contexts.

Lecture times: Refer to departmental timetable.

DP requirements: Papers, journal and proposal.

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Assessment: Three papers (30%), narrative and visual journal on research practice in studio (25%), group contributions to exhibition (20%), thesis research proposal (10%), participation (10%)

APG5091F LANDSCAPE ARCHITECTURE STUDIO V

16 NQF credits at HEQSF level 9

Convener: Dr J Raxworthy

Course outline:

In landscape design studios, students respond to a brief to develop speculative individual design projects that can range from the highly speculative to the pragmatic, and are assessed on a combination of factors including design ideas and outcome quality, representational aspects, theoretical underpinning and technical resolution. Developing an African focus, this quarter long studio is built around a field trip to an African city that happens in the Easter break, followed by a resultant studio project. Previous trips have travelled to Kampala in Uganda and Addis Ababa in Ethiopia. A local studio brief will also be offered.

Lecture times: Refer to departmental timetable.

DP requirements: None

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

END5128W MINOR DISSERTATION URBAN STUDIES

90 NQF credits at HEQSF level 9

Convener: Professor S Oldfield

Course entry requirements: None

Course outline:

Students will complete a suitable research proposal in consultation with an appropriate supervisor. After approval of the proposal, students will undertake a research project demonstrating the application of theory to empirical issues in the research area of urban studies.

DP requirements: Passing the coursework component of the MPhil specialising in Urban Studies.

Assessment: Dissertation 100%.

APG6000W PHD IN GEOMATICS

360 NQF credits at HEQSF level 10

Convener: TBA

Course outline:

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

Lecture times: None

DP requirements: None

Assessment: Written work counts 100%.

APG7000W MASTERS DISSERTATION ARCHITECTURE & PLANNING

180 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: Hons

APG7001W DISSERTATION ARCHITECTURE & PLANNING

120 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: Hons

APG7001Z MASTERS ARCH & PLANNING DISS

120 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: Hons

Co-requisites: None

DP requirements: None

Assessment: 100% submission of dissertation

APG8000W PHD IN ARCHITECTURE & PLANNING

360 NQF credits at HEQSF level 10

Convener: TBA

Course outline:

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

Lecture times: None

DP requirements: None

Assessment: Written work counts 100%

APG5087F LANDSCAPE RESEARCH METHODOLOGY

12 NQF credits at HEQSF level 9

Course outline:

Landscape architecture practice uses very diverse methods to suit different briefs, including some that are scientific, others social and more novel methods like design research. This course introduces general theories and models of methodology, examines how they are used in landscape architecture and encourages students to treat methodology design as a creative process. This provides the basis for students to begin developing their dissertation brief and methods to suit their interests, a dissertation proposal and its presentation a key outcome of the course.

CHEMICAL ENGINEERING

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

Bioprocess Engineering
Catalysis and Catalytic Processing
Minerals Beneficiation

Research Entities:

Centre for Bioprocess Engineering Research
Catalysis Institute
Centre for Minerals Research
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 Mandela Circle.

Website: www.chemeng.uct.ac.za

Staff

Professor and Head of Department

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

Professors

M Claeys, Dipl Ing(Chem Eng) Dr Ing *Karlsruhe*
DA Deglon, BSc(Eng) *Witwatersrand* MBA PhD *Cape Town* MSAIMM FSAAE
JCQ Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE
STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAIMM FSAAE ASSAF
FWISA
PJ Kooyman, Drs Chemie (MSc) *Leiden* PhD ChemE *Delft University of Technology* MSAIChE
AE Lewis, PrEng BSc(Eng)Chem MSc PhD *Cape Town* FSAIChE FSAIMM MASSAF FSAAE
FICHEM
KP Möller, BSc(Eng)Chem PhD *Cape Town*
J Petersen, BSc(Eng)Chem *Witwatersrand* PhD *Cape Town* MSAIMM
E van Steen, MSc(Eng) *Eindhoven* Dr.-Ing. *Karlsruhe* FSAIChE FSAAE AFICHEM
HB von Blottnitz, PrEng BSc(Eng)Chem *Cape Town* BSc(Hons) *UNISA* MSc *Cape Town* Dr Ing
RWTHAachen MSAIChE

Associate Professors

M Becker, BSc(Hons) Geology MSc *Cape Town* PhD *Pretoria*
JL Broadhurst, BSc(Hons) MSc *Port Elizabeth* PhD *Cape Town*
KC Corin, BSc(Hons) PhD *Cape Town*
NF Fischer, Dipl.-Ing.(Chem Eng) *Karlsruhe* PhD *Cape Town*
A Isafiade, BSc(Hons) *Ilorin* MSc *Ife* PhD *Cape Town* AMICHEM (Director of Postgraduate Studies)
PBJ Levecque, MSc(Eng) PhD *Leuven*

Emeritus Professors

J-P Franzidis, BSc(Eng) MSc Cape Town PhD *Open* MSAiChE MSAiMM
 CT O'Connor, PrEng BSc *UNISA* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAiMM
 FSAiChE FSAAE FRSSAf

Honorary Professors

JM Case, BSc(Hons) *Stellenbosch* HDE MSc *Cape Town* Med *Leeds* PhD *Monash* MASSAf
 I Govender, BSc *UDW* BSc(Hons)Physics PhD *Cape Town* HDE *UNISA*
 GJ Hutchings BSc(Chem) PhD *UCL* DSC (Heterogeneous Catalysis) *London* FICHEM FRS CBE
 MJ Nicol, BSc(Hons) PhD *Witwatersrand* FSAiMM, FAUSiMM
 JW Niemantsverdriet, BSc (Phys+Math) MSc *Amsterdam* PhD *Delft* (TechSciences)
 JG Petrie, CEng BSc(Eng)Chem *Cape Town* MSc *Houston* PhD *Cape Town* FICHEM

Honorary Associate Professor

B Cohen, BSc(Eng)Chem PhD *Cape Town*

Adjunct Professors

B J Chicksen, MBChB *Harare* FCP (SA) *Durban* MBA *Johannesburg*
 P Dempsey, NHD Metallurgy *Wits Technikon* BSc *UNISA* MDP *UNISA*
 CM Digby, BA Hons(Econ) *Trinity College Dublin* MA(Econ) *British Columbia*
 MSc(Environent) *London School of Economics and Political Science*
 AS Lambert, BSc(Hons) Extractive Metallurgy *Glasgow* FSAiMM
 JW Mann, BSc(Eng) Extractive Metallurgy *Witwatersrand* MBL *UNISA*
 R Schouwstra, BSc(Hons) *NWU* MSc *Johannesburg* DSc *NWU*
 MH Solomon, BSc(Eng)Mining, *Witwatersrand*, FSAiMM, FIQ, Mine Manager's Certificate of
 Competency (Metalliferous), MDP(Mining) *South Africa*
 WA van Dyk, BEng (Chemical, Extractive Metallurgy) PhD *Stellenbosch*
 DW Wright, BSc(Eng)Chem *Natal* MSAiChE FSAAE

Adjunct Associate Professor

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

Senior Lecturers

L Bbosa, BSc(Eng)Elec-Mech MSc PhD *Cape Town* MSAiMM
 MA Fagan-Endres, BSc(Eng)Chem *Cape Town* PhD *Cantab*
 HR Heydenrych, BSc(Eng)Chem MSc *Cape Town*
 TP Mokone BSc Hons(Chem) *UFS* MSc *UFS* PhD(Chem Eng) *Cape Town*
 S Tai, BSc(Hons)*UMIST* MSc PhD *Delft* (Director of Undergraduate Studies)

Lecturer

T Rampai, BSc(Hons) MSc *Cape Town*

Contract Lecturers

E Govender-Opitz, BSc(Eng)Chem PhD *Cape Town*
 MS Manono, BSc(Eng)Chem MSc *Cape Town* PGDBM Regenesys, AMiChE, MSAiChE,
 MSAiMM
 MN Naidoo, BSc(Eng)Chem Eng *UKZN*
 T van Heerden, BSc(Eng)Chem MSc *Cape Town*

Honorary Research Associates

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

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Chief Research Officer

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

Senior Research Officers

K Carden, BSc(Chem) MSc PhD *Cape Town FWISA*

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

APP van der Westhuizen, BEng *Stellenbosch MSc Cape Town*

JG Wiese NDip *CPUT MSc Cape Town*

Junior Research Fellow

J Waters, BTech(Chem Eng) *Cape Technikon MSc Cape Town*

Research Officers

PA Bepswa, BSc(Eng)Metallurgical *Zimbabwe PhD Cape Town*

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

A Kotsiopoulos, BScChem MSc PhD *Cape Town*

N Hussain, BSc(Eng)Chem MSc *Cape Town*

NTJ Luchters, BTech *Leiden MSc Cape Town*

R Mohamed, BSc BScHons(Chemistry) MSc *NMMU PhD(Chem Eng) Cape Town*

Principal Technical Officer

HJ Macke, Dip Mechanical Engineering Technician, *Germany*

Chief Technical Officers

MA Jakoet, BSc(Eng) Mechatronics *Cape Town*

P Johnston, BSc *Cape Town*

Senior Technical Officers

RB Cupido, NDip(Analytical Chemistry) BTech(Chemistry) MTech(Chem) *CPUT*

G Kaufmann, PGDip *Cape Town Mtech(Chem) BTech(Chem) CPUT MSRM EMT-B Cape Town*

WP Koorts BTech(Chem Eng) MTech *CPUT*

CA Le Roux, NDip *CPUT BTech(Chem) UNISA*

IE Ngoma, BTech(Biotech) *TUT MTech CPUT*

Technical Officers

DJ Bramble

M Smart, BScHons MSc *Stellenbosch PhD Cape Town*

Chief Scientific Officer

J Chivavava, B(Eng) *NUST MSc(Eng) Cape Town*

Senior Scientific Officers

T Chivengwa, BSc(Eng) MSc *Cape Town*

AS Geldenhuys, BEng (Chem) *Stellenbosch*

T Khoza, BSc(Eng) Chem MSc(Eng) Chem *Cape Town*

Z Le Riche, ND(Analytical Chemistry) *CPUT*

M Lisso, BSc(Eng) Chem MSc *Cape Town*

MC Richter, BSc(Hons) Physics MSc PhD *Cape Town*

GA Yorath, BSc(Hons) Mineral Processing Technology *Cornwall*

Scientific Officer

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

Department Laboratory ManagerA Mentoer, BSc(Hons) MSc *Stellenbosch***Analytical Laboratory Manager**S Govender, BSc(AppChem) Hons(Chem) MSc *UKZN***Department Manager**

SI Pillay

Building Supervisor

E Matthews

Administrative Staff

B Cloete (Undergraduate Administrator)

B Davids (Postgraduate Administrator)

N Davids (Finance Assistant)

S Jeppie (Purchaser)

N Dili (Receptionist)

K Mfundisi (Administrative Assistant)

The Department offers both undergraduate and postgraduate programmes in Chemical Engineering. The undergraduate programme draws top school leavers from South Africa and further afield, with an annual intake of approximately 140 students. Graduates from this programme are highly sought-after in a wide variety of industries. The Department has dynamic research programmes and students who have obtained satisfactory results in their undergraduate courses are encouraged to return for postgraduate study. The Department's research activities are at present centered on:

- Biological leaching of mineral ores, with work concentrated on the fundamental processes involved
- Bioprocess engineering focused on biotransformation, process design, process kinetics, novel bioprocesses and the recovery of biological product;
- Catalysis research aimed at synthesis, characterisation and modelling of heterogeneous catalysts and their application in a variety of reactions and reactor types
- Crystallization and precipitation research focusing on metal recovery in mineral processing and metal removal for environmental protection and crystallization for water treatment
- Educational research aimed at improving the quality of undergraduate teaching and learning;
- Environmental process engineering, both at a conceptual and a practical level
- Hydrogen and fuel cell technologies focusing on fuel processing catalysis and devices, electrodes development and fuel cell and stack development
- Hydrometallurgy for metal extraction
- Minerals processing research focused on milling, classification and flotation of ores;
- Process modelling and optimization
- Process synthesis featuring the application of pinch technology to heat and mass transfer systems as well as the control of process systems
- Value recovery from waste, contributing to industrial ecology and the circular economy
- Water remediation, treatment, recovery and footprinting

Postgraduate Programmes

Master's Programmes

MSc in Engineering specialising in Bioprocess Engineering [EM024CHE01]

Professor and Convener:

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

Core Courses

Code	Course	NQF Credits	HEQSF Level
CHE5082Z	Dissertation Preparation (in 1st year)	0	9
CHE5002W	Dissertation Chemical Engineering	120	9
CHE5051Z	Microbial Physiology & Dynamics	8	9
CHE5070Z	Advanced Bioprocess Engineering	16	9
CHE5049Z	Chemical Engineering Topics for Scientists	16	9
CHE5054Z	Biotechnology Laboratory	8	9
CHE5055Z	Research Communication & Methodology	16	9
END5050X	Master's Journal Paper	0	9
	Minimum total credits	180	

Notes

CHE5051Z is a core course for engineering graduates.

CHE5049Z is a core courses for life science graduates, but may be replaced by an equivalent course. Physical Science graduates will complete CHE5051Z and/or CHE5049Z or equivalent courses, dependent on their previous studies.

Elective or optional courses: 4 – 12 credits

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

Associate Professor and Convener:

N Fischer Diplom Ingenieur *Karlsruhe* PhD *Cape Town*

Core Courses for Chemical Engineering Graduates (students who have completed CHE4067F)

Code	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering	120	9
CHE5088Z	Introduction to Heterogeneous Catalysis Research	8	9
CHE5089Z	Characterisation Techniques for Catalysis Research	12	9
CHE5055Z	Research Communication & Methodology	16	9
CHE5082Z	Dissertation Preparation	0	9
END5050X	Master's journal paper	0	9
	Optional courses	24	9
	Minimum total credits	180	

Core Courses for Science Graduates (students who have not completed CHE4067F)

Code	Course	NQF Credits	HEQSF Level
CHE5002W	Dissertation Chemical Engineering	120	9
CHE4067F	Heterogeneous Catalysis	16	9
CHE5088Z	Introduction to Heterogeneous Catalysis Research	8	9

Code	Course	NQF Credits	HEQSF Level
CHE5089Z	Characterisation Techniques for Catalysis Research.....	12	9
CHE5055Z	Research Communication & Methodology	16	9
CHE5082Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9
	Optional courses	8	9
	Minimum total credits	180	

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

Professors and Co-conveners:

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

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.

Code	Course	NQF Credits	HEQSF Level
CHE5002Z	Master's Dissertation: Chemical Engineering	120	9
CHE5087Z	Research Methodology	16	9
CHE5082Z	Dissertation Preparation	0	9
END5050X	Master's Journal Paper.....	0	9
CHE4054Z*	Environmental Stewardship in Mining & Minerals Beneficiation	12	8
CHE4055X	Practical Training in Sustainable Development.....	0	8
CHE4056Z*	Special Topics in Sustainable Development.....	16	8
GSB4264Z	Strategic Engagement Practice	16	8
	Total credits per year	180	

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

University of Zambia (School of Mines)

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

University of Stellenbosch (Sustainability Institute)

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

Optional Courses for all Postgraduate Programmes

[EM_CHE_OPTIONAL COURSES]

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

Code	Course	NQF Credits	HEQSF Level
CHE5022Z	Introduction to Catalysis.....	16	9
CHE5030Z	Advanced Engineering Statistics I.....	8	9
CHE5040Z	Fuels & Chemicals from Oil.....	12	9
CHE5041Z	Instrumental Analysis Part A - General Measurement.....	4	9
CHE5042Z	Instrumental Analysis Part B - Chromatography.....	4	9
CHE5043Z	Instrumental Analysis Part C - Spectroscopy.....	4	9
CHE5045Z	Fuels & Chemicals from Coal & Syngas.....	12	9
CHE5047Z	Molecular Modelling.....	8	9
CHE5048Z	Crystallization and Precipitation.....	12	9
CHE5051Z	Microbial Physiology and Dynamics.....	8	9
CHE5052Z	Molecular Biology and Biocatalysis.....	8	9
CHE5054Z	Biotechnology Laboratory.....	8	9
CHE5064Z	Sustainability in Chemical Engineering.....	8	9
CHE5069Z	Advanced Thermodynamics and Separation Processes.....	8	9
CHE5070Z	Advanced Bioprocess Engineering.....	16	9
CHE5072Z	Fundamentals of Process Modelling.....	4	9
CHE5078Z	Advanced Numerical Methods for Engineers.....	16	9
CHE5079Z	Integrated Analysis of Mineral Beneficiation Systems.....	16	9
CHE5083Z	Translating Technology from the Laboratory to the Marketplace.....	8	9
CHE5085Z	Hydrogen Technology.....	8	9
CHE5086Z	Electrochemical Characterisation Techniques for Fuel Cells.....	4	9
EEE4103F	Nuclear Power Sources.....	12	8
END5049Z	Research Communication & Methods.....	16	9
MEC5035Z	Project Management.....	20	9

Doctoral Programmes

Doctor of Philosophy

[ED001CHE01]

ED001 Doctor of Philosophy is a Research Degree

Core Course

Code	Course	NQF Credits	HEQSF Level
CHE6000W	Thesis.....	360	10

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

Course Outlines

CHE4054Z ENVIRONMENTAL STEWARDSHIP IN MINING & MINERALS BENEFICIATION

12 NQF credits at HEQSF level 8

Convener: Professor H von Blottnitz

Course outline:

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

DP requirements: None

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

CHE4055X PRACTICAL TRAINING IN SUSTAINABLE DEVELOPMENT

0 NQF credits at HEQSF level 8

Convener: Professor H von Blottnitz

Course outline:

This course is grounded in the realizations that sustainable development requires professionals to be able to negotiate disciplinary truth boundaries so as to minimize externalization of costs and damages to 3rd parties or future generations; and requires an understanding of the complexity of coupled social-ecological systems, which can only partly be learnt in the classroom. This course aims to ground learning not just in theory but also in the evolving practice of sustainable development in Africa. Students are requested to register for a practical training period of two weeks or more, with an accredited host, resulting in a reflective report.

DP requirements: None

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

CHE4056Z SPECIAL TOPICS IN SUSTAINABLE DEVELOPMENT

16 NQF credits at HEQSF level 8

Convener: Professor STL 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 MASTERS DISSERTATION IN CHEMICAL ENGINEERING

180 NQF credits at HEQSF level 9

Convener: None

Co-requisites: CHE5055Z

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a

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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 HEQSF level 9

Convener: None

Course entry requirements: CHE5055Z, DP in CHE5082Z.

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design.

DP requirements: None

Assessment: Written work counts 100%.

CHE5030Z ADVANCED ENGINEERING STATISTICS I

8 NQF credits at HEQSF level 9

Convener: Professor K Möller

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

Course outline:

This course covers advanced engineering statistics. Topics include: Conducting a physical experiment, random variables and variation, making inference on random variables, normal distribution, confidence intervals. Design and analysis of experiments: sequential design, factorial designs, fractional factorial designs, response surface designs, mixture designs, optimal design. Nonlinear model fitting, nonlinear optimal design, application to laboratory and industrial data.

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

Assessment: 50% weighted average of all projects and assignments

CHE5033Z APPLIED MATHEMATICS & MODELING II

8 NQF credits at HEQSF level 9

Course outline:

This course covers applied mathematics and modelling. Topics include: non-linear multivariable parameter estimation, formulation of objective functions, optimisation (NLP), single variable, multivariable, BFGS, Nelder and Mead, Levenberg-Marquardt, sequential quadratic programming (QP&SQP), mix-integer non-linear optimisation (MINLP), unconstrained, constrained, inequalities, Lagrange multipliers, sensitivity analysis, and examples.

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

CHE5047Z INTRODUCTION TO MOLECULAR MODELING

8 NQF credits at HEQSF level 9

Course outline:

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

DP requirements: None

Assessment: Examination 2 hours.

CHE5048Z CRYSTALLISATION AND PRECIPITATION

12 NQF credits at HEQSF level 9

Convener: Professor AE Lewis

Course outline:

Crystallisation and precipitation are both purification and separation processes, and takes place through a solid phase being created from a liquid phase. The course covers crystallization methods and supersaturation, particle size distribution (PSD), crystal morphology, mother liquor inclusions, uptake of impurities, primary nucleation, growth mechanisms and growth rate expressions, the population balance equation, agglomeration and special considerations for precipitation.

DP requirements: None

Assessment: Assignments and Projects

CHE5051Z MICROBIAL PHYSIOLOGY AND DYNAMICS

8 NQF credits at HEQSF level 9

Convener: Dr R Huddy

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

Course outline:

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

DP requirements: None

Assessment: Examination 3 hours, assignments.

CHE5054Z BIOTECHNOLOGY LABORATORY

8 NQF credits at HEQSF level 9

Convener: TBA

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

Course outline:

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

DP requirements: None

Assessment: Assignments and practical examination.

CHE5055Z RESEARCH COMMUNICATION & METHODOLOGY

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

Convener: Professor STL Harrison

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

Course outline:

The aim of this course is to provide postgraduate students with the competency to execute meaningful research in a structured way, to critically analyse the results of this research and to communicate these results effectively. The course topics include: research philosophy, research planning, hypothesis development and research methodology; literature review skills; research ethics; research communication and related technical skills; experimental practice; structuring, writing and presentation of scientific outputs. The assignments include: oral presentation of seminars, scientific and technical writing tasks, experimental design tasks and literature review. The final examination comprises the compilation and presentation of the final report which is a complete research proposal.

DP requirements: Completion of all assignments and the final report (100%).

Assessment: Assignments and final report.

CHE5064Z SUSTAINABILITY IN CHEMICAL ENGINEERING

8 NQF credits at HEQSF level 9

Convener: Professor STL Harrison**Course entry requirements:** BSc (Eng) or BSc (Hons) degree or equivalent**Course outline:**

Sustainability is fast becoming a major factor in decision making in most industries employing chemical engineering graduates. Since the IChemE and its sister associations signed the London Communiqué in 1997, sustainability has become understood as a key design and operation criterion for chemical engineers to consider. This course seeks to provide graduate students with an awareness of the issues surrounding a sustainable process industry and an appreciation for its importance. The course will examine the central role of chemical engineering in achieving balance amongst economic, environmental, and social benefits and impacts for projects conducted by companies operating in the oil, chemicals, minerals and energy sectors, and will address related challenges of intensive agriculture and provision of water. It seeks to go further to provide a framework and a set of tools which will assist the process engineer in providing rational input in terms of sustainability into decision making, with quantification wherever possible.

DP requirements: None**Assessment:** Examination and assignments.

CHE5069Z ADVANCED THERMODYNAMICS AND SEPARATION

8 NQF credits at HEQSF level 9

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

This course aims to develop an understanding of advanced thermodynamics & separation processes. Topics include: multiphase equilibria: equations of state, activity coefficient models, gas-solid and liquid-solid systems, Gibbs free energy minimisation. Separations technology: azeotropes, residue curve/distillation curve analysis, complex separations, membranes, adsorption, reactive separations. Multi-component mass transfer: application of Maxwell-Stefan theory to separation systems.

DP requirements: None**Assessment:** Projects and assignments (50% for each project and assignment to pass course).

CHE5070Z ADVANCED BIOPROCESS ENGINEERING

16 NQF credits at HEQSF level 9

Convener: Professor STL Harrison**Course entry requirements:** BSc(Eng) or equivalent four year BSc(Hons) degree.**Course outline:**

This course is an advanced introduction to bioprocess design. Topics include: Stoichiometry of microbial growth and product formation. Mixing and oxygen transfer. Bioreactor design and scale up. Sterilisation. Material and energy balances for microbial systems. Biokinetic analysis of batch, fed-batch and continuous systems. Mixed cultures and mixed culture kinetics. Downstream processing. Bioprocess analysis. Environmental impact of bioprocesses.

DP requirements: Satisfactory completion of all projects and assignments.**Assessment:** Examination 3 hours, projects and assignments.

CHE5072Z FUNDAMENTALS OF PROCESS MODELING

4 NQF credits at HEQSF level 9

Course outline:

This advanced course covers the fundamentals of process modelling. Topics include: micro-, meso-, macro-scale modelling; population balance modelling; dynamics and stability of chemical systems.

DP requirements: Attendance 70%.**Assessment:** Project and/or examination.

CHE5078Z NUMERICAL METHODS FOR ENGINEERS

16 NQF credits at HEQSF level 9

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

Course outline:

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

DP requirements: None

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

CHE5082Z DISSERTATION PREPARATION

DP requirement for entry to CHE5002W.

0 NQF credits at HEQSF level 9

Co-requisites: CHE5055Z

Course outline:

The aim of this course is to allow a student to undertake preparatory work for the 120 credit dissertation (CHE5002W). Work required may include ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place, setting up of models, collection of data. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

CHE5083Z TRANSLATING TECHNOLOGY FROM THE LABORATORY TO THE MARKETPLACE

8 NQF credits at HEQSF level 9

Convener: Professor STL Harrison

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

Course outline:

This course aims to develop an understanding of how to translate technology from the laboratory to the marketplace. Topics covered include technology commercialisation; intellectual property; start-up companies (structure, resourcing); entrepreneurial resources; introduction to entrepreneurial finance and funding; business models specific to biotechnology; understanding the components of a business plan; and market research.

DP requirements: Satisfactory completion of 80% assignments

Assessment: Year mark.

CHE5086Z ELECTROCHEM CHARACTERISATION TECHNIQUES FOR FUEL CELLS

4 NQF credits at HEQSF level 9; block release.

Convener: Associate Professor P Leveque

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

Course outline:

Basics of electrochemistry: electrode reactions, electron transfer, double layer, design of experiment. Platinum as electrocatalyst: behaviour in bulk and as nanoparticle. The role of carbon and other supports for fuel cell catalysts. Theoretical and practical aspects of cyclic voltammetry, electrochemical impedance spectroscopy, rotation disk electrode, polarisation curve, current interrupt and linear sweep voltammetry. Overview of selected physical/chemical characterisation techniques and their application in fuel cell research.

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DP requirements: None

Assessment: Coursework 30%, Examination 70%

CHE5087Z RESEARCH METHODOLOGY

16 NQF credits at HEQSF level 9; block release.

Convener: Professor STL 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%.

CHE5088Z INTRODUCTION TO HETEROGENEOUS CATALYSIS RESEARCH

8 NQF credits at HEQSF level 9

Convener: Associate Professor N Fischer

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

Co-requisites: None

Course outline:

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

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

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

CHE5089Z CHARACTERIZATION TECHNIQUES FOR CATALYSIS RESEARCH

12 NQF credits at HEQSF level 9

Convener: Associate Professor N Fischer

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

Co-requisites: None

Course outline:

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

DP requirements: None

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

CHE6000W PHD IN CHEMICAL ENGINEERING

360 NQF credits at HEQSF level 10

Co-requisites: CHE5055Z

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

CHE9003Z INTERNATIONAL AFFILIATE 6-12 M

0 NQF credits at HEQSF level 0

END5050X MASTERS JOURNAL PAPER REQUIREMENT

0 NQF credits at HEQSF level 9

Course outline:

The aim of submitting a research paper for the masters' degree is to develop an understanding of what is required for the publication of research findings. To this end a candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by a Panel of Assessors. This is a requirement for candidates submitting either a 180 or 120 credit dissertation for the following degrees: MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc in Property Studies. Refer to the appropriate degree rules.

DP requirements: None

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

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

Professors

N P Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *CapeTown* PhD *Stell* FSAAE FSAICE FWISA
FSAIMunE Fellow IWA Mem IAHR Mem IAHS
H Beushausen, Dipl-Ing HAW Hamburg MSc(Eng) PhD *Cape Town*
M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* MSAICE MSASITS
A Zingoni, PrEng BSc(Eng) *Zimbabwe* MSc(Eng) *London* DIC PhD *London* CEng FIStructE
FZweIE MASSAf FIABSE FSAAE
MHP Zuidgeest, MSc(Eng) PhD(Eng) *Twente*

Associate Professors

R Behrens, Pr Pln BA MCRP PhD *Cape Town*
D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*
S Skatulla, Dipl-Ing *Karlsruhe* PhD *Adelaide*

Emeritus Professor

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

Emeritus Associate Professors

MO de Kock, PrEng BSc(Eng) *Cape Town*
R Del Mistro, PrEng TRP(SA) BSc(Eng) Diploma TE(IHE) MURP *Cape Town* PhD *Pretoria*
RO Heckroodt, MSc DSc *Pretoria* Dip Ceram *Leeds* FSAIMM FI Ceram (UK)
FA Kilner, PrEng MA *Oxon* MSc(Eng) *London* DIC

ADW Sparks, PrEng CEng BSc(Eng) *Natal* MSc(Eng) *Witwatersrand* MICE FSAICE
MOpResSocSAMRoySocSA

Senior Lecturers

DS Ikumi, PhD *Cape Town*

K Mudenda, PrEng BEng *Zambia* MSc(Eng) *Cape Town*

DG Randall, PrEng BSc(Eng)Chem PhD *Cape Town* MSAICHe MWISA MIMWA

Academic Development Senior Lecturer

NS Wolmarans, BSc(Eng) MSc(Eng) PhD *Cape Town*

Lecturer

FC Chebet, BSc(Eng) *Makerere* MSc(Eng) *Manchester*

L Nolutshungu, MSc(Eng) *Cape Town*

Senior Research Officer

KJ Carden, BSc MSc(Appl Sci) PhD *Cape Town*

Research Officer

H Schalekamp, BAS BArch MPhil PhD *Cape Town*

Honorary Research Associates

E Beukes, PhD *Cape Town*

LA Kane, BEng *Cardiff* MSc(Eng) *Cape Town*

K MacHutchon, PhD *Stellenbosch*

P Mguni, BSc *Zimbabwe* MSc *Aalborg* PhD *Copenhagen*

S Phayane, PrEng MEng *Cape Town*

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

I Tchegnina Ngassam, PhD *Paris-Est*

Adjunct Staff

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

Principal Technical Officer

TBC

Laboratory Manager/Principal Scientific Officer

N Hassen

Water Quality Laboratory Manager

N Thela, NDip Chem Eng *MUT* BTech Chem Eng *DUT* BSc Hon(Appl Sci) *Pretoria*

Chief Technical Officer

A Rule

Senior Technical Officer

T Mukaddam, ND Civil Eng *CPUT*

Departmental Manager

AB Dalwai, BSocSc *Cape Town*

Administrative Officer - Postgraduate

R Geswindt

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Administrative Officer – Undergraduate

I Ncube

Research Administrative Staff

A Sulo, ND Financial Management *PE FET College*

G Verster

Finance Assistant

A Courie

Senior Secretary

C Wright

Receptionist

Z Mcoteli

Laboratory Technical Staff

L Adams

H Mafungwa

C May

E Witbooi

Workshop Assistant

M Swayiza

Postgraduate Programmes

Master's Programmes

Master of Science in Engineering specialising in Civil Engineering

The Department of Civil Engineering prepares candidates for the Master of Science in Engineering. Masters degree programmes are offered which comprise different levels of research versus course work, thus allowing students to educate themselves according to their particular strengths and career choices. The majority of courses are block week 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

Code	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

Code	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation Civil Engineering	120	9

Code	Course	NQF Credits	HEQSF Level
	Elective courses approved by supervisor	60	9
CIV5109Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9
	Total credits.....	180	

Civil Infrastructure Management and Maintenance [CIV07]

Professor and Programme Convener:

H Beushausen, Dipl-Ing HAW *Hamburg* MSc(Eng) PhD *Cape Town*

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

All programmes can be completed in a minimum of two years full-time or may be taken over an extended period of a maximum of five years.

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

[EM023CIV07]

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

Master of Science in Engineering specialising in Civil Infrastructure Management & Maintenance

[EM024CIV07]

Code	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation.....	120	9
CIV5109Z	Dissertation Preparation	0	9
CIV5067Z	Advanced Infrastructure Management	20	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures	20	9
END5050X	Master's journal paper.....	0	9
	Elective courses from the list below.....	20	9
	Total credits.....	180	

Elective Courses (minimum of 20 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5139Z	Repair & Rehabilitation of Concrete Structures.....	20	9
CIV5140Z	Strengthening and Retrofitting of Concrete Structures	20	9
	Approved elective as an alternative to the above	20	9

Master of Engineering specialising in Civil Infrastructure Management and Maintenance

[EM017CIV07]

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5017Z	Minor Dissertation	60	9
CIV5067Z	Advanced Infrastructure Management	20	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures	20	9
CIV5139Z	Repair & Rehabilitation of Concrete Structures	20	9
CIV5140Z	Strengthening and Retrofitting of Concrete Structures.....	20	9
CON5016Z	Project Planning & Implementation	20	9
	Elective courses from the list below	20	9
	Total credits	180	

Elective Courses

Code	Course	NQF Credits	HEQSF Level
CIV5002Z	Structural Concrete Properties & Practice	16	9
CIV5113Z	Structural Dynamics with Applications.....	16	9
CIV5115Z	Bridge Management & Maintenance.....	10	9
CIV5118Z	Safety of Special Structures.....	10	9
CIV5119Z	Structural Performance Assessment & Monitoring	20	9
	Approved elective as an alternative to the above list.....	20	9

Master of Engineering in Civil Infrastructure Management and Maintenance

[EM033CIV07]

Programme Convener:

TBC

A candidate for the Master of Engineering in Civil Infrastructure Management and Maintenance is required to complete core courses totalling 100 credits, a research project totalling 45 credits, and approved elective courses totalling a minimum of 35 credits, and to comply with the prescribed curriculum.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5067Z	Advanced Infrastructure Management	20	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures	20	9
CIV5139Z	Repair & Rehabilitation of Concrete Structures	20	9
CIV5119Z	Structural Performance Assessment & Monitoring	20	9
CIV5136Z	CIMM Project.....	45	9
	Elective courses from the list below	55	9
	TOTAL	180	

Elective Courses (minimum of 35 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5002Z	Structural Concrete Properties & Practice	16	9
CIV5113Z	Structural Dynamics with Applications.....	16	9
CIV5115Z	Bridge Management & Maintenance.....	10	9

Code	Course	NQF Credits	HEQSF Level
CIV5118Z	Safety of Special Structures	10	9
CIV5025Z	Contract Law for Engineers	12	9
CIV5131Z	Research Design and Methodology for Civil Engineers	16	9
CON5014Z	Project Management & Systems Theory	20	9

Master of Science in Engineering specialising in Geotechnical Engineering [EM024CIV08]

Associate Professor and Programme Convener:

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

The master's programme with a specialisation in Geotechnical Engineering is intended to support high level training and enhance both the technical skills of recent graduates or experienced personnel who work in, or aspire to a career in civil engineering construction, consulting, environmental and related industries.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation	120	9
CIV5109Z	Dissertation Preparation	0	9
CIV5110Z	Laboratory and Field Techniques	16	9
CIV5114Z	Foundation Design	16	9
END5050X	Master's journal paper	0	9
	Core Elective Courses	16	9
	Elective courses	12	9
	Minimum total credits	180	

Core Elective Courses (minimum of 16 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5122Z	Advanced Soil Mechanics OR	16	9
CIV5143Z	Rock Mechanics	16	9

Elective Courses (minimum of 12 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5111Z	Ground Improvement Techniques	20	9
CIV5124Z	Geosynthetics Engineering	16	9
CIV5149Z	Slope Stability and Lateral Earth Supports	20	9
CIV5050Z	Soil Modelling and Numerical Methods	20	9

Enrichment courses (compulsory for MScEng)

Code	Course	NQF Credits	HEQSF Level
CHE5055Z	Research Communication and Methodology OR	16	9
CIV5131Z	Research Design and Methodology	16	9

Master of Geotechnical Engineering [EM028CIV08]

Associate Professor and Programme Convener:

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

The Master of Geotechnical Engineering (MGeotech) programme is designed to aid in the development of graduates in their careers as geotechnical engineers through courses that offer in-depth understanding of the principles of geotechnical engineering as well as the necessary knowledge and skills to engage effectively in providing solutions to engineering challenges involving the ground control and ground stability in civil engineering construction projects.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5129W	Geotechnical Engineering Project	45	9
CIV5110Z	Laboratory and Field Techniques	16	9
CIV5114Z	Foundation Design	16	9
CIV5149Z	Slope Stability and Lateral Earth Supports	20	9
	Elective courses	87	9
	Minimum total credits	180	

Elective Courses (minimum of 87 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5111Z	Ground Improvement Techniques	20	9
CIV5122Z	Advanced Soil Mechanics	16	9
CIV5124Z	Geosynthetics Engineering	16	9
CIV5143Z	Rock Mechanics	16	9
CIV5150Z	Soil Modelling and Numerical Methods	16	9
CIV5131Z	Research Design and Methodology	16	9

Structural Engineering and Materials

Associate Professor and Programme Convener:

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

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

All programmes can be completed in a minimum of two years full-time or may be taken over an extended period of a maximum of five years.

Master of Engineering specialising in Structural Engineering and Materials [EM017CIV04]

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

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5017Z	Minor Dissertation.....	60	9
CIV5113Z	Structural Dynamics with Applications.....	16	9
CIV5100Z	Plate and Shell Structures.....	16	9
CIV5142Z	Introduction to Finite Element Modelling in Structural Analysis .	16	9
	Elective Courses.....	72	9
	Total credits.....	180	

Elective courses (minimum of 72 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5002Z	Structural Concrete Properties and Practice	16	9
CIV5006Z	Advanced Structural Concrete Engineering	16	9
CIV5041Z	Bridge Analysis and Design	16	9
CIV5108Z	Advanced Mechanics of Materials	16	9
CIV5112Z	Stability and Design of Steel Structures	16	9
CIV5119Z	Structural Performance Assessment & Monitoring.....	20	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures .	20	9
CIV5139Z	Repair and Rehabilitation of Concrete Structures	20	9

Master of Science in Engineering specialising in Structural Engineering and Materials

[EM024CIV04]

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

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation.....	120	9
CIV5109Z	Dissertation Preparation	0	9

Select at least two of the following courses:

Code	Course	NQF Credits	HEQSF Level
CIV5108Z	Advanced Mechanics of Materials	16	9
CIV5113Z	Structural Dynamics with Applications.....	16	9
CIV5142Z	Introduction to Finite Element Modelling in Structural Analysis .	16	9

Elective Courses

Code	Course	NQF Credits	HEQSF Level
CIV5112Z	Stability and Design of Steel Structures.....	16	9
CIV5002Z	Structural Concrete Properties and Practice	16	9
CIV5100Z	Plate and Shell Structures.....	16	9
CIV5119Z	Structural Performance Assessment & Monitoring.....	20	9
MEC5064Z	Finite Element Analysis	12	9
CIV5139Z	Repair and Rehabilitation of Concrete Structures	20	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures .	20	9
CIV5041Z	Bridge Analysis and Design	16	9
MEC5063Z	An introduction to Finite Elements	12	9

Enrichment Courses

Code	Course	NQF Credits	HEQSF Level
CIV5131Z	Research Design and Methodology.....	16	9

128 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Additional courses can be selected from the postgraduate programme of the University of Stellenbosch or from the Center for Research in Computational and Applied Mechanics (CERECAM) at UCT or from the postgraduate programme of Geotechnical Engineering for both the MScEng and MEng degrees.

Master of Structural Engineering and Materials

[EM032CIV04]

A candidate for the Master of Structural Engineering and Materials is required to complete core courses totalling 96 credits, a research project totalling 45 credits, and approved elective courses totalling a minimum of 55 credits, and to comply with the prescribed curriculum.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5002Z	Structural Concrete Properties and Practice	16	9
CIV5006Z	Advanced Structural Concrete Engineering	16	9
CIV5112Z	Stability and Design of Steel Structures	16	9
CIV5100Z	Plate and Shell Structures	16	9
CIV5113Z	Structural Dynamics with Applications	16	9
CIV5131Z	Research Design and Methodology	16	9
CIV5137Z	MSEM Project	45	9
	Elective courses from the list below	39	9
	Total credits	180	

Elective Courses (minimum of 39 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5108Z	Advanced Mechanics of Materials	16	9
CIV5118Z	Safety of Special Structures	10	9
CIV5115Z	Bridge Management and Maintenance	10	9
CIV5041Z	Bridge Analysis and Design	16	9
CIV5025Z	Contract Law for Engineers	12	9
CIV5138Z	Deterioration and Condition Assessment of Concrete Structures	20	9
CIV5119Z	Structural Performance Assessment of Concrete Structures	20	9
CIV5139Z	Repair and Rehabilitation of Concrete Structures	20	9
MEC5064Z	Introduction to Finite Elements	12	9
MEC5063Z	Finite Element Analysis	12	9
CIV5142Z	Introduction to Finite Element Modelling in Structural Analysis	16	9

Transport Studies

Associate Professor and Programme Convener:

R Behrens, Pr Pln BA MCRP PhD *Cape Town*

The programme offers degrees specialising in transport studies, with a specific focus on the planning and management of urban passenger transport systems. The primary aim is to produce graduates from a range of postgraduate disciplines with the necessary knowledge and skills to engage effectively with the challenge of creating affordable, efficient, sustainable, safe, equitable and environmentally sound urban transport systems, and to contribute to the implementation of new and demanding policy directives. Curriculum content is cross-disciplinary in orientation and exposes students to a broad range of the analytical, evaluative, planning and management issues they are likely to encounter in the field.

Master of Engineering specialising in Transport Studies

[EM017CIV06]

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. Candidate elective courses may be selected from within the Transport Studies programme and from other programmes of study.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5017Z	Minor Dissertation.....	60	9
CIV5132Z	Transport Demand Analysis and Project Assessment	20	9
CIV5133Z	Transport Modelling.....	20	9
CIV5071Z	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]

A candidate for the MPhil degree is required to complete prescribed courses of a minimum value of 60 credits and a 120 credit dissertation.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5134W	Dissertation.....	120	9
CIV5109Z	Dissertation Preparation	0	9

Select three of the following courses:

Code	Course	NQF Credits	HEQSF Level
CIV5035Z	Management of Transport Supply and Demand.....	20	9
CIV5038Z	Integrated Land Use Transportation Planning.....	20	9
CIV5132Z	Transport Demand Analysis and Project Assessment	20	9
CIV5036Z	Local Area Transport Planning Management and Design.....	20	9
CIV5039Z	Non-motorised Transportation	20	9
CIV5133Z	Transport Modelling.....	20	9
CIV5070Z	Public Transport Policy and Regulation.....	20	9
CIV5071Z	Public Transport System Design and Operations Management	20	9
CIV5127Z	Discrete Choice Modelling and Stated Choice Survey Design	20	9
	Total credits.....	180	

Students are also eligible to complete the MPhil degree as a 180 credit dissertation.

Master of Philosophy specialising in Transport Studies

[EM027CIV06]

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.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5037Z	Minor Dissertation.....	60	9
CIV5035Z	Management of Transport Supply and Demand.....	20	9
CIV5038Z	Integrated Land Use-Transport Planning	20	9

130 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Code	Course	NQF Credits	HEQSF Level
CIV5132Z	Transport Demand Analysis and Project Assessment	20	9
	Approved elective courses	60	9
	Total credits	180	

Elective Courses (minimum of 60 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5036Z	Local Area Transport Planning Management and Design	20	9
CIV5039Z	Non-motorised Transportation.....	20	9
CIV5133Z	Transport Modelling	20	9
CIV5070Z	Public Transport Policy and Regulation	20	9
CIV5071Z	Public Transport System Design and Operations Management	20	9
CIV5127Z	Discrete Choice Modelling and Stated Choice Survey Design	20	9

Master of Transport Studies

[EM029CIV06]

A candidate for the Master of Transport Studies is required to complete core courses totalling not less than 60 credits, approved elective courses totalling a minimum of 80 credits, research projects totalling a minimum of 50 credits, and to comply with the prescribed curriculum.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CIV5135W	Research Project 1: Transport planning and engineering methods	25	9
CIV5073W	Research Project 2: Transport policy and planning case study.....	25	9
CIV5035Z	Management of Transport Supply and Demand	20	9
CIV5038Z	Integrated Land Use-Transport Planning.....	20	9
CIV5132Z	Transport Demand Analysis and Project Assessment	20	9
	Approved elective courses	80	9
	Total credits	190	

Elective Courses (minimum of 80 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5036Z	Local Area Transport Planning, Management and Design	20	9
CIV5039Z	Non-motorised Transportation.....	20	9
CIV5133Z	Transport Modelling	20	9
CIV5070Z	Public Transport Policy and Regulation	20	9
CIV5071Z	Public Transport System Design and Operations Management	20	9
CIV5127Z	Discrete Choice Modelling and Stated Choice Survey Design	20	9

Master of Philosophy specialising in Engineering Education

[EM026CIV09]

Doctor and Convener:

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

The Faculty of Engineering and the Built environment offers a structured MPhil programme in Engineering Education. Students are required to complete a minimum of 60 credits of coursework, 45 credits of which are core to the programme. The additional credits will include an elective course approved by the supervisor. To qualify for the MPhil degree specialising in Engineering Education candidates are required to complete a supervised dissertation equivalent to a further 120 credits. The dissertation should incorporate any or all of the following: design of an engineering education research project involving advanced concepts and theoretical principles located in the engineering education research field; 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, a rigorous analysis of empirical data, and the development of a coherent discussion of the analysis, or any other study acceptable to the Faculty. Students will register for the dissertation in the home department of their supervisor.

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC5102Z	Knowledge and Practices in Engineering Education.....	15	9
EEE5148Z	Theoretical Foundations in Engineering Education Research.....	15	9
CIV5109Z	Dissertation Preparation	0	9
CIV5147Z	Methodologies in Engineering Education Research.....	15	9
Elective	Subject to approval by supervisor	15	9
CIV5148W	Dissertation Engineering Education	120	9
	Total credits.....	180	

Water Quality Engineering**Senior Lecturer and Programme Convener:**

DS Ikumi, PhD *Cape Town*

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 Waste Water Treatment, Urban Water and Water Distribution.

Master of Engineering specialising in Water Quality Engineering**[EM017CIV02]****Core Courses**

Code	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	9
	Total credits.....	180	

Elective Courses (select 50 credits)

Code	Course	NQF Credits	HEQSF Level
CIV5049Z	Modelling & Simulation of Wastewater Treatment	12	9
CIV5051Z	Aquatic Chemistry Part A	14	9
CIV5052Z	Aquatic Chemistry Part B.....	14	9
CIV5054Z	Advanced Chemical, Physical & Biological Processes Modelling.....	10	9

Master of Science in Engineering specialising in Water Quality Engineering**[EM023CIV02]****Core Courses**

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

Master of Science in Engineering specialising in Water Quality Engineering**[EM024CIV02]****Core Courses**

Code	Course	NQF Credits	HEQSF Level
CIV5000Z	Dissertation	120	9
CIV5109Z	Dissertation Preparation	0	9
END5050X	Master's journal paper	0	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

Elective Courses

Code	Course	NQF Credits	HEQSF Level
CIV5049Z	Modelling & Simulation of Wastewater Treatment	12	9
CIV5051Z	Aquatic Chemistry Part A	14	9
CIV5052Z	Aquatic Chemistry Part B	14	9
CIV5054Z	Advanced Chemical, Physical & Biological Processes Modelling	10	9

Doctoral Programmes**Doctor of Philosophy****[ED001CIV01]**

Code	Course	NQF Credits	HEQSF Level
CIV6000W	Thesis	360	10
CIV6001W	Thesis (Engineering Education)	360	10

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

Course Outlines**CIV5000W MASTERS IN CIVIL ENGINEERING DISSERTATION**

180 NQF credits at HEQSF level 9

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design; or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%.

CIV5000Z MASTERS IN CIVIL ENG - DISSERT PART

120 NQF credits at HEQSF level 9

Course entry requirements: CIV5109Z

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data, development of an item of equipment or a technique involving novel features; or advanced design, or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%.

CIV5002Z STRUCTURAL CONCRETE PROPERTIES & PRACTICE

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: BScEng

Course outline:

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

Lecture times: 40 hours (1 week block lectures)

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

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

CIV5006Z ADVANCED STRUCTURAL CONCRETE ENGINEERING

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: BScEng; CIV3049S (or equivalent), CIV4045F (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).

CIV5017Z MINOR DISSERTATION

60 NQF credits at HEQSF level 9

Convener: As per programme requirement

Course entry requirements: Core MEng courses to be completed

Course outline:

Candidates will undertake a project of a development, review, or practical nature on a prescribed Civil Engineering topic. The project may be undertaken individually or as a group project and a project report must be written. The project will require approximately 600 hours of work.

DP requirements: None

Assessment: Written work 100%.

CIV5025Z CONTRACT LAW

12 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: Suitable undergraduate degree

Course outline:

The course aims to review the Law of Contract to develop a framework for the analysis of standard documentation for both main and subsidiary civil engineering contracts. Important aspects of mediation, arbitration and court procedures are stressed as is the need to identify and resolve legal problems through timeous negotiation. Disputes which have gone to law or arbitration will be studied to illustrate principles.

DP requirements: None

Assessment: Assignments 50%, final examination 50%.

CIV5030Z CIVIL ENGINEERING PROJECT

20 NQF credits at HEQSF level 9

Convener: As per programme requirement

Course entry requirements: Completion of appropriate postgraduate courses.

Course outline:

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

Details of project topics are available from the Department.

DP requirements: None

Assessment: Written project 100%.

CIV5032Z PRINCIPLES OF WASTEWATER TREATMENT & WASTEWATER CHARACTERISATION

Not offered in 2019

4 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

Course outline:

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

DP requirements: None

Assessment: Examination 100%.

CIV5035Z MANAGEMENT OF TRANSPORT SUPPLY AND DEMAND

20 NQF credits at HEQSF level 9

Convener: Associate Professor R Behrens**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 Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5036Z LOCAL AREA TRANSPORT PLANNING, MANAGEMENT AND DESIGN*Not offered in 2019*

20 NQF credits at HEQSF level 9

Convener: Associate Professor R Behrens**Course outline:**

This advanced course in local area transport planning, management and design includes: the planning and implementation of transport improvements at a local area (as opposed to citywide) scale; urban design, landscaping and geometric design of streets; the design and management of local area movement networks; and accommodating pedestrians, bicycles and persons with movement disabilities in local area movement networks.

DP requirements: None**Assessment:** Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5037Z MINOR DISSERTATION

60 NQF credits at HEQSF level 9

Course outline:

This minor dissertation course includes the selection of an approved research problem/topic; the preparation of research project/proposal; conducting a literature review; conducting research, including information/data acquisition and analysis, and the preparation of minor dissertation for examination (a word length of 15 000 words should not normally be exceeded).The project will require approximately 600 hours of work.

CIV5038Z INTEGRATED LAND USE TRANSPORT PLANNING

20 NQF credits at HEQSF level 9

Convener: Associate Professor R Behrens**Course outline:**

This course aims to develop an advanced understanding of the integration of land use planning and transport planning process. Topics include: theoretical perspectives on the relationship between transport systems and urban activity systems; co-evolution of transport systems and urban form; sustainable transport and the problem of 'automobile dependent' cities; planning paradigms and rationales for public intervention into land use and transport systems; legislative, institutional and financial frameworks for land use and transport planning in South Africa; conceptual framing and practical application of approaches to integrated land use-transport planning in the South African context and local and international case studies and experiences.

DP requirements: None

136 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Assessment: Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5039Z NON-MOTORISED TRANSPORTATION

20 NQF credits at HEQSF level 9

Convener: Professor M Vanderschuren

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 Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5040W MASTERS DISSERTATION: TRANSPORT STUDIES

180 NQF credits at HEQSF level 9

Convener: As per programme requirement.

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: 100% written work.

CIV5041Z BRIDGE ANALYSIS & DESIGN

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: BScEng

Course outline:

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

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

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

CIV5045Z THE ACTIVATED SLUDGE SYSTEM

Not offered in 2019

10 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

Course entry requirements: CIV5032Z

Course outline:

This course aims to develop an advanced understanding of the activated sludge system. Topics include: biological process modelling of the activated sludge system including nitrification; material mass balances; reactor kinetics; biological process kinetic equations of ordinary heterotrophic organism and autotrophic nitrifier organism growth and endogenous respiration; development of the steady state activated sludge model; application to design, selection of sludge age, impact of primary settling, sewage sludge disposal. Aeration is also covered.

DP requirements: None

Assessment: Examination 100%

CIV5046Z SEDIMENTATION IN WATER & WASTEWATER TREATMENT

Not offered in 2019

8 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

Course entry requirements: CIV5032Z

Course outline:

This advanced course in sedimentation in water and wastewater treatment includes: classes of settling; factors affecting settling tanks; column test for water-treatment solids settling characterization; application to sizing settling tanks (classes 1 and 2 settling); effect of flocculation; flux theory and application to sizing wastewater treatment plant settling tanks (classes 3 and 4); measures of activated sludge settleability and relationships between them; comparison of flux theory with other design procedures; and computational fluid dynamics modelling of settling tanks.

DP requirements: None

Assessment: Examination 100%

CIV5047Z SEWAGE SLUDGE TREATMENT

Not offered in 2019

8 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

Course entry requirements: CIV5032Z, CIV5046Z

Course outline:

This advanced course in sewage sludge treatment includes: an introduction to sewage sludge reuse and disposal guidelines in South Africa; characterization of primary and waste activated sludge in the context of mass balances over the entire wastewater treatment plant; sludge thickening with gravity sedimentation and flotation; development and validation of steady state aerobic digestion model for primary and waste activated sludge stabilisation and application to design and analysis including oxygen transfer and sludge thickening considerations; kinetics, stoichiometry and weak acid/base chemistry of anaerobic digestion; development, validation and application of steady state anaerobic digestion model, generation of sludge treatment liquors and the impact of their recirculation on effluent quality, and nutrient (N and P) reduction in sludge treatment liquors.

DP requirements: None

Assessment: Examination 100%.

CIV5048Z STEADY STATE DESIGN OF BIOLOGICAL NUTRIENT REMOVAL SYSTEMS

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

138 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Course entry requirements: CIV5045Z

Course outline:

This advanced course in steady state design of biological nutrient removal systems includes: ensuring nitrification; nitrification capacity, kinetics of denitrification, development of the steady state nitrification denitrification (ND) model; effect of ND on reactor volume, effluent alkalinity and oxygen demand; the role of readily biodegradable (RB) and slowly biodegradable (SB) organics; denitrification potential; effect of the influent TKN/COD ratio on unaerated mass fraction, N removal and effluent quality; calculation of inter-reactor recycles ratios for design and analysis of pre-, post- and combined denitrification systems. Characteristics of polyphosphate accumulating organisms (PAOs); development and use of biological excess phosphorus removal (BEPR) steady state model; design and analysis of NDBEPR of systems, chemical P precipitation and its effect on BEPR; novel applications; the impact of membrane solid/liquid separation and external nitrification on NDBEPR system design.

DP requirements: None

Assessment: Examination 100%

CIV5049Z MODELLING & SIMULATION OF WASTEWATER TREATMENT SYSTEMS

12 NQF credits at HEQSF level 9

Convener: Dr Ikumi

Course entry requirements: CIV5048Z

Course outline:

This advanced course in the modelling and simulation of wastewater treatment systems includes: kinetics of the readily biodegradable (RBCOD) and slowly biodegradable (SBCOD) organics utilization by ordinary heterotrophic organisms (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 2019

20 NQF credits at HEQSF level 9

Convener: Dr D Ikumi

Course entry requirements: CIV5045Z, CIV5046Z, CIV5047Z

Course outline:

This advanced course in integrated wastewater treatment plant design includes: calculating daily composite average flow and loads from diurnal data; influent flow balancing; integrated wastewater treatment plant modelling and design; major project brief; economic evaluation of different wastewater treatment plant layouts to achieve different technical, and environmental and economic objectives.

DP requirements: None

Assessment: Major project 100%.

CIV5051Z AQUATIC CHEMISTRY PART A

14 NQF credits at HEQSF level 9

Convener: Dr D Ikumi**Course entry requirements:** None**Course outline:**

This advanced course in aquatic chemistry covers: chemical thermodynamics; acids and bases, activity, pH equilibria of weak acid base systems, master variable diagrams, titration of acids and bases, reference species; alkalinity acidity and pH, buffering intensity, detailed treatment of the carbonate system; precipitation and dissolution, Caldwell-Lawrence conditioning diagrams, critical evaluation of the Langelier index; and terrestrial and ground water stabilization.

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

CIV5052Z AQUATIC CHEMISTRY PART B

14 NQF credits at HEQSF level 9

Convener: Dr D Ikumi**Course entry requirements:** CIV5051Z**Course outline:**

This advanced course in aquatic chemistry covers: mixed weak acid systems; alkalinity, acidity and Deffeyes types single aqueous phase diagrams; application to pH control in anaerobic digester; the nitrogen and sulphur systems;. Kinetics of precipitation reactions; redox equilibrium systems; Pourbaix (pe-pH) diagrams; application to the chemistry of iron, manganese, lead, chlorine and nitrates in treated and wastewaters; kinetics of redox reactions; and applications to physico-chemical treatment processes.

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

CIV5054Z ADVANCED CHEMICAL, PHYSICAL & BIOLOGICAL PROCESSES MODELLING

10 NQF credits at HEQSF level 9

Convener: Dr D Ikumi**Course entry requirements:** CIV5049Z, CIV5051Z, CIV5052Z**Course outline:**

This advanced course in chemical, physical and biological processes modelling includes: aqueous mixed weak acid base chemistry of the carbonate, phosphate, ammonia, short chain fatty acid and sulphur systems; kinetics of gas evolution and stripping; modelling multiple mineral precipitation in 3 phases such as in mineral precipitation in anaerobic digester liquor aeration; integrated chemical, physical and biological processes modelling of activated sludge and anaerobic digestion; modelling acidogenic, methanogenic and sulphidogenic systems.

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

CIV5064Z URBAN TRANSITIONS IN THE GLOBAL SOUTH*Not offered in 2019*

20 NQF credits at HEQSF level 9

Convener: Professor E Pieterse**Course entry requirements:** Any suitable four-year degree**Course outline:**

The aim of this course is to provide students with a wide-ranging introduction to the dynamics of differential urbanization processes in the global South with an eye on understanding the role of infrastructure in advancing more sustainable urban forms and patterns. The overarching learning objectives of the module are to understand the nature, drivers and consequences of the second urban transition from a sustainability perspective, as well as to make connections between urbanisation and

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long-term sustainability outcomes in different contexts, settings and scales. Topics covered include problems and issues of developing cities, poverty, exclusion, informality, livelihoods, economic development, governance and infrastructure.

Lecture times: 40 hours (1 week block lectures)

DP requirements: Complete all assignments.

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

CIV5067Z ADVANCED INFRASTRUCTURE MANAGEMENT

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: Any suitable four-year degree

Course outline:

The aim of this module is to expose students to the concepts of municipal infrastructure management. These concepts include the context for Infrastructure Management Planning, the process of Infrastructure Management Planning and the techniques required to prepare an Infrastructure Management Plan.

DP requirements: None

Assessment: Assignments 40%; take home examination 60%.

CIV5070Z PUBLIC TRANSPORT POLICY AND REGULATION

20 NQF credits at HEQSF level 9

Convener: Associate Professor R Behrens

Course entry requirements: None

Course outline:

This course aims to develop an understanding of public passenger transport system policy analysis and regulation. Topics include: Legislative and planning frameworks: institutional, legislative, financing and planning frameworks for integrated public transport infrastructure provision and service operation. Public transport policy: policy debates on subsidisation and competition regulation; mode alternatives analysis; international case studies of public transport system reform. Paratransit reform: operator consolidation and transition; fleet renewal; service upgrade; integration with scheduled services. Public transport system regulation and competition: industry structures; approaches to regulation and competition; licensing and contracting. Quality of service: quality-of-service measurement; passenger satisfaction measurement; passenger information systems and wayfinding.

DP requirements: None

Assessment: Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5071Z PUBLIC TRANSPORT SYSTEM DESIGN AND MANAGEMENT

20 NQF credits at HEQSF level 9

Convener: Professor M Zuidgeest

Course entry requirements: None

Course outline:

This course aims to develop an advanced understanding of public passenger transport system design and operations management. Topics include: Public transport system concepts: basic bus and rail system concepts; alternative technologies and operating characteristics. Public transport system design: route network planning; service planning; road and rail right-of-way design and vehicle prioritisation; signalling systems; station and interchange design; demand estimation; passenger capacity analysis. Public transport system operations management: service quality assessment, scheduling and rostering; train movement control systems; reliability, disruption and incident management; performance assessment; ridership measurement. Integrated fare structures: integrated ticketing systems; fare structures; fare setting. System maintenance: asset management; vehicle fleet

and rolling stock maintenance and refurbishment. DP requirements: Students are required to pass class exercises during the course week.

DP requirements: None

Assessment: Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5073W TRANSPORT POLICY AND PLANNING CASE STUDY

25 NQF credits at HEQSF level 9

Convener: Associate Professor R Behrens

Course entry requirements: None

Course outline:

The aim of this course is to offer students an opportunity to undertake a case study research project in which they are able to develop or deepen skills in transport policy and planning processes. The research would involve undertaking a critical investigation of the requirement for, the process of preparing and implementing, the content and the impacts of a selected transport policy, plan, strategy or project.

DP requirements: None

Assessment: Project report 100%.

CIV5100Z PLATE & SHELL STRUCTURES PART A

16 NQF credits at HEQSF level 9

Convener: Professor A Zingoni

Course entry requirements: BScEng

Course outline:

This course aims to be a comprehensive treatment of plate and shell theories, and their application to the solution of various problems in structural engineering. Plate and Shell Structures part A will cover plates subjected to bending and twisting (slope, curvature, twist, bending moments, transverse shears and twisting moments); the derivation of the bending equation for transversally loaded plates (rectangular and polar co-ordinates), solutions for rectangular plates and circular plates, practical applications, introduction to shell structures; the membrane hypothesis for shells; the membrane theory of axisymmetrically loaded shells of revolution.

DP requirements: None

Assessment: Examination 100%.

CIV5104S PLATE & SHELL STRUCTURES PART B

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Professor A Zingoni

Course entry requirements: CIV5100Z

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%.

CIV5107Z INTEGRATED URBAN WATER MANAGEMENT

20 NQF credits at HEQSF level 9; .

Convener: Professor NP Armitage

Course entry requirements: Any suitable four-year degree.

Course outline:

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

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

DP requirements: Complete all assignments.

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

CIV5108Z ADVANCED MECHANICS OF MATERIALS

16 NQF credits at HEQSF level 9

Convener: Associate Professor S Skatulla

Course entry requirements: BScEng or equivalent

Course outline:

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

DP requirements: 40% Subminimum in class tests.

Assessment: Examination 60%, coursework 40%.

CIV5109Z DISSERTATION PREPARATION

Prerequisite for CIV5000Z and CIV5134W

0 NQF credits at HEQSF level 9

Convener: As per programme requirement.

Course outline:

The aim of this course is to allow a student to undertake preparatory work for the master's dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

Assessment: None

CIV5110Z LABORATORY & FIELD TECHNIQUES

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to develop an advanced understanding of laboratory and field techniques. Topics include: Laboratory methods: role and scope of laboratory tests; fundamentals of stress-strain and strength measurements; stresses, pore pressures and strains; transducers and control systems; practical applications. The theoretical and practical aspects of in situ tests in geotechnical engineering. Tests discussed include: dynamic cone penetrometer standard penetration test, field vane, piezocone, dilatometer, pressuremeter etc. Geophysical methods are also included. Emphasis on use of in situ test results for determining engineering properties of soil for design. Field instrumentation; settlement gauges; extensometers; inclinometers; piezometers; geotechnical data correlation charts; measurements of in-situ stresses and permeability's; etc. are also covered.

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

DP requirements: None

Assessment: 40% Coursework, project 60%.

CIV5111Z GROUND IMPROVEMENT TECHNIQUES

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to introduce students to the concepts underpinning a range of ground improvements and soil remediation techniques and an appreciation of how these techniques are applied in practice. The course covers important design and construction aspects associated with ground improvement techniques including: Mechanical methods (compaction, vibrotechniques), Hydraulic methods (groundwater lowering, preloading, vertical drains, electro-osmosis), Physical/chemical methods (admixtures, grouting, deep soil mixing, ground freezing), Inclusions (rigid inclusions, soil reinforcements) and contaminated land and remediation.

Lecture times: 40 hours (1 week block lectures)

DP requirements: None

Assessment: Course work 50%, Project 50%

CIV5112Z STABILITY & DESIGN OF STEEL STRUCTURES

16 NQF credits at HEQSF level 9

Convener: Associate Professor S Skatulla

Course entry requirements: BScEng

Course outline:

This course aims to treat advanced topics in constructional steel work. The topics include elastic and inelastic buckling behaviour; plate buckling; non-linear instability behaviour of thin-walled structures, design for fatigue, design of steel-concrete composites, hybrid steel structures, steel connections plate girders, and the behaviour of steel structures under fire. Applications in industrial buildings and crane supporting structures are also addressed.

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5113Z STRUCTURAL DYNAMICS WITH APPLICATIONS

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course entry requirements: BScEng

Course outline:

This course aims to introduce the concepts of structural dynamics and its applications in structural engineering. Topics covered include dynamic equilibrium of structures. Response of a single degree

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of freedom system to dynamic excitation: free vibration, harmonic loads, impulse loading and general loading Response of multi-degree-of-freedom systems. Free vibrations: mass, damping, and stiffness matrices. Rayleigh damping. Forced vibrations: modal superposition and step by step methods. Continuous systems. Applications to seismic design of structures, blast and impact effects on structures and wind engineering

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5114Z FOUNDATION DESIGN

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to furnish participants with the necessary knowledge and design skills required to ensure stability of both the ground, and any structure built in or on the ground. It will introduce participants to the application of theories of soil mechanics, applied mathematics and physics to provide solutions to the serviceability and ultimate limit states of geotechnical structures. Topics include: review of soil mechanics; working stress approach, limit state design; analysis and design of shallow and deep foundations; determination of settlement of structures; use of foundation design standards such as Eurocodes, SANS 10160; etc.

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

DP requirements: None

Assessment: Coursework 50%, project 50%.

CIV5115Z BRIDGE MANAGEMENT & MAINTENANCE

Not offered in 2019

10 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course entry requirements: BScEng

Course outline:

This course aims to introduce the principles of bridge management and maintenance. The focus is on both highway bridges and railway bridges. The course provides the basic philosophies behind bridge management systems, the structure of a bridge management system, and the implementation of bridge management system. Life cycle cost analysis of bridges are introduced. Linkages between bridge management, maintenance and rehabilitation of bridges is discussed. Key to this course are practical bridge inspections and case studies.

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5118Z SAFETY OF SPECIAL STRUCTURES

Not offered in 2019

10 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course entry requirements: BScEng

Course outline:

The course introduces students to the governance and management of special structures. The procedures employed for safety evaluation are generally not specified in codes of practice. Probabilistic based risk analysis and surveillance techniques for the evaluation of loading and consequences of failure will be introduced. Case studies are used to demonstrate the principles.

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5119Z STRUCTURAL PERFORMANCE ASSESSMENT & MONITORING

20 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course entry requirements: CIV5113Z

Course outline:

This aims to introduce concepts of structural health monitoring of civil infrastructure. The course covers: philosophy of structural performance assessment, performance indicators, strategies for structural performance assessment, introduction to theoretical modal analysis, experimental modal analysis, instrumentation, data acquisition, data quality assurance, modal parameter estimation and validation, introduction to model updating, model updating methods, structural modifications, correlation between tests and FEM models, structural monitoring, measurement of live load strains/stresses, probabilistic data analysis, material performance assessment, performance assessment, and estimation of remaining life.

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5121Z DESIGN & MODELLING OF WATER DISTRIBUTION SYSTEMS

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: TBC

Course entry requirements: None

Course outline:

The aim of this course is to provide a structured and practical introduction to the design and modelling of water distribution systems. Topics include: Components of water transport and distribution systems. Water Demand: categories, patterns, calculation, forecasting. Hydraulics of Pipe Flow: basic equations, single pipe calculation, branched and looped networks, system-and pump characteristics and pressure dependent demand. Hydraulics of storage and pumps. Main components of Hydraulic Design: design parameters, choice of supply scheme and network layouts. Engineering design: choice of pipe materials, valves and other equipment. Pumps: review of pump types and their applications, design of pumping stations, power requirements and energy consumption, auxiliary equipment. Hydraulic modelling of distribution systems.

DP requirements: None

Assessment: Design assignment 100%.

CIV5122Z ADVANCED SOIL MECHANICS

16 NQF credits at HEQSF level 9

Convener: FC Chebet

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

Course outline:

This course aims to provide extensive insight and depth to students' understanding of the theoretical background involved in the design of geotechnical systems in order to facilitate critical thinking in geotechnical analyses. It covers advanced concepts and theories in soil mechanics fundamental to geotechnical engineering such as; shear strength of soils; stress-strain behaviour; drained and undrained shear strength; stress paths; critical state soil mechanics, failure criteria; constitutive models soil deformation analysis; stress distribution in soil; settlement of soil; and consolidation theory.

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

DP requirements: None

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Assessment: Coursework 30%, examination 70%.

CIV5123Z CONTAMINATED LAND AND REMEDIATION

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to create awareness of the occurrence of and risks posed by contaminants in contaminated sites and remediation issues, and to develop basic engineering skills and knowledge required to identify appropriate remediation methods for contaminated land and waste disposal activities. It covers the problems associated with contaminated lands that arise from the unmanaged release of contaminants into the environment. Selected topics include: contaminated land definition; legal framework governing contaminated lands; contaminant types and transportation mechanisms, risk assessment procedures related to contaminated lands, site investigation and monitoring related to contaminated lands and remediation, and waste disposal methods.

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

DP requirements: None

Assessment: Coursework 30%, examination 70%.

CIV5124Z GEOSYNTHETICS ENGINEERING

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to introduce advanced students to geosynthetics and their applications in the built environment and covers important considerations in the use of geosynthetics to solve civil engineering problems. It includes methods of analysis, design, construction and field monitoring of structures constructed with geosynthetics. Topics include the behaviour and interaction of these materials in filtration, drainage, separation, reinforcement, erosion control and barrier functions.

DP requirements: None

Assessment: Coursework 30%, examination 70%.

CIV5125Z LATERAL EARTH SUPPORTS

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to introduce students to the analysis of lateral earth pressures, various earth retention systems and its applicability, limitations and design. The course provides knowledge and tools for design and analyses of earth structures and earth retention systems. The selection, design and performance of earth retention structures used for support of fills and excavations will be covered as well as theory related to earth pressures and soil reinforcement.

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5126Z SLOPE STABILITY

Not offered in 2019

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

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

Course outline:

This course aims to demonstrate the application of concepts, principles and theories of slopes and to understand the different slope stabilization techniques and its applicability and limitations. The course focuses on stability of natural slopes and stability considerations related to man-made cuts and fills. Emphasis will be on the conditions up to and until the slip is initiated. Students will be introduced to different slide mechanisms, the conditions of their occurrence, and the theories and principles governing stability of slopes. The course will also include other important aspects such as: field investigations to obtain input for slope stability analysis; slope stability analysis programmes; slope monitoring techniques and slope stabilisation methods.

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

DP requirements: None

Assessment: Coursework 50%, examination 50%.

CIV5128Z LOSSES AND PRESSURE MANAGEMENT IN WATER DISTRIBUTION SYSTEMS

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: TBC

Course entry requirements: None

Course outline:

This course aims to teach theory and application of water losses and 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%.

CIV5129W GEOTECHNICAL ENGINEERING PROJECT

45 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

Course entry requirements: None

Course outline:

The aim of the course is to offer students an opportunity to undertake a case study project in which they are able to develop skills in analysing and providing solutions to typical geotechnical engineering problems encountered in the field. The project is intended to provide a platform for the students to put into practice the methodological and technical competencies acquired during the taught course work component of the programme. A statement of objectives of the geotechnical engineering project will be agreed upon, and the course of study will be guided by the supervisor. The programme will involve the student in about 450 hours of work, and a written output in the form of a report is submitted.

DP requirements: None

Assessment: Project report 100%.

CIV5131Z RESEARCH DESIGN AND METHODOLOGY FOR CIVIL ENGINEERS

16 NQF credits at HEQSF level 9

Convener: Professor M Zuidgeest

Course entry requirements: None

Course outline:

This course aims to develop conceptual skills for conducting research at the master's level. Topics include: the scientific method, induction and deduction, inference, statistical thinking and ethics, as well as technical skills which include technical writing, searching and interpretation of scientific literature, proper use of citations, and communication of research outputs.

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

DP requirements: None

Assessment: Coursework 100%.

CIV5132Z TRANSPORT DEMAND ANALYSIS AND PROJECT ASSESSMENT

20 NQF credits at HEQSF level 9

Convener: Professor M Vanderschuren

Course entry requirements: None

Course outline:

This course aims to develop an understanding of transport demand analysis and project assessment. Topics include: travel data collection and survey design; data processing and analysis; the link between methodological approaches to transport analysis and the analytical questions raised by different policy environments; theoretical and philosophical backgrounds of assessment and evaluation methods; and techniques for the assessment and evaluation of urban transport proposals.

DP requirements: None

Assessment: Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5133Z TRANSPORT MODELLING

20 NQF credits at HEQSF level 9

Convener: Professor M Zuidgeest

Course entry requirements: First year course in statistical methods or mathematics.

Course outline:

This course aims to develop an advanced understanding of transport modelling principles and skills in working with these models. Topics include: transport modelling types and scales; theory of travel demand modelling, including the four-step transport model (i.e. trip generation, trip distribution, mode choice and traffic assignment); output analysis; land use – transport interaction models, as well as theory of traffic flow dynamics, including capacity assessment, LOS assessment, shockwave analysis, dynamic traffic management and elementary traffic control design. The course ends with a discussion about the link between models and the analytical questions raised by different policy environments.

DP requirements: None

Assessment: Preparatory Assignments 15%; group assignment 10%; major assignment 50% and course test 25%.

CIV5134W MASTERS DISSERTATION TRANSPORT STUDIES

120 NQF credits at HEQSF level 9

Convener: As per programme requirement.

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: 100% written work

CIV5135W TRANSPORT PLANNING AND ENGINEERING METHODS
PROJECT

25 NQF credits at HEQSF level 9

Convener: Professor M Zuidgeest

Course entry requirements: None

Course outline:

This course aims to offer students an opportunity to undertake a research project in which students are able to develop and enhance skills in a selected area of professional practice. The research would involve undertaking a critical investigation of the origins, rationale, and debates surrounding the particular professional practice, and the necessary activities associated with applying the practice and reflecting on how it might be improved.

DP requirements: None

Assessment: Project report 100%

CIV5138Z DETERIORATION AND CONDITION ASSESSMENT OF CONCRETE
STRUCTURES

20 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: None

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); Alkali Silica Reaction (ASR); chemical attack; cracking of concrete structures; fire damage to structures; prevention of concrete deterioration through material selection, mix design and construction; service-life modelling (principles, deterioration models, service life models, normative guidelines); impact of loads on concrete structures; on-site evaluation techniques; visual assessment of concrete structures; principles, planning and execution of assessments; test methods (types, application and limitations, interpretation of results, case studies); non-destructive test methods (NDT): classical NDT (rebound hammer, cover depth, half-cell potential), advanced NDT (radar, sonic methods, impact echo), imaging and interpretation of results; 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: Minimum average mark of 50% for Assignments 1 and 2, attendance at lab and practical sessions (80% attendance required).

Assessment: Assignments 50%; Exam 50%

CIV5139Z REPAIR AND REHABILITATION OF CONCRETE STRUCTURES

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Professor H Beushausen

Course entry requirements: None

Course outline:

This course deals with the repair and rehabilitation of concrete structures and covers the following topics: introduction to the assessment of deterioration of concrete structures; repair materials and strategies; compatibility aspects; durability and repair audits; service life predictions; economics of repair and life-cycle costing; practical and contractual aspects; repair methods and materials; reinforcement corrosion repair; repair of ASR-damaged structures; crack injection; bonded overlays and patch repairs; electrochemical repair techniques; surface coatings and durability extension; repair of fire damaged structures; repair materials for chemical resistance against acid and sulphate attack; maintenance planning.

DP requirements: Minimum average mark of 50% for Assignments 1 and 2, attendance at lab and practical sessions (80% attendance required).

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Assessment: Assignments 50%; Exam 50%

CIIV5140Z STRENGTHENING AND RETROFITTING OF CONCRETE STRUCTURES

20 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course entry requirements: None

Course outline:

This course deals with the strengthening and retrofitting of concrete structures and covers the following topics: introduction to structural condition surveys and assessment of concrete structures; materials and strategies for structural strengthening; compatibility aspects; structural requirements and procedures for rehabilitation; practical and contractual aspects; strengthening systems; FRP design and application; strengthening for shear, bending and torsion; bonded steel plates; external prestressing systems; design procedures; analysis of strengthened concrete structures.

DP requirements: Minimum average mark of 50% for Assignments 1 and 2, attendance at lab and practical sessions (80% attendance required).

Assessment: Assignments 50%; Exam 50%

CIIV5141Z CONDITION ASSESSMENT AND REMEDIAL ACTION ON STEEL STRUCTURES

20 NQF credits at HEQSF level 9

Convener: Professor P Moyo

Course outline:

The course aims to develop an understanding of durability aspects, service life design, condition assessment and non-destructive testing of steel structures. Topics include: basics of steel material science; material characteristics and properties; structural behaviour of steel; advantages of steel structures in industrial application; fire resistance of steel structures; deterioration of steel structures; fundamentals of steel corrosion; corrosion detection techniques; in-situ assessment of steel structures; protection of steel structures; coatings; cathodic protection; fatigue behaviour; strengthening and repair of steel structures.

CIIV5142Z FINITE ELEMENT MODELLING IN STRUCTURAL ANALYSIS

16 NQF credits at HEQSF level 9

Convener: Associate Professor S Skatulla

Course entry requirements: None

Course outline:

The course aims to introduce advanced students to finite element modelling theory, typical applications in structural engineering and recommendations. The topics include fundamental approaches and solution strategies in finite element modelling; linear and non-linear structural problems; different types of non-linearity in structural engineering; implication of the various mesh types including truss, beam, plate and shell elements; the effects of h and p mesh refinements and mesh quality; different types of structural supports including rigid supports, elastic bedding, kinematic constraint supports, the influence on stress distribution and recommendations of suitable application; different treatment of concentrated loads and distributed loads and the effect of mesh resolution.

DP requirements: Submission and satisfactory performance in all assignments.

Assessment: 50% take-home major assignment and 50% final written examination.

CIV5143Z ROCK MECHANICS*Not offered in 2019*

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba**Course entry requirements:** Suitable undergraduate degree qualification in an engineering, geosciences or geological field.**Course outline:**

This course provides an introduction to the theory of rock mechanics and its applications in construction and mine operations. Students are presented with the fundamental concepts of stress and strain in isotropic and anisotropic rocks and conduct stress analyses using data collected in the laboratory and the field. Rock mass structures and classification schemes are introduced, and students learn how these govern rock slope stability and underground rock excavation methods in a given stress environment. Rock control and support systems utilized in underground and surface excavations and their related safety requirements are discussed. Rock mechanics topics surrounding blasting and the stability of impoundment dams and tailings dumps are also presented.

DP requirements: None**Assessment:** Coursework 50%, examination 50%.

CIV5144Z ADVANCED INTRODUCTION TO WASTEWATER TREATMENT*Not offered in 2019*

10 NQF credits at HEQSF level 9

Convener: Dr D Ikumi**Course outline:**

This course aims to introduce master's level students to modern municipal wastewater treatment from the perspective of it being a water and resource recovery facility (WRRF). Technical but non-specialist, it can be taken by any postgraduate science and engineering graduate who is admitted to master's level (NQF9). It aims to give instruction on the tests and measurement methods used for design and operation of WWTPs. By following a virtual tour of a modern WWTP, the purpose, principles, processes (physical, chemical and biological) and performance of the different unit operations involved in primary, secondary and sludge treatment that make up a WRRF are described. This will give qualitative insight into the implications of primary settling, biological N and P removal and different sludge treatment options on WWTP size, power consumption, effluent water quality, energy and phosphorus recovery and operational complexity.

CIV5145Z MASTER OF WATER ENGINEERING PROJECT

45 NQF credits at HEQSF level 9

Course outline:

The statement of objectives for the MWE project will be agreed upon between the supervisor and student. To successfully complete the 45cr research project, it is necessary to undertake in the region of 450 hours of study. The hours are made up of research and contact time between the student and supervisor.

CIV5146Z SUSTAINABLE DRAINAGE SYSTEMS*Not offered in 2019*

20 NQF credits at HEQSF level 9

Convener: Professor N Armitage**Course outline:**

This course aims to explore the philosophy behind the Sustainable Drainage Systems (SuDS) approach; the modelling of urban drainage systems using SWMM / PCSWMM; the selection of an appropriate SuDS treatment train; the design of selected SuDS Stormwater Control Measures (SCMs); the planning of an appropriate Operation and Maintenance (O&M) programme; the determination of the Total Lifecycle Costs (TLCs) for the proposed SuDS treatment train.

152 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

CIV5150Z SOIL MODELLING AND NUMERICAL METHODS

16 NQF credits at HEQSF level 9

Convener: Associate Professor D Kalumba

Course outline:

In this course participants will be introduced to: a) models used in describing soil behaviour and their use in numerical modelling; b) the advantages and limitations of different constitutive models describing soil behaviour; and c) the basic knowledge of how soil constitutive models are used in finite element analysis. They will be provided with an understanding of how to select the appropriate soil parameters. By the end of the course, they will consequently have a good grasp of soil modelling for different geotechnical applications. Topics will include: Elastic models; Basic elasto-plastic models; Cam-clay and Critical State based models; Stress paths; and Elasto-plastic Finite element method.

CIV6000W PHD IN CIVIL ENGINEERING

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

CIV9000Z INTERNATIONAL AFFILIATE 2 MONTHS

0 NQF credits at HEQSF level 0

CIV9001Z INTERNATIONAL AFFILIATE 2-4 MONTHS

0 NQF credits at HEQSF level 0

CIV9002Z INTERNATIONAL AFFILIATE 4-6 MONTHS

0 NQF credits at HEQSF level 0

CIV9003Z INTERNATIONAL AFFILIATE 6-12 MONTHS

0 NQF credits at HEQSF level 0

CIV9004Z POSTDOCTORAL FELLOW

0 NQF credits at HEQSF level 0

END5050X MASTERS JOURNAL PAPER REQUIREMENT

0 NQF credits at HEQSF level 9

Course outline:

The aim of submitting a research paper for the masters' degree is to develop an understanding of what is required for the publication of research findings. To this end a candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by a Panel of Assessors. This is a requirement for candidates submitting either a 180 or 120 credit dissertation for the following degrees: MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc in Property Studies. Refer to the appropriate degree rules.

DP requirements: None

CIV5127Z DISCRETE CHOICE MODELLING AND STATED CHOICE SURVEY DESIGN

20 NQF credits at HEQSF level 9

Convener: Professor M Zuidgeest

Course entry requirements: No prior knowledge of discrete choice models is needed. Basic topics are covered early in the week, while more advanced topics are covered later. It is however assumed that participants have a basic knowledge of statistical methods, including linear regression models. Hence, first year university mathematics and statistics will be required.

Course outline:

This course will study the specification, estimation, and application of discrete choice models as well as the design of stated choice experiments. Day 1: Introduction to choice modelling and multinomial logit, Data & estimation, Analysis of results and specification testing, Estimation of logit models (Exercise). Day 2: Nested logit & other GEV models, Estimation of GEV models (Exercise), Latent class, mixed logit & simulation based estimation, Estimation of latent class & mixed logit (Exercise). Day 3: Model applications: sampling, forecasting and appraisal, Model fitting exercise (Exercise), Alternative models and examples, Case studies in South Africa I. Day 4: Stated choice surveys, Generating a design (Exercise), Drawbacks of orthogonal designs. Day 5: Efficient designs, Generating efficient designs (Exercise), Case studies in South Africa II.

DP requirements: None

Assessment: Coursework 100%

CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following postgraduate degree programmes:

Construction Management
Quantity Surveying
Property Studies
Project Management

Research Entity:

Urban Real Estate Research Unit

The Department is housed on Level 5 of the Snape Building, opposite Engineering Mall, off Madiba Circle, Upper Campus.

Staff

Associate Professor and Head of Department

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

Professors

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

Associate Professors

MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*

F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

A Windapo, BSc(Building) *IfE* MSc(Construction Management) PhD *Lagos* FNIOB PrCPM

Emeritus Professors

BG Boaden, BSc(QS) *Witwatersrand* MBA *British Columbia* PhD *Witwatersrand*

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

AJ Stevens, MSc(Building) *Cape Town* PhD *UPE*

Senior Lecturers

E Edwardes, BSc BSc(QS) MSc(Project Management) *Pret* PrQS PMAQS

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

K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS

MW Massyn, BSc(Building) *UPE* FCIQB

RPT McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*

SD Nurick, BCom BSc(Hons)(Property Studies), MPhil *Cape Town* MRICS

N-T Tuan, BSc(Eng) *Chung Cheng Institute of Technology* MEng *Pret* PhD *Cape Town* INFORMS
Taiwan Chapter

Lecturers

A Mtya, BSc Hons (CM) *Cape Town* Candidate CPM SACPCMP

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

Contract Lecturer

Mochelo Lefoka, BSc (CS), *Cape Town*, BSc (Hons) (CM) *Cape Town*

Honorary Research Associate

C Kariuki, BA (Land Economics) MA (Housing Administration) *Nairobi*

Junior Research Fellow

L Boyle, BSc (Construction Studies) BScHons (Quantity Surveying) M Phil (Urban Sustainability) *Cape Town*

Departmental Manager

JM Thompsett

Administrative Officers

M Fagodien (Postgraduate)

W Samaai BA *Cape Town* (Undergraduate and Honours)

Administrative Assistants

J Breda (Finance)

Reception and General Administration

V Daries

Departmental Assistant

M Neutt

Postgraduate Programmes

Please note that the offering of all postgraduate programmes is subject to a minimum student enrolment.

A subminimum of 40% applies to the examination and coursework components of all Honours level courses with a CON course code.

A subminimum of 50% applies to the examination and coursework components of all Postgraduate Diploma and Master's level courses with a CON course code.

Honours Programmes

Bachelor of Science Honours in Construction Management [EH002CON02]

Programme Convener::

Ms K Le Jeune, BSc(QS) MSc(Property Studies) Cape Town PrQS PMAQS MRICS

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).

156 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

A candidate shall complete approved courses to a total of at least 160 credits and shall comply with all the prescribed curriculum requirements.

Core Courses

Code	Course	NQF Credits	HEQSF Level
ACC2022F/S	Management Accounting I.....	18	6
CON4030F	Property Studies II	16	8
CON4033W	Applied Contract Law II	16	8
CON4038F	Advanced Construction Management	16	8
CON4039S	Integrated Management Project	16	8
CON4047W	Research Project.....	32	8
CON4049S	Construction Innovation.....	16	8
STA1000F	Statistics 1000	18	5
CON4035X	Practical training	0	8
	Approved elective	12	8
	Total credits	160	

Elective Courses

Courses totalling a minimum of 12 credits must be taken, of which at least 8 credits should be at HEQSF level 8.

Code	Course	NQF Credits	HEQSF Level
CON4042H	Advanced Property Studies B.....	16	8
CON4045S	Housing Development & Management I T.....	16	8

Or any 12 credit course presented at Honours level which has been approved by the Programme Convener.

Bachelor of Science Honours in Quantity Surveying **[EH004CON05]**

Programme Convener::

Ms K Le Jeune, BSc(QS) MSc(Property Studies) Cape Town PrQS PMAQS MRICS

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 to a total of at least 164 credits and shall comply with all the prescribed curriculum requirements..

Core Courses

Code	Course	NQF Credits	HEQSF Level
ACC2022F/S	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

Code	Course	NQF Credits	HEQSF Level
CON4037S	Civil Engineering Measurement	16	8
STA1000F	Statistics 1000	18	5
CON4035X	Practical Training	0	8
	Approved elective	16	
	Total credits	164	

Elective Courses

Courses totalling a minimum of 16 credits must be taken, of which at least 8 credits should be at HEQSF level 8.

Code	Course	NQF Credits	HEQSF Level
CON4038F	Advanced Construction Management	16	8
CON4042H	Advanced Property Studies B	16	8
CON4045S	Housing Development & Management I T	16	8
CON4049S	Construction Innovation	16	8

Or any 12 credit course presented at Honours level which has been approved by the Programme Convenor.

Bachelor of Science Honours in Property Studies [EH003CON03]

Associate Professor and Programme Convenor:

MM Mooya, BSc(Land Economy) Copperbelt MPhil(Land Economy) Cantab PhD(Real Estate) Pret

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 to a total of at least 144 credits and shall comply with all the prescribed curriculum requirements.

Core Courses

Code	Course	NQF Credits	HEQSF Level
CON4041S	Advanced Property Studies A	16	8
CON4042H	Advanced Property Studies B	16	8
CON4043S	Applied Property Law	16	8
CON4045S	Housing Development & Management IT	16	8
CON4047W	Research Project	32	8
CON4048F	Advanced Property Studies C	16	8
	Approved electives	32	8
	Total credits	144	

Elective Courses

Courses totalling a minimum of 32 credits must be taken, of which at least 8 credits should be at HESQF level 8.

Code	Course	NQF Credits	HEQSF Level
ACC1012S	Business Accounting	18	5
ACC2022F/S	Management Accounting I	18	6

158 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

Code	Course	NQF Credits	HEQSF Level
BUS2010F	Marketing I.....	18	6
CML2005F	Labour Law	18	6
CML2001F	Company Law	18	6
BUS4103F	Effective People Practices.....	18	8
CON3039S	Construction Management IT	16	7
ECO2003F	Microeconomics II.....	18	6
ECO2004S	Macroeconomics II	18	6
STA2020F/S	Applied Statistics	24	6
STA3022F	Research and Survey Statistics.....	36	7

Or any 12 credit course presented at Honours level which has been approved by the Programme Convener.

Master's Programmes

Master of Science in Property Studies

[EM013CON03]

Associate Professor and Programme Convener:

F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

The primary aim of the MSc in Property Studies programme 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 to a total of at least 200 credits and shall comply with all the prescribed curriculum requirements.

Core Courses

Code	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
CON5046Z**	Research Methodology	20	9
	Total credits	200	

Note: From 2019 intake these courses * will be replaced by CON5046Z**

Elective 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:

Code	Course	NQF Credits	HEQSF Level
CON5044Z	Advanced Property Valuation	20	9

Master of Science in Project Management **[EM014CON06]**

Senior Lecturer and Programme Convenor :

N-T Tuan, BSc(Eng) *Chung Cheng Institute of Technology* MEng *Pret* PhD *Cape Town* INFORMS *Taiwan Chapter*

A candidate for the MSc in Project Management programme shall complete approved courses to a total of at least 200 credits and shall comply with all the prescribed curriculum requirements.

Core Courses

Code	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
CON5046Z**	Research Methodology	20	9
	Approved elective.....	20	9
	Total credits	200	

Note: From 2019 intake these courses * will be replaced by CON5046Z**

Elective Courses

One approved 20-credit course at HESQF level 9 must be taken, or a combination of courses totalling 20 credits, offered by the University.

Elective Course (select 20 credits)

Code	Course	NQF Credits	HEQSF Level
CON5030Z	Project Finance & Procurement.....	20	9
	Other approved elective.....	20	9

Doctoral Programmes

Doctor of Philosophy**[ED001CON01]**

ED001 Doctor of Philosophy is a Research Degree

Core Course

Code	Course	NQF Credits	HEQSF Level
CON6009W	Thesis	360	10

160 DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

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

Course Outlines

CON4030F PROPERTY STUDIES II

16 NQF credits at HEQSF level 8; 4 lectures per week, project(s), seminars, tutorials.

Convener: Mr R McGaffin

Course entry requirements: CON3033F

Course outline:

This course in property studies aims to develop an understanding of feasibility studies; risk assessment techniques; capital budgeting and sources of finance; the property development process; whole life appraisal; maintenance management; and property valuation methods.

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

Assessment: Year mark 50%; June examination 2 hours 50%.

CON4032F MEASUREMENT & DESIGN APPRAISAL III

No additional assessment.

12 NQF credits at HEQSF level 8; 4 lectures per week, project(s), seminars, tutorials.

Convener: Ms K Le Jeune

Course entry requirements: CON3012W, CON3031W

Course outline:

This course in measurement and design appraisal covers: Design appraisal, measurement and preparation of tender documentation for complex buildings and specialist installations (electrical and mechanical). The theoretical component involves a study of: (i) critical design appraisal and the improvement of constructability and cost-efficiency; (ii) compiling the Preliminaries Bill; and (iii) descriptive clauses in the Standard System of Measuring of Building Work. The practical component involves the application of the principles of measurement to advanced/unconventional forms of building construction and specialist installations by means of elemental quantification, covering: Bulk Earthworks; Planking, Strutting and Shoring; Piling; Underpinning; Basements; Electrical Installations; and Mechanical Installations. The practicals require computerised documentation using measurement software.

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

Assessment: Year mark 80% ; June oral examination (20%) 30 minutes.

CON4033W APPLIED CONTRACT LAW II

16 NQF credits at HEQSF level 8; 2 lectures per week, seminar(s).

Convener: Mr T Boxall

Course entry requirements: CML1002F or CML1001F or CML1006S, CON3032W

Course outline:

This course aims to develop an understanding of applied contract law. Topics include: the Insolvency Act; case studies of construction and building disputes; alternative dispute resolution; government and new engineering forms of contract; and common international contracts.

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

Assessment: Year mark 50% ; November examination 2 hours 50%.

CON4034W PROFESSIONAL PRACTICE

No additional assessment.

20 NQF credits at HEQSF level 8; First Semester: 4 lectures per week, seminars, tutorials, studio sessions. Second Semester: Simulated Office Project, studio sessions as required..

Convener: Ms K Le Jeune

Course entry requirements: CON3031W

Co-requisites: CON4032F

Course outline:

This course in professional practice covers: The Quantity Surveying Profession Act (No. 49 of 2000), Rules promulgated under the Act, and the implications of the Code of Conduct for registered practitioners; the commission; the Quantity Surveyor-Client Agreement; professional liability and professional indemnity insurance; fee scales; PROCAP; the Quantity Surveying function during the pre-contract, tender, post-contract, and final account stages; preparation and presentation of cost plans and Bills of Quantities, administration and adjudication of competitive bids, valuation for interim payment certificates, recovery statements, 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 54.4 % ; June oral examination (45.6%) minimum 30 minutes,

CON4035X PRACTICAL TRAINING

0 NQF credits at HEQSF level 8

Convener: Ms 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.

CON4037S CIVIL ENGINEERING MEASUREMENT

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

Convener: Ms K Le Jeune

Course entry requirements: CON3012W, CON4032F

Course outline:

This course aims to develop an understanding of measurement and scheduling of civil engineering construction. The theoretical aspects of the course cover the SANS 1200 specifications and the SANS 10120: Part 4 Typical Schedules of Quantities for: Site Clearance; Earthworks; and Concrete (Structural). The practical component involves the application of the principles of measurement to the elements: Site Clearance; Earthworks; and Concrete (Structural).

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

Assessment: Year mark 50% ; November examination 3 hours 50%.

CON4038F ADVANCED CONSTRUCTION MANAGEMENT

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, tutorials, field trip(s)..

Convener: Mr M Massyn

Course entry requirements: CON3012W, CON3038W

Course outline:

This advanced course in construction management covers: The concept of project management compared with the management of construction enterprises. Organisational theory and management, organisation structures for enterprises and a major projects. Leadership and motivation on projects. Precontract planning. Production and logistics management. Contractual risk management and contracting strategies. Human relations management including: industrial relations practice; and health and safety requirements.

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

Assessment: Year mark 50% ; June examination 2 hours 50%.

CON4039S INTEGRATED MANAGEMENT PROJECT

This course is not eligible for additional assessment.

16 NQF credits at HEQSF level 8; 2 lectures per week, field trips, tutorials, seminars.

Convener: Mr M Massyn/Ms A Mtya

Course entry requirements: CON4038F, CON3031W

Course outline:

This integrated management project uses the documents for an actual construction project to, simulate all activities performed during the pre-tender and construction phases of a project such as obtaining bids from suppliers and subcontractors, preparing the estimate, preparing the site layout, preparing all planning activities required; analysing production requirements such as concrete cycles and formwork selection, plant and material management; health and safety risk assessment; financial management such as interim certificate and final account preparation and reconciliation.

DP requirements: None

Assessment: Portfolio (70%), oral examination (November) 30% (1 hour).

CON4041S ADVANCED PROPERTY STUDIES A

16 NQF credits at HEQSF level 8; 4 lectures per week, tutorials.

Convener: Associate Professor M Mooya

Course entry requirements: CON3034F, CON3035S, CON3041F

Course outline:

This advanced course in property studies covers: Expropriation: the legislation; the process; compensation; methods of valuation. Property Valuation: influence of re-zoning on value; valuation of farmland; usually non-negotiable properties; large shopping centres; air space; interest in time-share; leasehold interests; retirement villages; mining rights. Valuation of properties classified as "special" in terms of function, design, construction, or location; market/non-market properties; and properties subject to particular legislation.

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

Assessment: Year mark 50% ; November examination 2 hours 50%.

CON4042H ADVANCED PROPERTY STUDIES B

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, field trips.

Convener: Associate Professor K Michell/Mr D Owen

Course entry requirements: CON3034F or CON3033F, CON3035S or CON3038W, CON3032W or 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% November examination 2 hours 35%.

CON4043S APPLIED PROPERTY LAW

16 NQF credits at HEQSF level 8; 4 lectures per week, tutorials.

Convener: Mr T Boxall

Course entry requirements: CML2011S (or equivalent).

Course outline:

This course in applied contract law covers: A detailed study of the statutes and ordinances affecting property development and valuation. A detailed study of case law relating to: malafides of valuation court; what constitutes immovable property; method of valuation; separate valuations of land and buildings; valuation of an interest in land; restrictive conditions effect on value; Expropriation Act; expropriation in terms of provincial ordinances; valuation of subdivided property; and method of valuation.

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

Assessment: Year mark 50%; November examination 2 hours 50%.

CON4045S HOUSING DEVELOPMENT & MANAGEMENT I T

16 NQF credits at HEQSF level 8; 4 lectures per week, seminars, tutorials.

Convener: Mr R McGaffin

Course outline:

This course aims to conceptualise housing as a multi-dimensional asset. Students will be guided to: define the housing problem and assess various policy intervention undertaken internationally and locally to date; based on the problem statement propose sound interventions drawing on theory and evidence, and undertake a financial viability study of a housing project.

DP requirements: 40% subminimum in both course work and examination; Attendance and satisfactory participation in all contact sessions; Satisfactory participation in all group work; Submission of all assignments as per due dates.

Assessment: Year mark 50% ; June examination 2 hours 50%.

CON4047W RESEARCH REPORT

This course is not eligible for additional assessment.

32 NQF credits at HEQSF level 8; Seminar(s).

Convener: Associate Professor A Windapo/Dr N Tuan

Course entry requirements: CON1019F/S, STA1000F/S

Course outline:

This course aims to provide an understanding of the research process. Topics include: selection of research problem; preparation of the research proposal; conducting empirical research; analysis of findings; drawing conclusions; making recommendations; and presentation of a research report.

DP requirements: Submission of a satisfactory research proposal

Assessment: November examination - Research report 100%.

CON4048F ADVANCED PROPERTY STUDIES C

16 NQF credits at HEQSF level 8; 4 lectures or tutorials per week.

Convener: Associate Professor F Viruly

Course entry requirements: CON3034F/S, CON3035S, CON3041S

Course outline:

This advanced course in property studies covers: Modern portfolio theory: portfolio risk and return; applied portfolio theory; index models; portfolio construction (structure, selection and management). Property Portfolio: compiling an efficient property portfolio; IPD and property data sources; trading properties; diversification strategies. The property component of institutional investor portfolios; the property listed sector including property unit trusts and property loan stocks; property market research and analysis; and quantitative techniques for analysis of market data.

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

Assessment: Year mark 50%; June examination 2 hours 50%.

CON4049S CONSTRUCTION INNOVATION

16 NQF credits at HEQSF level 8; 2 lectures per week, field trip(s), tutorials, seminars.

Convener: Associate Professor A Windapo

Course entry requirements: CON3038W, CON3012W

Course outline:

This course aims to develop an understanding of innovation in construction. Topics include: cycles of innovation; dissemination of technology; relationship between technology, economic practice and structures of the industry using examples such as lean production, intelligent buildings, standardisation and pre-assembly, design management and sustainable construction, and entrepreneurship.

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

Assessment: Year mark 50% ; November examination 2 hours 50%.

CON5006Z PROPERTY DEVELOPMENT

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: Associate Professor F Viruly

Course outline:

This course in property development covers: investment evaluations; property development evaluation, incorporating: environmental impact assessments; land assembly and servicing; economic viability analysis; management and marketing of property developments; risk assessment; and whole life appraisal.

DP requirements: 50% subminimum in both course work and examination.

Assessment: Three hour examination 50%, assignments 50%.

CON5007Z PROPERTY LAW

20 NQF credits at HEQSF level 9; one week block lectures..

Convener: Ms L van Schalkwyk

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%.

CON5008Z URBAN LAND ECONOMICS

20 NQF credits at HEQSF level 9; one week block lectures..

Convener: Associate Professor F Viruly

Course outline:

This course in urban land economics covers: urban economics and urban problems; the urbanization process; the urban hierarchy; urban rent; theories of urban spatial structure; location theory; and problems in developing countries.

DP requirements: 50% subminimum in both course work and examination.

Assessment: Three hour examination 50%, assignments 50%.

CON509Z PROPERTY FINANCE

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: TBC

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%.

CON5010Z MINOR DISSERTATION PROPERTY STUDIES

60 NQF credits at HEQSF level 9

Convener: Associate Professor F Viruly

Course entry requirements: CON5037Z and CON5042Z

Course outline:

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a minor dissertation.

DP requirements: None

Assessment: Research Report

CON5014Z PROJECT MANAGEMENT & SYSTEMS THEORY

20 NQF credits at HEQSF level 9; one week block lectures..

Convener: Mr 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%.

CON5016Z PROJECT PLANNING & IMPLEMENTATION

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: Mr M Massyn

Course outline:

This course in project planning and implementation covers: the need for planning which includes the rules for planning and control; scope management, project strategy, project methodology; project scheduling techniques; and change management and project integration.

DP requirements: 50% subminimum in both course work and examination.

Assessment: Three hour examination 50%, assignments 50%.

CON5018Z HUMAN RESOURCE MANAGEMENT & INTERPERSONAL COMMUNICATION

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: Mr 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

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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%.

CON5021Z PROPERTY PORTFOLIO MANAGEMENT

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: Associate Professor F Viruly

Course outline:

This course in property portfolio management covers: Portfolio Management: the property cycle; the economic cycle; modern portfolio theory; the property portfolio. Operational Property/Asset Management: introduction to property management; legal aspects/tenant issues; maintenance/services; investment strategy and value; current trends; case studies. Strategic property/asset management; shopping centre management: management; leasing; financial control. Facilities Management: space planning and management; relocation; maintenance management and life cycle costing; energy management; environmental issues; and outsourcing.

DP requirements: 50% subminimum in both course work and examination.

Assessment: Three hour examination 50%, assignments 50%.

CON5022Z TOTAL QUALITY MANAGEMENT IN A PROJECT ENVIRONMENT

20 NQF credits at HEQSF level 9; one week block lectures.

Convener: Dr N Tuan

Course outline:

This course aims to develop an understanding of total quality management in a project environment and includes: Total Quality Management as a set of management processes and systems and the application of TQM in project environments; new product development, value engineering, safety, and health and welfare.

DP requirements: 50% subminimum in both course work and examination.

Assessment: Three hour examination at end of module 50%, assignments 50%.

CON5023Z MINOR DISSERTATION PROJECT MANAGEMENT

60 NQF credits at HEQSF level 9

Convener: Dr N Tuan

Course entry requirements: CON5037Z and CON5042Z

Course outline:

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a minor dissertation.

DP requirements: None

Assessment: Written work counts 100%.

CON5024W DISSERTATION CONSTRUCTION ECONOMICS & MANAGEMENT

180 NQF credits at HEQSF level 9

Convener: TBA

Course outline:

Students select a research topic, prepare a proposal, undertake empirical research, analyse the findings, draw conclusions and present a dissertation.

DP requirements: None

Assessment: Written work counts 100%.

CON5025W DISSERTATION CONSTRUCTION ECONOMICS & MANAGEMENT

120 NQF credits at HEQSF level 9

Convener: TBA

Course entry requirements: CON5040Z DP

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: Research Report.

CON5025Z MASTERS DISSERTATION CONSTRUCTION ECONOMICS & MANAGEMENT

120 NQF credits at HEQSF level 9

CON5029Z PROJECT RISK MANAGEMENT

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

Convener: Dr N Tuan

Course outline:

This course in project risk management covers: the nature of risks and the nature of projects; risk perceptions and the communication of risk; systematic risk management; creating a project risk management framework; establishing risk registers and reviewing risk management performance.

DP requirements: 50% subminimum in both course work and examination

Assessment: Three hour examination at end of module 50%, assignments 50%.

CON5030Z PROJECT FINANCE & PROCUREMENT

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

Convener: TBC

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%.

CON5033Z DISSERTATION PROJECT MANAGEMENT

120 NQF credits at HEQSF level 9

Convener: Dr N Tuan

Course entry requirements: CON5040Z

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%.

CON5034Z DISSERTATION PROPERTY STUDIES

120 NQF credits at HEQSF level 9

Convener: Associate Professor F Viruly

Course entry requirements: CON5040Z

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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: Research Report.

CON5036Z INTRODUCTION TO RESEARCH

4 NQF credits at HEQSF level 9

Convener: Professor K Cattell

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 HEQSF level 9; half week block lectures.

Convener: Dr N Tuan

Course entry requirements: CON5036Z

Course outline:

This course aims to develop an understanding of research methodology, the research experience; knowledge and problems; the proposal chapter; designing the research; theoretical frameworks; overview of research methods - from quantitative to qualitative; case studies; writing the literature review, data presentation and analysis; and concluding the research.

DP requirements: 100% attendance at lectures in block week.

Assessment: Evaluation of Research Proposal 100%.

CON5040Z DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

Convener: TBA

Course outline:

The aim of this course is to allow a student to undertake preparatory work for the master's dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

CON5041Z PRINCIPLES OF APPLIED STATISTICS

4 NQF credits at HEQSF level 9

Convener: Professor K Cattell

Course entry requirements: Knowledge of Excel.

Course outline:

This course in applied statistics covers: Data presentation: Identifying an appropriate population; drawing a sample from the population; organising data; discrete and continuous data types; graphical presentation of data. Descriptive statistics: Exploratory data analysis and summary statistics. Applied mathematics: Simple interest; equivalence; compound interest; present value; annuities; general annuities; sinking funds; and amortization.

DP requirements: None

Assessment: One-and-a-half-hour examination 100%.

CON5042Z FURTHER APPLIED STATISTICS (ADVANCED PRINCIPLES)

6 NQF credits at HEQSF level 9

Convener: Professor K Cattell**Course entry requirements:** CON5041Z**Course outline:**

This course in advanced principles of applied statistics covers: Design of a questionnaire: Defining the "target" population, drawing a sample from the population, organising the data into an appropriate format for further analysis. Presenting the results: Summarizing the data, and interpreting the results. Statistical methods: Contingency tables; (Chi Square tests); multiple regression; t-test and Anova; and confidence interval equivalence.

DP requirements: Class attendance and submission of all worksheets, projects and assignments.**Assessment:** Continuous assessment

CON5043Z PROPERTY VALUATION THEORY & PRACTICE

20 NQF credits at HEQSF level 9

Convener: Associate Professor M Mooya**Course outline:**

This course in property valuation theory and practice covers: The Valuer; Valuation Theory - concepts and historical development; Accuracy of Valuations; The Surveyor General; Register of Deeds; Local Authorities; Town Planning Schemes; the Valuer's Records; Factors Affecting Supply and Demand in the Property Market; Different Types of Fixed Property; Factors Influencing the Value of Property; Approaches to the Valuation of Property; the Valuation Report.

Potential and its Influence on Value: Legal Concept of Potential; Economic Concept of Potential; Potential for an Alternative Use; Redevelopment Potential; Quantifying the Influence of Potential on Value; Highest and Best Use of a Property; Under-improved Property; Over-improved Property; "Wrong" or Inappropriate Development; Influence of Re-zoning on Value. Methods of Valuation I: Sales, Cost and Income Methods of Valuation. Valuation of Residential Properties: Definition of a Residential Property; Valuation Approach; Sources of Information; the Valuation Process; Limitations on Use and Development; Unimproved Properties; Improved Properties; Valuation of Township Developments including Developers' Interests. Valuation of Income Producing Properties I: Influence of Leases on Value; Valuation of Leasehold Interests; Valuation of Income Producing Properties; Overview of Capitalisation Rates and their Use in the Valuation of Income Producing Properties. South African Legislative Environment: Relevant legislation and its application to the Valuation Process. Case Law: Relevant Case Law as it pertains to the Valuation of Property. Expropriation: Legislation; Valuation for Expropriation; Valuation of Servitudes. ARGUS - Valuation DCF Software: Use of the ARGUS software for the valuation of property.

DP requirements: 50% subminimum in both course work and examination.**Assessment:** Three hour examination 50%, assignments 50%.

CON5044Z ADVANCED PROPERTY VALUATION

20 NQF credits at HEQSF level 9

Convener: Ms K. Evans**Course entry requirements:** CON5043Z**Course outline:**

This advanced course in property evaluation covers: Valuation of Income Producing Properties II: Valuation of Residential, Commercial and Industrial Properties; Capitalisation Rates - Detailed Discussion of Capitalisation Rates; Usage and Derivation from Market; Pitfalls.

Methods of Valuation II: Residual and Accounts Methods of Valuation. Valuation of Special Properties: Valuation of Sectional Titles; Valuation for Fractional Ownership; Valuation of Farms and Agricultural Land; Valuation of Shopping Centres; Valuation of Special Properties, including Petrol Stations, Air Space, Mining Rights and Minerals, Industrial Plant and Machinery; Non-Negotiable Properties, and Properties Subject to Particular Legislation. Introduction to Non-Market Valuation Methods: Travel Cost Method; Contingent Valuation Method; and Hedonic Pricing

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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%.

CON5046Z RESEARCH METHODOLOGY

20 NQF credits at HEQSF level 9

Convener: Mr I Jay

Course outline:

This course aims to develop an understanding of academic research design. This includes: research methodology, the research experience; knowledge and problems; the proposal chapter; designing the research; theoretical frameworks; overview of research methods - from qualitative to quantitative; case studies; writing the literature review; data presentation and analysis; and concluding the research.

CON6009W THESIS

360 NQF credits at HEQSF level 10

Convener: TBA

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

ELECTRICAL ENGINEERING

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

Email address: eleceng@uct.ac.za

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Staff

Professor and Head of Department

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

Professors

P Barendse, MSc(Eng) PhD *Cape Town* MIEEE

KA Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ SMIEEE

MA Khan, MSc(Eng) PhD *Cape Town* SMIEEE

Emeritus Professors

A Baghai-Wadji, MSc(Eng) PhD DSc *Vienna* FEMA SMIEEE

M Braae, MSc(Eng) *Cape Town* PhD *UMIST* MIEEE

BJ Downing, MSc *Bradford* PhD *Sheffield*

G de Jager, MSc *Rhodes* PhD *Manchester* MBL SA MIEEE

CT Gaunt, BSc(Eng) *Natal* MBL SA PhD *Cape Town* FIET FSAIEE

MR Inngs, BSc(Hons) *Rhodes* PhD *London* SMIEEE

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

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

Associate Professors

S Chowdhury, PrEng BEE(Hons) PhD (Eng) *Kolkata* MIET SMIEEE MIE SMSAIEE

OE Falowo, BEng MEng *Akure* PhD *Cape Town* SMIEEE

A Mishra, BE *REC India* PhD *Edinburgh* SMIEEE

F Nicolls, MSc(Eng) PhD *Cape Town*

AJ Wilkinson, BSc(Eng) *Cape Town* PhD *London*

Emeritus Associate Professors

ME Dlodlo, BSEE *Geneva* MSEE *Kansas State* PhD *Delft* MIEEE F'ZweIE Pr.Eng.(ECZ)

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

M Malengret, MSc(Eng), PhD *Cape Town*

Honorary Associate Professor

R Laufer, Dipl.-Ing *TU Berlin* Dr.-Ing. *Stuttgart* IAA

Senior Lecturers

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

MY Abdul Gaffar, BSc(Eng) MSc(Eng) *Natal* PhD *Cape Town*

A Murgu, MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD *Jyväskylä* MIEEE

D Oyedokun, MSc(Eng) PhD *Cape Town* MIEEE SAIEE

A Patel, MSc(Eng) PhD *Cape Town* MIEEE

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MS Tsoeu, MSc(Eng) PhD *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) *Witwatersrand* PhD (*Cape Town*)

Honorary Adjunct Senior Lecturer

Froehlich A, LL.M.MAS Maître en Droit *France*, Dr jur *Vienna*, IISL

Lecturers

J Mwangama, MSc(Eng) PhD *Cape Town* MIEEE
WPF Schonken BEng MSc(Eng) PhD *Stellenbosch* SMIEEE

Senior Scholar

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

Chief Technical Officers

D De Maar, BEd(Hons) *Cape Town*
J Pead, BSc(Eng) MSc(Eng) *Cape Town*
M Soltanian, BSc(Eng) MSc(Eng) *Iran*

Senior Technical Officers

P Bizimana
P Titus

Technical Officer

B Daniels

Departmental Manager

J Buxey

Finance Officer

C Koonin

Administrative Officer (Undergraduate)

M van der Westhuizen BA PGDip(LIS) *Cape Town*

Administrative Assistants

R Harris (General)
N Moodley (Postgraduate)
S Sabodien (AMES Research Group)
D Singh (Space and Radar Masters)

Receptionist

L Johannes

The Department offers the following postgraduate specialisations:

Control Engineering
Computational Electronics
Engineering Education
High Performance Computing

- Image Processing and Vision Systems
- Instrumentation
- Mechatronics
- Machines and Power Electronics
- Nuclear Power
- Power Systems
- Radar, Antennas and Remote Sensing Robotics
- Renewable Energy
- Robotics
- Telecommunications
- Space Technology

Postgraduate Programmes

Honours Programmes

Bachelor of Science Honours specialising in Nuclear Power [EH007EEE08]

Emeritus Professor and Programme Convener::

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

Nuclear power stations operating in over 30 countries provide approximately 13% of the world’s electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Bachelor of Science Honours programme provides an interdisciplinary postgraduate qualification in the key aspects of nuclear power for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of nuclear power, including the policy, operating, safety and regulatory aspects.

The degree comprises coursework to the minimum of 108 credits and a 40-credit final year project.

The programme can be completed as a one-year full-time programme, or over an extended period for students who are employed. It is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week blocks, with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

Core Courses

Code	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
EEE4112Z	Honours Nuclear Project	40	8
	Total credits.....	148	

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

Master's Programmes

Master of Engineering specialising in Nuclear Power [EM017EEE08]

Emeritus Professor and Programme Convener:

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

Nuclear power stations operating in over 30 countries provide approximately 13% of the world's electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Master of Engineering (MEng) programme provides a postgraduate qualification in the key aspects of nuclear power for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of nuclear power, including the policy, operating, safety and regulatory aspects.

The degree comprises coursework to the minimum of 120 credits and a 60-credit dissertation.

The programme can be completed as a one-year full-time programme, or over an extended period for students who are employed. It is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week or two-week blocks, with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

Core Courses

Code	Course	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation: M(Eng).....	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	180	

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

Master of Philosophy specialising in Nuclear Power [EM027EEE08]

Emeritus Professor and Convener:

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

Nuclear power stations operating in over 30 countries provide approximately 13% of the world's electricity. Nuclear energy is a part of the existing and planned energy and electricity policy of South Africa.

This Master of 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 can be completed as a one-year full-time programme, or over an extended period for students who are employed. It is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive one-week or two-week blocks, with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

Core courses

Code	Course	NQF Credits	HEQSF Level
EEE5145W	Minor Dissertation: MPhil.....	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	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	12	8
	Total credits.....	180	

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

**Master of Engineering specialising in Radar
[EM017EEE06]**

Associate Professor and Programme Convener::

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

A candidate for the MEng in Radar is required to complete core courses totalling 120 credits and a 60 credit minor dissertation.

Each course will typically contain a lecture component of five full days, followed by weekly seminars, tasks and a written examination, over a five week period after the first, intensive lecture session. The programme is designed to support students that cannot be resident in Cape Town for the full duration to complete all courses, by using distance learning techniques during the follow up period after each course (after the one week intensive lecture period). All students will, however, have to be present in Cape Town for the one week lecture period for each course. Elements of continuous assessment (problem sets, short projects) and a written examination are utilised to assess the course.

Core Course

Code	Course	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation: M(Eng).....	60	9

Elective courses: select courses to the value of 120 credits

Code	Course	NQF Credits	HEQSF Level
EEE5105Z	Fundamentals of Radar Signal and Data Processing	20	9
EEE5108Z	Advanced Engineering Mathematics.....	20	9
EEE5109Z	Multitarget Multisensor Tracking and Data Fusion	20	9
EEE5110Z	Clutter and Detection in Clutter	20	9
EEE5111Z	High Resolution & Imaging Radar.....	20	9
EEE5112Z	Radar System Modelling.....	20	9

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Code	Course	NQF Credits	HEQSF Level
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	180	

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

Master of Engineering specialising in Telecommunications **[EM017EEE09]**

Associate Professor and Programme Convener:

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

A candidate for the MEng in specializing Telecommunications is required to complete core courses of 120 credits and a 60 credit minor dissertation.

This programme aims to provide knowledge, skills and aptitudes for practising engineers to adapt to the rapidly changing technological landscape, turning products of research into practical solutions of developing world problems within international standards. The programme offers a selection of courses that span broad fundamental concepts that find applications in a wide range of disciplines. The approach enables students to be agile in response to new knowledge and novel developments. Core courses include Information Theory, Statistical Signal Theory and Advanced Engineering Mathematics.

Core Courses

Code	Course	NQF Credits	HEQSF Level
EEE5004Z	Minor Dissertation: M(Eng).....	60	9

Elective courses: select courses to the value of 120 credits

Code	Course	NQF Credits	HEQSF Level
EEE5032Z	Digital Communication Systems	20	9
EEE5121Z	Microwave Components and Antennas	20	9
EEE5138Z	Broadband Communication Networks	20	9
EEE5108Z	Advanced Engineering Mathematics	20	9
EEE5135Z	Information Theory and Error-Control Coding	20	9
EEE5136Z	Statistical Signal Theory.....	20	9
EEE5139Z	Wireless Data Network Convergence.....	20	9
EEE5140Z	Software Defined Radio	20	9
	Total credits	180	

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

Master of Philosophy specialising in Space Studies [EM026EEE07]

Programme Convener:

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

Space technology and space applications are used to such an extent that they are now part of the critical infrastructure of the modern information society. Space applications are also a key contributor to sustainable development in areas such as food and water security, weather prediction, climate change monitoring, environmental resource management, disaster management, search-and-rescue, financial transactions, telemedicine and tele-education. This Master of Philosophy (MPhil) programme is aimed at providing an interdisciplinary postgraduate qualification in the key aspects of space science and technology and space applications for societal benefit. The programme provides a balance of the scientific, engineering and applications aspects of space technology, as well as the policy, financial, commercial and regulatory aspects. The degree comprises coursework to the minimum of 60 credits and a 120-credit dissertation. The coursework comprises 45 credits of compulsory core courses in: Space mission analysis and design; Space applications for sustainable development; and Space and society. The candidate is required to complete a further minimum of 15 credits of approved elective courses to make up a minimum of 60 credits of coursework. Candidates deemed to have completed equivalent coursework, or deemed to have equivalent work experience in the space arena, may exceptionally be permitted to register for this degree by dissertation only, in which case the dissertation must be to the value of 180 credits [EM025EEE07].

The programme is designed to accommodate students who cannot be resident in Cape Town for the full duration of the degree. The courses will be offered in intensive course periods with pre-contact reading and post-contact assignments and various distance learning activities. Students will be required to be in Cape Town for the intensive course periods.

Core Courses

Code	Course	NQF Credits	HEQSF Level
EEE5146W	Partial Dissertation: MPhil	120	9
EEE5103Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9
EEE5124Z	Space and Society.....	15	9
EEE5125Z	Space Applications for Sustainable Development.....	15	9
EEE5126Z	Space Mission Analysis and Design.....	15	9
	Elective courses	15	9
	Total credits.....	180	

Elective Courses: select courses to value of at least 15 credits

Code	Course	NQF Credits	HEQSF Level
EEE5127Z	Special Topics in Space Technology A.....	5	9
EEE5133Z	Special Topics in Space Technology B.....	5	9
EEE5134Z	Special Topics in Space Technology C.....	5	9
EEE5141Z	Special Topics in Space Technology D.....	5	9
EEE5142Z	Special Topics in Space Technology E.....	5	9

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

Master of Philosophy specialising in Engineering Education [EM026EEEE04]

Programme Convener:

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

The Faculty of Engineering and the Built environment offers a structured MPhil programme in Engineering Education. Students are required to complete a minimum of 60 credits of coursework, 45 credits of which are core to the programme. The additional credits will include an elective course approved by the supervisor. To qualify for the MPhil degree specialising in Engineering Education candidates are required to complete a supervised dissertation equivalent to a further 120 credits. The dissertation should incorporate any or all of the following: design of an engineering education research project involving advanced concepts and theoretical principles located in the engineering education research field; 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, a rigorous analysis of empirical data, and the development of a coherent discussion of the analysis, or any other study acceptable to the Faculty. Students will register for the dissertation in the home department of their supervisor.

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC5102Z	Knowledge and Practices in Engineering Education.....	15	9
EEE5148Z	Theoretical Foundations in Engineering Education Research.....	15	9
EEE5103Z	Dissertation Preparation	0	9
CIV5147Z	Methodologies in Engineering Education Research.....	15	9
Elective	Subject to approval by supervisor.....	15	9
EEE5149W	Dissertation Engineering Education	120	9
	Total credits	180	

Master of Science in Engineering specialising in Electrical Engineering [EM023/EM024]

The Department prepares candidates for the Master of Science in Engineering in Electrical Engineering and for the Doctor of Philosophy. The Department offers a number of special postgraduate courses each year some of which are scheduled to facilitate attendance by practising engineers from industry. The majority of courses are full-time and cover a variety of topics.

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

Research Master's by dissertation

[EM023EEEE01]

EM023 Research Master's by dissertation

Core Course

Code	Course	NQF Credits	HEQSF Level
EEE5000W	Full Dissertation: MSc(Eng).....	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Research Master's by coursework and dissertation**[EM024EEE01]****EM024 Research Master's by coursework and dissertation****Core Courses**

Code	Course	NQF Credits	HEQSF Level
EEE5002W	Partial Dissertation: MSc(Eng)	120	9
EEE5103Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9
	Elective courses approved by supervisor	60	9
	Total credits.....	180	

Doctoral Programmes**Doctor of Philosophy****[ED001EEE01]****ED001 Doctor of Philosophy is a Research Degree****Core Course**

Code	Course	NQF Credits	HEQSF Level
EEE6000W	Thesis	360	10

It is advisable before making an online application

(<http://www.ebe.uct.ac.za/ebe/apply/postgradstudies/apply>) for Masters or PhD, that you make contact via email with one of the Academic staff members listed below to discuss your research interest.

RESEARCH AREAS	
Bio-Inspired Robotics and Biomechanics	A.Patel@uct.ac.za
Commensal Radar Research	Daniel.OHagan@uct.ac.za
Control Systems and Mechatronics	Edward.Boje@uct.ac.za
Electronic & Accelerated Computational Engineering	Alireza.Baghai-Wadji@uct.ac.za
Electronics	Andrew.Wilkinson@uct.ac.za
Engineering Education	Renee.Smit@uct.ac.za
Future Internet Technologies	Joyce.Mwangama@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
Power Systems & Renewable Energy	David.Oyedokun@uct.ac.za
Mobile Robotics	Robyn.Verrinder@uct.ac.za
Power Systems Protection, Renewable Distributed Generation & Microgrids	Sunetra.Chowdhury@uct.ac.za
Power Electronics, Drives & Machines	Paul.Barendse@uct.ac.za
Power System Network Studies	Kehinde.Awodele@uct.ac.za
Power Network Optimization, Control and Stability	Komla.Folly@uct.ac.za
Radar Signal Processing and Digital Signal Processing	Yunus.Abdulgaffar@uct.ac.za
Space Technology	Peter.Martinez@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.

Course Outlines

EEE4106Z INTRODUCTORY NUCLEAR PHYSICS AND RADIATION FOR POWER SUPPLY

16 NQF credits at HEQSF level 8

Convener: Emeritus Professor D Aschman

Course outline:

This advanced course aims to develop strong concepts of nuclear physics and radiation in the context of nuclear power reactors. Topics include: nuclear physics and radiation in the context of nuclear power reactors; atomic nature of matter; binding energy; radioactive decay; nuclear fission; neutron efficiency; ionising radiation; radiation detection and measurement; and effects of radiation on matter and biological systems.

DP requirements: None

Assessment: Coursework 30%, examination 70%.

EEE4107Z THERMODYNAMICS FOR NUCLEAR POWER STATIONS

16 NQF credits at HEQSF level 8

Convener: Dr 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%.

EEE4108Z ELECTRICAL & MECHANICAL EQUIPMENT IN NUCLEAR POWER STATIONS

16 NQF credits at HEQSF level 8

Convener: 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%.

EEE4109Z THEORY AND DESIGN OF NUCLEAR REACTORS

16 NQF credits at HEQSF level 8

Convener: Emeritus Professor CT Gaunt

Course outline:

This course aims to develop strong concepts of engineering theory and design as applied in the context of nuclear power reactors. Topics include: nuclear reactor engineering theory and design,

with an emphasis on pressurised water reactors: types and generations of power reactors; neutron life cycle; reactor operation theory; reactor core design; thermal-hydraulic analysis; core power density and effect on reactor size, control and shielding; corrosion and materials properties.

DP requirements: None

Assessment: Coursework 30%, examination 70%.

EEE4110Z OPERATION AND SAFETY OF NUCLEAR REACTORS

16 NQF credits at HEQSF level 8

Convener: Emeritus Professor CT Gaunt

Course outline:

This advanced course aims to develop strong concepts in the operation and safety of complex systems and the application in the context of nuclear power stations. Topics include: functional description and design of main components of primary, secondary, auxiliary and safety systems; physical phenomena determining order of magnitude of key parameters of reactor operation; system modelling, normal operating transients, accident scenarios and extreme event identification; shutdown and restart; reactor coolant system; reactor protection; electricity supplies needed for production and safety; and simulators.

DP requirements: None

Assessment: Coursework 30%, examination 70%.

EEE4111Z REGULATORY STANDARDS FOR NUCLEAR POWER

16 NQF credits at HEQSF level 8

Convener: Emeritus Professor CT Gaunt

Course outline:

This course aims to understand the principles of regulatory processes, including safety, environmental and operating regulations, and their application in the context of nuclear power. Topics will include the safety requirements and licencing processes for nuclear plants: nuclear regulation; design philosophy; radiation protection management; emergency preparedness; verification and assurance; learning from incidents; international peer review. Energy regulation: energy regulator, integrated energy planning. Environmental regulation: environmental impact analysis; environmental management plans; and monitoring.

DP requirements: None

Assessment: Coursework 30%, examination 70%.

EEE4112Z HONOURS NUCLEAR PROJECT

40 NQF credits at HEQSF level 8

Convener: Emeritus Professor CT Gaunt

Course outline:

An engineering project involves the creative application of scientific principles to the solution of a technical problem. It involves a problem description or research hypothesis developed in consultation with a supervisor, reviewing the topic in detail and defining the boundaries (scope) carefully, confirming an understanding of the requirements of the supervisor, searching for, selecting and justifying the most appropriate approaches to solving the problem or testing the hypothesis. It also requires a student to be able to analyse, design, build, integrate and test as is appropriate for the specific project. This could include the use of hardware, software and simulation. A student is required also to evaluate the project against the success criteria and design objectives, and to write a report about the project, the findings, and any recommendations. The report shall not exceed 18000 words. In addition a student must make an oral presentation and prepare a poster.

DP requirements: None

Assessment: Report 95%, Poster 5%

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EEE5000W FULL DISSERTATION: MSC(ENG)

180 NQF credits at HEQSF level 9

Convener: Professor E Boje

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 in engineering science or design; 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method as appropriate. The report shall not exceed 40 000 words without the Head of Department's approval of the candidate's written application and justification.

DP requirements: None

Assessment: Written work counts 100%.

EEE5002W PARTIAL DISSERTATION:MSC(ENG)

120 NQF credits at HEQSF level 9

Convener: Professor E Boje

Course entry requirements: EEE5103Z

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 in engineering science or design; 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method as appropriate. The report shall not exceed 30 000 words without the Head of Department's approval of the candidate's written application and justification.

DP requirements: None

Assessment: Written work counts 100%.

EEE5004Z MINOR DISSERTATION: M(ENG)

60 NQF credits at HEQSF level 9

Convener: Professor E Boje

Course outline:

The minor dissertation shall be on an engineering science or design topic consistent with the specialisation of the degree. The project 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: research 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method as appropriate. The report shall not exceed 20 000 words without the Head of Department's approval of the candidate's written application and justification.

DP requirements: None

Assessment: Written work counts 100%.

EEE5018Z MULTIVARIABLE CONTROL SYSTEM DESIGN

16 NQF credits at HEQSF level 9

Convener: Professor E Boje

Course entry requirements: EEE3069W or equivalent.

Course outline:

This course in multivariable control system design will cover selected topics in: Structure of large-scale systems, system decomposition. Frequency domain design methods: inverse nyquist arrays, characteristic loci, direct nyquist arrays. State Space design methods: pole placement control, state observers. Adaptive control methods: parameter estimators, minimum variance, pole placement designs in self-tuning regulators, and model reference adaptive controllers.

DP requirements: Satisfactory completion of coursework.

Assessment: Examination 3 hours.

EEE5022Z IMAGING RADAR APPLICATIONS

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: BSc(Eng) in Electrical Engineering or BSc(Hons) in Physics

Course outline:

This advanced course covers the underlying principles of all common imaging radar applications. Topics include: fundamentals of electromagnetic surface scattering; basics of synthetic aperture radar; interferometry; subsidence monitoring; polarimetry; scatterometers; altimeters; lidar and ground penetrating radar applications.

Assessment: Examination 3 hours.

EEE5032Z DIGITAL COMMUNICATIONS

Offered on Demand

20 NQF credits at HEQSF level 9; tutorials and 8 practical exercises as required and a project..

Convener: Associate Professor M Dlodlo

Course entry requirements: EEE3084W, EEE3086F or equivalent .and Postgraduates standing in Telecommunications or Radar

Course outline:

This advanced course in digital communications includes: Digital Communication Systems Theory: probability, random variables and random signal principles, modelling of digital communication signals and systems; modelling of information sources; optimum receivers, channel and system performance in the presence of Gaussian noise, synchronisation; channel models, channel capacity, and equalisation, resource allocation, multichannel and multicarrier systems, spread-spectrum signalling, optical communication signalling principles, and software-defined radios. Practical Applications: selected topics from baseband and bandpass signalling; technical standards for wireless / optical / satellite-based communication systems; multiplexing and multiple access standards; next generation communication systems

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

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

EEE5103Z DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

Course outline:

The aim of this course is to allow a student to undertake preparatory work for the master's dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of

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suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

EEE5105Z FUNDAMENTALS RADAR SIGNAL & DP

20 NQF credits at HEQSF level 9

Convener: Associate Professor A Mishra

Course entry requirements: BSc in Electrical Engineering, Honours in Science, including final year students

Course outline:

This course in the fundamentals of radar signal and data processing includes selected topics in: signal processing in radar systems (history of radar; basic radar functions; elements of pulsed radar; signal processing concepts in radar e.g. spatial resolution, sampling theory, correlation, interference suppression, phenomenology, imaging, detection). Signal models and processing in radar (radar cross section; radar equation; swerling models; clutter modelling; noise modelling and signal-to-noise ratio; jamming; doppler shift; cross-range; multipath; sampling in doppler and angle domains; quantization; I/Q modulation; radar; matched filtering; compression filtering; ambiguity function; pulse burst waveforms; frequency-modulated waveforms; phase modulated waveforms; doppler spectrum; moving target indication; pulse doppler processing; pulse pair processing) data processing; topics in radar (radar detection and hypothesis testing; threshold detection; binary integration; constant false alarm rate; cell-averaging CFAR; order statistic CFAR; spatial filtering; beam forming; space-time adaptive processing; and cognitive radar).

DP requirements: 80% attendance of lectures and completion of tutorials/projects.

Assessment: Project 25%, tutorials 20% and examination 55%

EEE5108Z ADVANCED ENGINEERING MATHEMATICS

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: All undergraduate calculus, algebra and numerical methods required by a typical BSc Engineering (Electronics) degree.

Course outline:

This course aims to develop an advanced understanding of radar, electronic protection and telecommunications mathematics. Selected topics include: statistics and random processes: probability and induction; causality versus randomness; distribution and density functions; mean and variance; moments; characteristic functions; probability space; conditional distributions and probability; Bernoulli's theorem and games of chance; bivariate distributions; joint moments; joint characteristic functions; conditional expected values; ergodicity detection and estimation: systems with stochastic inputs; the power spectrum; parameter estimation; hypothesis testing; mean square estimation; Cramer-Rao bounds; stochastic convergence and limit theorems; finite-order systems and state variables; spectral representation of random processes; spectrum estimation; bandlimited processes and sampling theory; deterministic signals in noise; bispectra and system identification; filtering and prediction; Kalman filters. linear algebra: system of linear equations; Cramer's rule; Gaussian elimination; Gauss-Jordan elimination; vectors and vector spaces; least squares; Gram-Schmidt process; vector differential calculus; vector integral calculus. Matrix algebra: matrix addition, multiplication, dot product, transpose; eigenvalue, eigenvector and eigenspace; Jordan normal form; matrix rank, determinants and inversion; matrix congruence and congruence relation; conjugate transpose and hermitian matrices; matrix orthogonality; matrix decomposition methods; specific types of matrices e.g. Toeplitz matrices. Numerical methods: numerical linear algebra, e.g. solving systems of linear equations and eigenvalue algorithms; Interpolation, e.g. polynomial interpolation, spline interpolation and trigonometric interpolation; finding roots of nonlinear equations; optimization, e.g. linear programming and nonlinear programming; numerical quadrature (i.e. integration); numerical differential equation solutions; and the Monte Carlo analysis.

DP requirements: 80% attendance of lectures and completion of tutorials/projects.

Assessment: Coursework 20%, examination 55% and project 25%.

EEE5109Z MULTI-TARGET MULTISENSOR TRACKING AND DATA FUSION*Offered on Demand*

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan**Course entry requirements:** BSc in Electrical Engineering, Honours in Science, including final year students.**Course outline:**

Part 1: Multi-Target Tracking (selected topics from) The Basics of Target Tracking. Sensor and Source Characteristics. Kinematic State Estimation: Filtering and Prediction basics (Kalman filtering, Bayesian filtering, others). Information-theoretic models (parametric templates, artificial neural networks, cluster algorithms, voting methods, figures of merit, pattern recognition, others) Modelling and Tracking Dynamic Targets. Passive Sensor Tracking. Basic Methods for Data Association. Advanced Methods for MTT Data Association. Attribute Data Fusion. Multiple Sensor Tracking - Issues and Methods. Multiple Sensor Tracking - System Implementation and Applications. Reasoning Schemes for Situation Assessment and Sensor Management. Situation Assessment; Tracking System Performance Prediction, and Evaluation. Multi Target Tracking with an Agile Beam Radar. Sensor Management. Multiple Hypothesis Tracking System Design and Application. Detection and Tracking of Dim Targets in Clutter.

Part 2 : Kinematic Data Fusion (selected topics from)Data/Information Fusion Models — JDL Data Fusion Model. Unified Data Fusion Model. Visual Situation Assessment Model. Strategies and Algorithms for Target Tracking and Data Fusion; Multiple Radar Tracking (Architectures; Centralized or distributed? Tracks or measurements? Sensor registration and alignment; Track fusion) Performance Evaluation of Data Fusion Systems, Software, and Tracking; Evaluation of tracking system; Covariance analyses; Correlation probabilities; Markov chains Simulation and Monte Carlo techniques Applications of Multisensor Systems and Data Fusion; Sensor Management in Data Fusion Systems (Sensor management functions Establishing target priorities; Sensor tasking).

DP requirements: 80% attendance of lectures and completion of tutorials/projects.**Assessment:** Projects 25%, tutorials 20% and examination 55%.

EEE5110Z CLUTTER & DETECTION IN CLUTTER*Offered on Demand*

20 NQF credits at HEQSF level 9

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

Selected topics from:Part 1: Ground and Sea Radar Clutter Modelling.

Statistical modelling of radar clutter. General sea and ground clutter features; Modelling for radar cross section (RCS); Empirically observed models (Rayleigh, Weibull, K, generalized K, log-normal, etc.); Extension of the Central Limit Theorem (CLT): the compound-Gaussian model; Multidimensional models of random clutter vectors; Radar clutter power spectral density models (Gaussian, power-law, exp., AR, etc.); - Experimental Validation: Sea Clutter Data. Amplitude analysis of HH, VV, HV, and VH data; Validation of the compound-Gaussian model by means of speckle and texture analyses; Cumulant domain analysis; Coherent analysis: empirical correlation and PSD; Incoherent analysis: empirical correlation; Non-stationarity and cyclostationarity of sea clutter data;Validation of the compound-Gaussian model by means of speckle and texture analyses; Cumulant domain analysis; Coherent analysis: empirical correlation and PSD; Incoherent analysis: empirical correlation; Non-stationarity and cyclostationarity of sea clutter data; Experimental Validation: Ground Clutter Data. Measurement instrumentation; Analysis of I and Q clutter components; Azimuth and range correlation/spectral analyses; Cumulant based Gaussianity test; Amplitude PDF analysis; Impact of clutter statistics and spectral models on radar performance prediction. Clutter simulation for radar performance evaluation.

Part 2: Coherent Radar Target Detection in Heavy-Tailed Clutter.

- Coherent Detection of Radar Targets in non-Gaussian Disturbance. Radar detection problem; Optimum coherent detection in Gaussian clutter; Optimum coherent detection in compound-

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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%.

EEE5111Z HIGH RESOLUTION AND IMAGING RADAR

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: BSc in Electrical Engineering, Honours in Science, including final year students.

Course outline:

Part 1: High Resolution Radar (selection of) Application of the Radar Range Equation to High-Resolution Radar, High-Resolution Radar Design; High-Range-Resolution Waveforms and Processing; Synthetic High-Range-Resolution Radar.

Part 2: Synthetic Aperture Radar (selection of) Synthetic Aperture Concepts; SAR Signal Properties; SAR Processing Algorithms (Range Doppler Algorithm; Chirp Scaling Algorithm; Omega-K Algorithm; SPECAN Algorithm) Comparison of Algorithms; Doppler Centroid Estimation; Automatic Focusing; Advanced concepts (Polarimetric SAR; Interferometric SAR; GMTI); Applications of SAR (Military, Earth Observation, Digital Terrain Elevation Models).

Part 3: Inverse Synthetic Aperture Radar (selection of) Inverse Synthetic Aperture Radar Concepts; ISAR Geometry and Signal Modeling; ISAR image formation (RF Front-End and Signal demodulation; Radial motion compensation (Autofocusing); Image formation (Range-Doppler (RD), Joint Time-Frequency Analysis (JTFA), Back-projection); Interpretation of ISAR Images Image Autofocusing techniques (Parametric and non-parametric techniques; Hot Spot Processing (Prominent Point Processing); Phase Gradient Autofocus (PGA); Image Contrast Based Autofocus (ICBA); Image Entropy Based Autofocus (IEBA); Comparison of methods Time-window selection; Cross range scaling; ISAR imaging using CLEAN techniques; Polarimetric ISAR; Recent advances (Bistatic and multi-static ISAR, 3D ISAR).

DP requirements: 80% attendance of lectures and completion of tutorials/projects.

Assessment: Projects 25%, tutorials 20% and examinations 55%.

EEE5112Z RADAR SYSTEM MODELLING

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: BSc in Electrical Engineering, Honours in Science, including final year students

Course outline:

This course aims to develop an advanced understanding of radar system modelling. Topics include: modelling & 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%.

EEE5114Z SPECIAL TOPICS IN RADAR A

Offered on Demand

5 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course outline:

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures and a post cost seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

DP requirements: None

Assessment: 3 hour Examination 100%.

EEE5115Z SPECIAL TOPICS IN RADAR B

Offered on Demand

5 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course outline:

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post cost seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

DP requirements: None

Assessment: 2 hour examination 100%.

EEE5116Z SPECIAL TOPICS IN RADAR C

Offered on Demand

5 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course outline:

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

DP requirements: None

Assessment: 3 hour examination 100%

EEE5117Z SPECIAL TOPICS IN RADAR D

Offered on Demand

10 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course outline:

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

DP requirements: None

Assessment: 3 hour examination 100%

EEE5118Z SPECIAL TOPICS IN RADAR E

Offered on Demand

10 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

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Course outline:

This short course is a presentation and study of a specialist topic in the field of radar and electronic defence. A student will participate in 16 hours of lectures, and a post course seminar, which will discuss a problem, set by the course convener. Assessment is by means of a written examination.

DP requirements: None

Assessment: 3 hour examination 100%

EEE5119Z INTRODUCTION TO RADAR SYSTEMS

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: BSc in Electrical Engineering, Honours in Science, including final year students

Course outline:

This advanced course in radar systems includes: Introduction to Signal Processing in Radar Systems (basic radar functions; elements of pulsed radar; signal processing concepts in radar e.g. spatial resolution, sampling theory, correlation, interference suppression, phenomenology, imaging, detection). Signal Models and Processing in Radar (radar cross section; radar equation; swerling models; clutter modelling; noise modelling and signal-to-noise ratio; jamming; doppler shift; cross-range; multipath; sampling in doppler and angle domains; quantization; I/Q modulation; radar; matched filtering; compression filtering; ambiguity function; pulse burst waveforms; frequency-modulated waveforms; phase modulated waveforms; Doppler spectrum; moving target indication; pulse doppler processing; pulse pair processing). Data Processing Topics in Radar (radar detection and hypothesis testing; threshold detection; binary integration; constant false alarm rate; CFAR forms, {Cell-averaging CFAR; Order statistic CFAR}); spatial filtering; temporal filtering, beam forming; space-time adaptive processing; concepts of cognitive radar). Introduction to Radar Target Recognition Information available in radar signals; extracting features from radar signals, signal processing for target recognition, pattern recognition techniques, secondary radar, over the horizon radar, and subsurface radar.

DP requirements: 80% attendance of lectures and completion of tutorials/projects.

Assessment: Coursework 40% and examination 60%

EEE5120Z INTRODUCTION TO ELECTRONIC DEFENCE

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O' Hagan

Course entry requirements: BSc in Electrical Engineering, Honours in Science, including final year students.

Course outline:

This course is an advanced introduction to electronic defence. Selected topics include: Electronic Warfare: threats, requirements and principles (information warfare, intelligence, electronic attack against radar & communication systems). Advanced Radar Threat (low-intensity threat, air defence radar, phased array radars, airborne radar, EP techniques for surveillance and tracking radar). Modern EA Systems: architecture, types, and technology (onboard/offboard architectures, operational EA systems architecture, EA radar jamming waveforms, transponder jamming, support jamming). EA Against Modern Radar Systems (pulse compression, pulsed doppler radar, monopulse, coherent sidelobe cancelers). Digital Radio Frequency Memory (DRFM architectures, DRFM fundamentals, DRFM sampling techniques, direct digital synthesizer, advanced DRFM architecture, voltage controlled oscillators). Electronic Warfare Support (signal and threat environment, parameters measured by the ES system, advanced ES systems, direction finding, probability of intercept). Expendables and Decoy Systems (design of expendable EA systems, chaff, infrared missile attack). Directed Energy Weapons and Stealth Technology (directed energy weapons, stealth). Applications of EW-Surveillance (search for, intercept, identify, and locate or localize sources of intentional and un-intentional radiated electromagnetic energy for immediate threat recognition, targeting, planning). Jamming (use of electromagnetic energy, directed energy, or

anti-radiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability). Protection (passive and active means to protect personnel, facilities, and equipment from any effects of friendly or enemy use of the electromagnetic spectrum that could degrade, neutralize, or destroy friendly combat capability).

DP requirements: 80% attendance of lectures and completion of tutorials/projects.

Assessment: Coursework 40% and examination 60%

EEE5121Z MICROWAVE COMPONENTS& ANTENNAS

Offered on Demand

20 NQF credits at HEQSF level 9; block release.

Convener: Associate Professor D O'Hagan

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 HEQSF level 9; block release.

Convener: Professor A Baghai-Wadji

Course outline:

This course introduces students to classical, modern and cutting-edge computational techniques for modelling and simulation of micro-electronic, micro-acoustic, and photonic devices. The course provides instruction in: finite difference method, finite element method, boundary element method, classical statistical methods, standard integral transform techniques, variational analysis techniques, method of functional analysis, iterative techniques, asymptotic analysis methods and micro-acoustic devices, electromagnetic and acoustic near-fields, photonic devices, meso-scopic electronic devices.

DP requirements: None

Assessment: Coursework 30% and examination 70%.

EEE5123S COMPUTATIONAL ELECTRONICS II

20 NQF credits at HEQSF level 9; block release.

Convener: Professor A Baghai-Wadji

Course outline:

This course introduces 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%.

EEE5124Z SPACE AND SOCIETY

15 NQF credits at HEQSF level 9; block release.

Convener: Professor P Martinez

Course outline:

This advanced course will focus on the societal dimensions of space science and technology. The course will cover the scientific, military, economic and political rationales for space activities. The various international and national regulatory frameworks for space activities will be covered as well as the rationales for and salient aspects of international space cooperation. Space activities are often thought of in terms of their scientific and technological attributes. Yet, the successful implementation of both public and private sector space programmes relies on a wide variety of non-space factors. This course will cover: the historical and current economic, political, military and regulatory drivers for space activities. The drivers for international cooperation in space activities and the changing geopolitics of space cooperation. An overview of regulation of space activities at national and international level and the financing of space projects. A further important aim will be to train students in the communication of space activities to the media and to non-specialist audiences.

DP requirements: None

Assessment: Coursework 45% and examination 55%

EEE5125Z SPACE APPLICATIONS FOR SUSTAINABLE DEVELOPMENT

15 NQF credits at HEQSF level 9; block release.

Convener: Professor P Martinez

Course outline:

Space systems play a critical role in the modern information society. The course will focus on the applications of space technology to address sustainable development challenges from a local and global perspective. The three main pillars of space applications are: Earth observation, communications and satellite-aided positioning, timing and navigation. These technologies may be applied to a wide variety of problems in food, water and human security, climate change, environmental management, disaster management and telemedicine and tele-education. The course will provide an overview of the main applications of space systems to support sustainable development. The course content will be supplemented by hands-on workshops in which students will have the opportunity to work with satellite data to solve real-world problems.

DP requirements: None

Assessment: Coursework 45% and examination 55%

EEE5126Z SPACE MISSION ANALYSIS AND DESIGN

15 NQF credits at HEQSF level 9; block release.

Convener: Professor P Martinez

Course outline:

Spacecraft are considered to be part of a space system that comprises both a space segment and a ground segment. This requires an understanding of the space environment and its effects on spacecraft, as well as the basic principles of astronautics to describe satellite orbits and spacecraft trajectories. This course aims to provide a systematic introduction to all the aspects and processes involved in the definition, design, development, testing and operation of space systems. Students are introduced to analysis tools that can be used to explore different mission architectures from the point of view of the space environment, Earth coverage, orbit selection, mission operations and data/information flow and analysis. The course will also address access to space and space transportation from a mission design perspective.

DP requirements: None

Assessment: Coursework 45% and examination 55%

EEE5127Z SPECIAL TOPICS IN SPACE STUDIES

5 NQF credits at HEQSF level 9

Convener: Professor P Martinez**Course outline:**

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The course will cover an important topic in space studies that is not covered by other courses. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures and supplemented by the use of online resources. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and deepen the students' knowledge of the special topic.

DP requirements: None**Assessment:** Coursework 45% and examination 55%

EEE5128Z NUCLEAR REACTOR THEORY AND DESIGN

20 NQF credits at HEQSF level 9

Convener: Emeritus Professor CT Gaunt**Course outline:**

This advanced course aims to develop strong concepts of engineering theory and design as applied in the context of nuclear power reactors. Topics include: nuclear reactor engineering theory and design, with an emphasis on pressurised water reactors: types and generations of power reactors; neutron life cycle; reactor operation theory; reactor core design; thermal-hydraulic analysis; core power density and effect on reactor size, control and shielding; corrosion and materials properties.

DP requirements: None**Assessment:** Coursework 30%, examination 70%.

EEE5129Z NUCLEAR REACTOR OPERATIONS AND SAFETY

20 NQF credits at HEQSF level 9

Convener: Emeritus Professor CT Gaunt**Course outline:**

This advanced course aims to establish strong concepts of the operation and safety of complex systems and the application in the context of nuclear power stations. Topics include: functional description and design of main components of primary, secondary, auxiliary and safety systems; physical phenomena determining order of magnitude of key parameters of reactor operation; system modelling, normal operating transients, accident scenarios and extreme event identification; shutdown and restart; reactor coolant system; reactor protection; electricity supplies needed for production and safety; and simulators.

DP requirements: None**Assessment:** Coursework 30%, examination 70%.

EEE5130Z REGULATORY REQUIREMENTS FOR NUCLEAR POWER

20 NQF credits at HEQSF level 9

Convener: Emeritus Professor CT Gaunt**Course outline:**

This course aims to develop an advanced understanding of nuclear facility licencing, assess the integration of nuclear energy into large power systems, and understand environmental impact assessment and management. Topics include: safety requirements and licencing processes for nuclear plants: nuclear regulation; design philosophy; radiation protection management; emergency preparedness; verification and assurance; learning from incidents; international peer review. Energy regulation: energy regulator, integrated energy planning; independent system operators; market systems. Environmental regulation: environmental impact analysis; environmental management plans; and monitoring.

DP requirements: None**Assessment:** Coursework 30%, examination 70%.

EEE5131Z MICROWAVE FILTERS

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Associate Professor R Geschke

Course outline:

The course is presented over five days and presents a systematic progression of topics from specification and theoretical synthesis, CAD-assisted design and practical manufacturing techniques for microwave filters operating in the frequency ranges of typical radar systems.

DP requirements: 80% attendance and submission of seminars and tutorial assignments

Assessment: Coursework 50%, Examination 50%

EEE5132Z SPECIAL TOPIC IN RADAR F

20 NQF credits at HEQSF level 9

Convener: Associate Professor D O'Hagan

Course entry requirements: An Engineering Honours Degree or equivalent.

Course outline:

This course is a presentation and study of a specialist topic in the field of Radar and Electronic Defence. A student will attend 35 hours of lectures in block release format in 1 week. This will be 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%

EEE5133Z SPECIAL TOPICS IN SPACE TECHNOLOGY B

5 NQF credits at HEQSF level 9

Convener: Professor P Martinez

Course outline:

This course provides an introduction to a highly specialised or cutting-edge topic in space studies. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures, supplemented by the use of online resources and distance-learning methods. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and hence deepen the course participant's knowledge of the special topic in question.

DP requirements: 80% attendance at all lectures and learning events and submission of all assignments.

Assessment: Coursework 45%, Examination 55%

EEE5134Z SPECIAL TOPICS IN SPACE TECHNOLOGY C

5 NQF credits at HEQSF level 9

Convener: Professor P Martinez

Course entry requirements: An Engineering degree or equivalent four-year degree.

Course outline:

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures, supplemented by the use of online resources and distance-learning methods. The course convener and/or presenter will set goals for structured self-learning to complement the classroom learning and hence deepen the course participant's knowledge of the special topic in question.

DP requirements: 80% attendance at all lectures and learning events and submission of all assignments.

Assessment: Coursework 45%, Examination 55%

EEE5135Z INFORMATION THEORY & ERROR-CONTROL CODING

20 NQF credits at HEQSF level 9

Convener: Associate Professor M Dlodlo**Co-requisites:** Postgraduate standing in Electrical Engineering and exposure to undergraduate telecommunications content**Course outline:**

This course explains the basic ideas of information theory and the correspondences between the elements of this theory and certain natural concepts of importance in a wide number of fields, such as transmission, storage, authoring and protection of data. On the basis of simple concepts from probability calculus, models are developed for a discrete information source and a discrete communication channel. Further, the theoretical basics for developing source coding algorithms is provided, as well as the basics of optimal data transmission through a discrete communication channel. Introduction to error-correcting codes; mathematical basics; block codes fundamentals; cyclic codes; co-operating codes; soft-decision decoding; convolutional codes; iterative decoding (turbo codes, LDPC codes); applications.

DP requirements: None**Assessment:** Coursework 50%, Examination 50%

EEE5136Z STATISTICAL SIGNAL THEORY

20 NQF credits at HEQSF level 9

Convener: Dr A Murgu**Course entry requirements:** MAM2083F/S, EEE2036S, EEE3086F, or equivalents.**Co-requisites:** None**Course outline:**

This course originates in the realm of causal uncertainty over observed phenomena due to incomplete information from the real world. The theory of probability seeks to mathematically verify whether or not predictions about these phenomena are justifiable and pragmatic. The course challenges the participants to assume the probabilistic model of events where some of the possible determining factors may be unavailable. Mathematical statistical theory then enables us to examine the concepts and measure the likelihood of 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 in communication systems. elements of DSP; estimation filtering and detection of random signals; information pattern retrieval.

DP requirements: Assignment mark of at least 40%**Assessment:** Coursework 40%, Examination 60%

EEE5138Z BROADBAND COMMUNICATION NETWORKS

20 NQF credits at HEQSF level 9

Convener: Mr N Ventura**Course entry requirements:** Postgraduate standing in Electrical Engineering or background in undergraduate communication engineering course work.**Co-requisites:** None**Course outline:**

Enterprises are faced with demands that focus their attention on the need to design, evaluate, manage and maintain networks infrastructures to process large quantity of data, move portions of the information technology operation to a cloud computing infrastructure, have large number of objects providing services to end users and have mobile devices as an indispensable part of an enterprise generating unique demands on network planning and management.

The course aims to develop an understanding of key innovation areas in Modern Networking, which are closely related but nevertheless represent different research domains, namely:

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1. Network of the Future (NoF) driven by Mobile Broadband evolution towards high bandwidth heterogeneous access networks, single core network architectures, and the notion of Software Defined Networks (SDN) and the Openflow protocol;
2. Traditional concepts of virtual networks and the modern approach to network virtualization; the concept of software defined infrastructure;
3. Cloud-based Networks and Service Delivery Platforms (SDP), enabling much more scalable and cost efficient realizations and role outs of networks and innovative applications;
4. Internet of Things (IoT) and unified Machine to Machine (M2M) communications enabling the convergence of a broad spectrum of monitoring and control applications;
5. The 5G infrastructure which is expected to become the core of the digital society and economy. Anything as a service (XaaS) everywhere is envisioned as among the primary drivers for global adoption. 5G will support mission-critical machine communications and massive machine type of traffic.

DP requirements: 80% attendance and handing in of tutorials

Assessment: Coursework 20%, Project 30% and Examination 50%

EEE5139Z WIRELESS DATA NETWORK CONVERGENCE

20 NQF credits at HEQSF level 9

Convener: Associate Professor OE Falowo

Course entry requirements: Postgraduate standing in Electrical Engineering or EEE3084W or EEE3083F and EEE3085S or equivalent.

Co-requisites: Postgraduate standing in Electrical Engineering and prior exposure to undergraduate telecommunications content.

Course outline:

This course aims to introduce students to advanced wireless networks with an emphasis on architecture, components, and protocols, as well as the latest developments in 4G towards 5G wireless standards. New concepts of mobility management, software defined network and new developments will be covered together with 3GPP standards and Internet Engineering Task Force (IETF) standard protocols. These examples will enable student engagement with the theoretical material and the related practical issues. Students will be able to understand the challenges associated with the latest generation of wireless networks and gain insight into new techniques under development.

DP requirements: None

Assessment: Coursework 40%, Examination 60%

EEE5140Z SOFTWARE DEFINED RADIO

Offered on Demand

20 NQF credits at HEQSF level 9

Convener: Dr S Winberg

Course outline:

This course aims to provide advanced students with an overview of a 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: understand the fundamentals of the communication link, modulation and demodulation, digital filters, dealing with uncertainty and errors in the channel, error detection and correction mechanisms, characteristics of wireless 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, benefits and limitations encountered in choosing a software-defined radio system design. Understand elementary antenna design 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%

EEE5141Z SPECIAL TOPICS IN SPACE TECHNOLOGY D*Offered on Demand*

5 NQF credits at HEQSF level 9

Convener: Professor P Martinez**Course outline:**

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The course will cover an important topic in space studies that is not yet covered by other courses. 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 methods. The course will set goals for structured self-learning to complement the classroom learning and deepen knowledge of the special topic.

DP requirements: None**Assessment:** Coursework (45%), Examination (55%)

EEE5142Z SPECIAL TOPICS IN SPACE TECHNOLOGY E*Offered on Demand*

5 NQF credits at HEQSF level 9

Convener: Professor P Martinez**Course outline:**

This course provides an introduction to a highly specialized or cutting-edge topic in space studies. The course will cover an important topic in space studies that is not yet covered by other courses. The topic will be presented by a leading practitioner in the field. The course will be delivered through lectures, supplemented by online resources and methods. The course will set goals for structured self-learning to complement the classroom learning and deepen knowledge of the special topic.

DP requirements: None**Assessment:** Coursework (45%) Examination (55%)

EEE5143Z COMPUTATIONAL LINGUISTICS

16 NQF credits at HEQSF level 9

Convener: Dr M Tsoeu**Course outline:**

This course aims to introduce advanced students to aspects of linguistics: phonetics, phonology, morphology, syntax, semantics, speech production and perception, which are relevant to machine processing of languages and speech. A review of measurement systems, and signal processing: sampling, Fourier transforms, modulation, will be covered with applications to acoustics. An introduction to probability theory and its applications in parameter estimation will be covered, leading to advanced concepts in machine learning: neural networks, support vector machines, hidden Markov models, deep learning and auto-encoders, with applications to language signal processing, acoustic modeling, language modeling, language recognition and translation. This course will be taught using a selected programming language between: C++, C#, Java and Python, and applied to a selected set of South African Languages: English, Afrikaans, Sesotho, Sepedi, Setswana, isiXhosa, isiZulu, isiSwati, isiNdebele, Tshivenda, Xhitsonga and South African Sign Language.

DP requirements: Completion of practicals and class project.**Assessment:** 10% test, 20% project, 10% tutorial, 10% practicals, 50% exam

EEE5144Z MATHEMATICAL METHODS IN NETWORK OPERATIONS AND MANAGEMENT

20 NQF credits at HEQSF level 9

Convener: Dr A Murgu

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Course outline:

This course aims to develop an advanced understanding of networks services management and governance approaches in modern communication and data networks. Topics include: linear and nonlinear programming, planning and scheduling models for fixed-mobile convergence of the next-generation networks and services; network topology modeling, minimum spanning trees for network interoperability, hierarchical and reconfigurable networks; max-flow and min-cost flow problem models for network operations: routing, multicasting, flow control, data parsing, information retrieval, signaling; parametric flow optimization problem: time lags modeling, dynamic networks models for Multi-Protocol Label Switching(MPLS), Virtual Private LAN Systems (VPLS), network virtualization, multiservice platforms, data servers, cluster servers; digraphic sequencing models for network reconfiguration, evolution and self-optimization; network economics: utility theory, competition, arbitrage, convergence; applications to service clouds, resource sharing, pooling and splitting; models of service governance.

DP requirements: Assignment mark of at least 40%

Assessment: Coursework 40%, examination 60%

EEE5145W MINOR DISSERTATION: MPHIL

60 NQF credits at HEQSF level 9

Convener: Professor E Boje

Course outline:

The minor dissertation shall be on a multi- or inter-disciplinary topic associated with electrical engineering and on a topic consistent with the taught courses and/or the specialisation of the degree. The project 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: research 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method or rigorous investigation by deductive or inductive reasoning or rhetoric, as appropriate. The report shall not exceed 20 000 words without the Head of Department's approval of the candidate's written application and justification.

DP requirements: None

Assessment: Written work counts 100%.

EEE5146W PARTIAL DISSERTATION: MPHIL

120 NQF credits at HEQSF level 9

Convener: Professor E Boje

Course entry requirements: EEE5103Z

Course outline:

The research dissertation in partial fulfilment of a degree shall be on a multi- or inter-disciplinary topic associated with electrical engineering and on a topic consistent with the taught courses and/or the specialisation of the degree. The project 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: research 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method or rigorous investigation by deductive or inductive reasoning or rhetoric, as appropriate. The report shall not exceed 30 000 words without the Head of Department's approval of the candidate's written application and justification.

DP requirements: None

Assessment: Written work counts 100%.

EEE5147W FULL DISSERTATION: MPHIL

180 NQF credits at HEQSF level 9

Convener: Professor E Boje**Course outline:**

The dissertation shall be on a multi- or inter-disciplinary topic associated with electrical engineering and 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; research 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. The written report shall demonstrate the candidate's understanding and application of the scientific method or engineering method or rigorous investigation by deductive or inductive reasoning or rhetoric, as appropriate. The report shall not exceed 40 000 words without the Head of Department's approval of the candidate's written application and justification.

EEE5148Z THEORETICAL FOUNDATIONS IN ENGINEERING EDUCATION RESEARCH

15 NQF credits at HEQSF level 9

Course outline:

This course aims to provide an introduction to substantive theories that address key educational concepts. These broad concepts revolve around the notions of identity, discourse, knowledge, student experience, and social structure. Students should be able to: demonstrate understanding of key theoretical concepts for framing engineering education in the higher education context; evaluate the utility of theories introduced to describe and explain engineering education phenomena; critically evaluate engineering education research literature (from a theoretical perspective); and construct a theoretical argument.

EEE5149W DISSERTATION ENGINEERING EDUCATION

120 NQF credits at HEQSF level 9

Course outline:

The dissertation should incorporate any or all of the following: design of an engineering education research project involving advanced concepts and theoretical principles located in the engineering education research field; 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, a rigorous analysis of empirical data, and the development of a coherent discussion of the analysis, or any other study acceptable to the Faculty.

END5050X MASTERS JOURNAL PAPER REQUIREMENT

0 NQF credits at HEQSF level 9

Course outline:

The aim of submitting a research paper for the masters' degree is to develop an understanding of what is required for the publication of research findings. To this end a candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by a Panel of Assessors. This is a requirement for candidates submitting either a 180 or 120 credit dissertation for the following degrees: MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc in Property Studies. Refer to the appropriate degree rules.

DP requirements: None

EEE6000W PHD IN ELECTRICAL ENGINEERING

360 NQF credits at HEQSF level 10

Course outline:

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake

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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%.

MECHANICAL ENGINEERING

The Department offers the following postgraduate degree programmes:

Research projects and courses are offered through which suitably qualified graduates may enter the PGDip in Power Plant Engineering, BSc Honours in Materials Science, MSc(Eng), MPhil(Eng), MEng and PhD.

These areas of specialisation include:

Computational Mechanics
 Mechanical and Mechatronic Engineering
 Energy and Development Studies
 Engineering Management
 Materials Engineering
 Mechanical Engineering
 Sustainable Energy Engineering

Research Entities

Blast Impact and Survivability Research Unit (BISRU)
 Centre for Materials Engineering (CME)
 Centre for Research in Computational and Applied Mechanics (CERECAM)
 Energy Research Centre (ERC)

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

Staff

Professor and Head of Department

GS Langdon, BEng PhD *Liverpool* MIMechE CEng

Deputy Heads of Department

Research: Professor PG Rousseau, PrEng BEng (Mech) MEng (Mech) PhD *Pretoria* OPM *HBS*
 Teaching: Professor BI Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* FSAIMechE

Professors

T Bello-Ochende, PrEng BEng MEng *Ilorin* PhD *Duke* MASME
 RD Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE
 H Winkler, MSc *Berkley* MA PhD *Cape Town*

Emeritus Professors

KF Bennett, BSc(Eng) *Cape Town* MSc CNA A PhD *Cape Town* FSAIMechE
 J Gryzagoridis, PrEng BSc(Eng) *Lamar* MSc(Eng) *Texas A&M* PhD *Cape Town* MSAIMechE
 M(SA)IRAC M(SA)INT M(SAAM) M(N.YORK) ACAD.SCIENCES
 GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE
 RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE

Honorary Professor

L Jestin, Msc(Eng) PhD *Marseille* HDR *Provence*

Adjunct Professor

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

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SARChI South African Research Chair in Computational Mechanics

Professor BD Reddy, BSc(Eng) *Cape Town* PhD *Cantab*

SARChI South African Research Chair in Industrial CFD

Professor AG Malan, PrEng BEng(Mech) MEng(Mech) *Pretoria* PhD *Swansea*

Associate Professors

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

WF Fuls, BSc(Eng) MSc(Eng) PhD(Eng) *NWU*

R Kuppuswamy, BEng(Hons) MTech PhD *Singapore* SMSME

HD Mouton, BSc(Eng) *Pretoria* BSc *Unisa* BEng(Hons) MEng *Pretoria* PhD Eng *NWU*

G Vicatos, PrEng BSc(MechElec)(Marine) *Newcastle* MSc(Aero) DIC *London* PhD *Cape Town*

CJ von Klemperer, BSc(Eng) MSc(Eng) PhD *Natal*

Senior Lecturers

TJ Cloete, BIng MIng *Stellenbosch*

C Findeis, NHD(Mech Eng) *Pretoria*

D Findeis, BSc(Eng) MSc(Eng) *Cape Town* MSAIMechE

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

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

EB Ismail, BSc(Eng) MSc(Eng) *Cape Town*

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

MN Ngoepe, BSc(Eng) *Cape Town*, DPhil *Oxon*

HT Pearce, BSc(Eng) *Cape Town* MS PhD *Illinois*

S Parker, BSc(Eng) MSc(Eng) *Cape Town*

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

CD Woolard, MSc *London* PhD *Cape Town*

Lecturers

LC Raw, BSc(Eng) MSc(Eng) *Cape Town*

Principal Technical Officers

P Smith

R Whittemore, BSc(Eng) *Cape Town*

Chief Technical Officer

D Jacobs

Senior Technical Officers

H Christians

G du Plessis

Technical Assistants

P Jacobs

W Slaverse

Departmental Manager

CMC Jonker, BCom(Hon) *UWC*

Administrative Officer (Undergraduate)

R Maree

Administrative Assistant (Postgraduate)

TBC

Administrative Officer (Finance)

B Glass

Senior Secretary

S van Sensie

Department Assistant

G Doolings

Postgraduate Programmes

- Bachelor of Science Honours in Materials Science
- Postgraduate Diploma in Power Plant Engineering
- Master of Engineering by 120 credits coursework and a 60 credit dissertation
- Master of Science in Engineering by 180 credit dissertation
- Master of Science in Engineering by 60 credits coursework and a 120 credit dissertation
- Master of Philosophy by coursework and dissertation
- Doctor of Philosophy

Honours Programmes

Bachelor of Science Honours in Materials Science [EH005MEC04]

Programme Convener:

CD Woolard, MSc *London* PhD *Cape Town*

The Department offers a BSc(Hons) in Materials Science to graduates with a three-year Bachelor of Science degree. The aim is to provide one year of intensive training in Materials Science and Technology. The broad-based instructional approach prepares graduates for careers in a wide range of industrial settings, from small manufacturing companies to large corporations producing bulk commodity products, and R&D laboratories. In addition the BSc(Hons) in Materials Science programme prepares students for registration for research degrees in Materials Engineering at the Master's and ultimately Doctoral levels.

The programme runs over one year, with students taking a structured programme of **144 credits** of coursework, including a project, as follows.

Core Courses

Code	Course	NQF Credits	HEQSF Level
MEC4091Z	Materials Science Honours Research Project.....	40	8
MEC4096Z	Manufacture & Properties of Composites	12	8
MEC4097Z	Manufacture & Properties of Ceramics.....	8	8
MEC4098Z	Properties & Manufacture of Metallic Materials.....	16	8
MEC4100Z	Manufacture & Properties of Polymers.....	12	8
MEC4114Z	Experimental Techniques in Materials Science.....	16	8
	Approved Electives	40	8
	Total credits	144	

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Elective Courses

Select courses to the value of 40 credits from the following:

Code	Course	NQF Credits	HEQSF Level
CHE3069S	Mineral and Metallurgical Processing	16	7
MEC3060F	Materials under Stress	8	7
MEC3069S	Production Processes	8	7
MEC4088Z	Manufacturing with Materials	12	8
MEC4099Z	Phase Transformations in Materials	8	8
END5044F	Professional Communication Studies	16	9

Postgraduate Diplomas

Postgraduate Diploma in Power Plant Engineering

[EG010MEC11]

Associate Professor:

WF Fuls, SSc(Eng) MSc(Eng) PhD(Eng) *NWU*

The department offers a Postgraduate Diploma in Power Plant Engineering. The aim is to provide growth and development opportunities for engineers, scientists and technologists employed by, or interested in, the power generation and distribution industry. The diploma allows students to further develop the high-level specialist skills required to deal with specific technical challenges faced by those working in, or entering, the power plant industry. The programme is specifically designed to run over two years to accommodate employed students, with students taking a structured programme of 120 credits of coursework, as follows:

Core Courses

Code	Course	NQF Credits	HEQSF Level
MEC4115Z	Overview of the Power Plant Industry	15	8
MEC4116Z	Power Plant Systems Analysis	15	8
MEC4118Z	Systems Engineering in the Power Industry	15	8
MEC4119Z	Mechanical Behaviour of Materials	15	8
MEC4120Z	Leadership in a Technical Environment	15	8
	Approved Electives	30	8/9
	Total credits	120	

Note: Certain courses run every other year. Contact the course convener for more information.

Elective Courses

Select courses to the value of 30 credits from the following:

Code	Course	NQF Credits	HEQSF Level
MEC4122Z	Turbine Plant Engineering	15	8
MEC4117Z	Power Plant Boilers: Thermofluid Processes & Controls	15	8
	Other approved electives*	30	8-9

*Other MEC or EEE courses at HEQSF level 8 or 9 may be taken as electives, subject to approval by the programme convener. It is also possible to take relevant courses at other universities as an occasional student, upon approval of the programme convener.

Master's Programmes

MSc in Engineering specialising in Mechanical Engineering [MEC01]

Research Master's by dissertation

[EM023MEC01]

EM023 Research Master's by dissertation

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC5000W	Dissertation Mechanical Engineering	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Research Master's by coursework and dissertation

[EM024MEC01]

Not offered in 2019

EM024 Research Master's by coursework and dissertation

Core Courses

Code	Course	NQF Credits	HEQSF Level
MEC5010Z	Dissertation Mechanical Engineering	120	9
	Elective courses approved by supervisor	60	9
MEC5097Z	Dissertation Preparation	0	9
END5050X	Master's journal paper	0	9
	Total credits	180	

MSc in Engineering specialising in Materials Engineering [MEC03]

The Centre for Materials Engineering prepares candidates for the Master of Science in Engineering in Materials Engineering and for the Doctor of Philosophy.

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

Research Master's by dissertation

[EM023MEC03]

EM023 Research Master's by dissertation

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC5070W	Dissertation Materials Engineering	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Research Master's by coursework and dissertation

[EM024MEC03]

Not offered in 2019

EM024 Research Master's by coursework and dissertation

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Core Courses

Code	Course	NQF Credits	HEQSF Level
MEC5071Z	Dissertation Materials Engineering	120	9
	Elective courses approved by supervisor	60	9
MEC5097Z	Dissertation Preparation	0	9
END5050X	Master's journal paper	0	9
	Total credits	180	

MSc in Engineering specializing in Sustainable Energy Engineering **[EM023MEC07]**

Professor and Convener:

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

Compulsory Courses

Code	Course	NQF Credits	HEQSF Level
MEC5060W	Dissertation: Sustainable Energy Engineering	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

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

Not offered in 2019

Professor and Convener:

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

The Energy Research Centre offers a structured Master's Programme in Sustainable Energy Systems Engineering, specifically aimed at science and engineering graduates with an interest in Energy Systems Analysis. Students are required to complete 60 credits of course work, specified below. Courses other than those on the list below may be taken subject to approval by the Director of the Energy Research Centre. To qualify for the degree in MSc(Eng), candidates are required to complete a supervised dissertation, equivalent to a further 120 credits, the topic of which requires the approval of the Director of the ERC.

Compulsory Courses

Code	Course	NQF Credits	HEQSF Level
MEC5061Z	Dissertation: Sustainable Energy	120	9
MEC5099Z	Fundamentals of Energy for Development	30	9
MEC5100Z	Energy Systems Analysis	30	9
MEC5097Z	Dissertation Preparation	0	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Master of Philosophy specialising in Energy & Development Studies **[EM025MEC08]**

Professor and Convener:

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

Compulsory Course

Code	Course	NQF Credits	HEQSF Level
MEC5093W	Dissertation Energy & Development Studies	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Master of Philosophy specialising in Energy & Development Studies

[EM026MEC08]

Not offered in 2019

Professor and Convener:

H Winkler, MSc Berkeley MA PhD Cape Town

The Energy Research Centre offers a structured Master's Programme in Energy and Development Studies, specifically aimed at graduates from diverse academic backgrounds with an interest in Energy and Climate Policy. Students are required to complete 60 credits of course work, specified below. Courses other than those on the list below may be taken subject to the approval of the Director of the Energy Research Centre. To qualify for the MPhil degree candidates are required to complete a supervised dissertation, equivalent to a further 120 credits, the topic of which requires the approval of the Director of the ERC.

Compulsory Course

Code	Course	NQF Credits	HEQSF Level
MEC5092Z	Dissertation Energy & Development Studies.....	120	9
MEC5099Z	Fundamentals of Energy for Development.....	30	9
MEC5101Z	Energy and Climate Policy for Sustainable Development	30	9
MEC5097Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9
	Total credits.....	180	

Master of Philosophy specialising in Computational Mechanics

[EM026MEC01]

Professor and Convener:

Centre For Research in Computational and Applied Mechanics (CERECAM)

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

Compulsory Courses

Code	Course	NQF Credits	HEQSF Level
MEC5010Z	Dissertation.....	120	9
MEC5097Z	Dissertation Preparation	0	9
END5050X	Master's journal paper.....	0	9

Elective courses

Select courses to the value of 60 credits:

Code	Course	NQF Credits	HEQSF Level
MEC5063Z	An Introduction to Finite Elements	12	9
MEC5064Z	Finite Element Analysis	12	9
MEC5065Z	Programming for Scientists & Engineers	12	9
MEC5066Z	Continuum Mechanics.....	12	9

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Code	Course	NQF Credits	HEQSF Level
MEC5067Z	Non-linear Material Behaviour	12	9
MEC5068Z	Topics in Computational & Applied Mechanics	12	9

Research Masters in Engineering Management [MEC02]

The Department offers a Master of Science specialising in Engineering Management and a Master of Philosophy specialising in Engineering Management as research only master's programmes. The nature of the research project could either be of a strongly interdisciplinary nature, in which case the candidate will register for a Master of Philosophy specialising in Engineering Management. Alternatively, if the research project is strongly focussed on the scientific method or an appropriate engineering method, then the candidate will register for a Master of Science specialising in Engineering Management.

Master of Science in Engineering specialising in Engineering Management [EM023MEC02]

Doctor and Convener:

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

Compulsory Courses

Code	Course	NQF Credits	HEQSF Level
MEC5047W	Dissertation: Engineering Management	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Master of Philosophy specialising in Engineering Management [EM025MEC02]

Doctor and Convener:

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

Compulsory Courses

Code	Course	NQF Credits	HEQSF Level
MEC5047W	Dissertation: Engineering Management	180	9
END5050X	Master's journal paper	0	9
	Total credits	180	

Master of Philosophy specialising in Engineering Education [EM026MEC09]

Programme Convener:

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

The Faculty of Engineering and the Built environment offers a structured MPhil programme in Engineering Education. Students are required to complete a minimum of 60 credits of coursework, 45 credits of which are core to the programme. The additional credits will include an elective course approved by the supervisor. To qualify for the MPhil degree specialising in Engineering Education candidates are required to complete a supervised dissertation equivalent to a further 120 credits. The dissertation should incorporate any or all of the following: design of an engineering education research project involving advanced concepts and theoretical principles located in the engineering education research field; 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, a rigorous analysis of empirical data, and the development of a coherent discussion of the analysis, or any other study acceptable to the Faculty. Students will register for the dissertation in the home department of their supervisor.

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC5102Z	Knowledge and Practices in Engineering Education	15	9
EEE5148Z	Theoretical Foundations in Engineering Education Research	15	9
MEC5097Z	Dissertation Preparation	0	9
CIV5147Z	Methodologies in Engineering Education Research	15	9
Elective	Subject to approval by supervisor	15	9
MEC5103W	Dissertation Engineering Education	120	9
	Total Credits	180	

Doctoral Programmes

Doctor of Philosophy

[ED001]

ED001 Doctor of Philosophy is a Research Degree

Core Course

Code	Course	NQF Credits	HEQSF Level
MEC6000W	Thesis (Mechanical Engineering)	360	10
MEC6002W	Thesis (Engineering Management)	360	10
MEC6003W	Thesis (Sustainable Energy Engineering)	360	10
MEC6004W	Thesis (Materials Engineering)	360	10
MEC6005W	Thesis (Energy & Development Studies)	360	10
MEC6006W	Thesis (Engineering Education)	360	10

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

Course Outlines

MEC4088Z MANUFACTURING WITH MATERIALS

12 NQF credits at HEQSF level 8

Convener: Dr SL George

Course entry requirements: 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 test, 3 hour examination

MEC4091Z MATERIALS SCIENCE HONOURS RESEARCH PROJECT

This course starts in semester 1 and finishes in semester 2

40 NQF credits at HEQSF level 8

Convener: Dr SL George

Course entry requirements: Completion of BSc degree.

Course outline:

Students are required to attend a series of lectures and practicals on experimental techniques. Each student will be given an individual laboratory project on a problem relating to materials. A period of twelve weeks is allocated for the project and on completion a treatise must be submitted for examination.

DP requirements: None

Assessment: Project report.

MEC4096Z MANUFACTURE & PROPERTIES OF COMPOSITES

12 NQF credits at HEQSF level 8

Convener: Dr C Woolard

Course entry requirements: MEC2042F or BSc (Hons) MatSc candidate

Course outline:

This course aims to develop an advanced understanding of the manufacture and properties of composites. Topics include: history of composites; carbon, glass and aramid fibres; functions of the reinforcement and matrix, polymer-, metal- and ceramic-matrix composites; manufacture of composites; thermal properties, elastic properties of fibre composites; fracture and toughness, the fibre/matrix interface; geometric aspects; laminate theory and the strength of laminates; testing of composites and environmental effects; selection, and modification and design of composites.

DP requirements: None

Assessment: Class tests, examination 3 hours.

MEC4097Z MANUFACTURE AND PROPERTIES OF CERAMICS

8 NQF credits at HEQSF level 8

Convener: Professor RD Knutsen

Course entry requirements: MEC2042F or BSc (Hons) MatSc candidate

Course outline:

This course aims to develop an advanced understanding of the manufacture and properties of ceramics. Topics include: history of ceramics; traditional ceramics; glasses and glass ceramics; advanced ceramics; chemical bonding in ceramics; physical, mechanical and chemical properties of ceramics, nucleation and growth phenomena; production and properties of engineering ceramics, refractories; fracture and reliability of ceramics; powder technologies; and selection and design of ceramic components.

DP requirements: 35% minimum for class record.

Assessment: Class tests, examination 3 hours (40% min for examination).

MEC4098Z PROPERTIES AND MANUFACTURE OF METALLIC MATERIALS

16 NQF credits at HEQSF level 8

Convener: Professor RD Knutsen

Course entry requirements: MEC2042F or BSc(Hons) MatSc candidate

Course outline:

This course aims to develop an advanced understanding of the properties and manufacture of metallic materials. The course covers four main topics, namely, the solidification process; the metallurgy of ferrous, non-ferrous and light metal alloys; the relationship between manufacturing processes, mechanical properties and microstructures of metallic materials; and an introduction to metallic corrosion. The course also includes a week-long intensive module on wrought aluminium processing.

Lecture times: This course is presented in the first semester

DP requirements: None

Assessment: Projects, class tests, examination 3 hours.

MEC4099Z PHASE TRANSFORMATIONS IN MATERIALS

8 NQF credits at HEQSF level 8

Convener: Professor RD Knutsen

Course entry requirements: MEC3060F

Course outline:

This course aims to give an understanding of the thermodynamics and kinetics of phase transitions. The course covers the following topics: the application of thermodynamics in kinematics in materials science and engineering; thermodynamic states of variables; the first law of thermodynamics (energy conservation law); phase transitions (liquid/solid and solid state matter); single component and binary systems; equilibrium phase diagrams; and diffusion in liquid and solid state matter.

Lecture times: This course is presented in the first quarter of the year

DP requirements: Completion of all practicals & assignments

Assessment: Class record (30%); 2 hour examination (70%).

MEC4100Z MANUFACTURE & PROPERTIES OF POLYMERS

12 NQF credits at HEQSF level 8

Convener: Dr C Woolard

Course entry requirements: MEC2042F or BSc(Hons) MatSc candidate

Course outline:

This course aims to develop an advanced understanding of the manufacture and properties of polymers. Topics include: polymer nomenclature; morphology; bonding; molecular weight, polymerization, crystallisation; polymer types; rheology; manufacturing methods; applications; polymer identification; polymer modification, additives; analytical techniques; biodegradability; and selection and design.

DP requirements: None

Assessment: Practical, class tests, examination 3 hours.

MEC4111Z NUCLEAR MANUFACTURING AND CONSTRUCTION ENG MANAGEMENT

12 NQF credits at HEQSF level 8

Convener: Dr C Shaw

Course outline:

This course covers: Application of appropriate tools, techniques and theories for management problem solving; an overview of how construction projects are initiated and driven forward; roles and responsibilities of the various human resources involved in construction projects; knowledge of forms of regulations, contract and of law relevant to construction projects; health and safety; costing and financial implications in construction projects; processes and conversion of activities into processes in a nuclear power plant; value chain for identifying improvements; understanding of the origins of “wastes” in an organisation.

Assessment: Group assignment and presentation (10%); Individual assignments (20%); Written examination (70%)

MEC4114Z EXPERIMENTAL TECHNIQUES IN MATERIALS SCIENCE

This course starts in semester 1 and finishes in semester 2

16 NQF credits at HEQSF level 8

Convener: Dr CD Woolard

Course entry requirements: Registration for BSc(Hons) in MatSc

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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%

MEC4115Z OVERVIEW OF THE POWER PLANT INDUSTRY

15 NQF credits at HEQSF level 8

Convener: Professor L Jestin and Mr P Gosai

Course outline:

The aim of this course is to establish a balanced understanding of the global energy domain, by enhancing the contextual understanding of content in other courses. Topics include: world energy outlook; integrated energy planning; types of power generation plants; environmental impact and sustainability; renewable energy resources; nuclear power generation; energy efficiency and demand side management; energy industry and economics; power generation mix and the IRP (integrated resource plan); and the economics of power generation.

DP requirements: Submission of all the assignments on time as stipulated in the programme plan. Attendance and participation in the contact week on campus.

Assessment: Coursework 40%, exam 60%

MEC4116Z POWER PLANT SYSTEMS ANALYSIS

15 NQF credits at HEQSF level 8

Convener: Professor P Rousseau

Course outline:

The aim of this course is to lay the theoretical foundations of thermofluid process modelling applied to power plants, based on the fundamentals of thermodynamics, fluid mechanics and heat transfer. Topics include: Introduction to thermofluid systems analysis. Overview of fundamental concepts. Conservation laws for fluid control volumes. Component characteristics: Pipe and duct flows, Pumps, fans and turbomachinery and Furnaces, boilers and heat exchangers. Also covered are simple analyses of important thermofluid processes, integrated systems analysis and modelling (steady state) as well as integrated systems analysis and modelling (dynamic).

DP requirements: Submission of all the assignments on time as stipulated in the programme plan. Attendance and participation in the contact week on campus.

Assessment: Assessment of the assignments: the average mark obtained for the assignments will contribute 30% to the final course mark. Assessment of the final examination: the mark obtained for the final examination will contribute 70% to the final course mark.

MEC4117Z POWER PLANT BOILERS: THERMOFLUID PROCESSES AND CONTROLS

15 NQF credits at HEQSF level 8

Convener: Professor P Rousseau

Course entry requirements: None

Course outline:

The aim of this course is to lay the theoretical foundation for modelling and analysing the performance of boilers in a typical coal-fired power plant. The focus is on combustion, thermodynamics, heat transfer and fluid mechanics in the boiler, and how these processes are controlled. Also included are boiler types and configurations, fuels and combustion, furnace heat

transfer, two-phase flow heat transfer and hydraulics, superheater and reheater heat transfer, draft system hydraulics and air pre-heaters, furnace controls, fouling and slagging, erosion and corrosion, and the commissioning and acceptance testing of boilers.

DP requirements: Submission of all the assignments on time as stipulated in the programme plan. Attendance and participation in the contact week on campus.

Assessment: Assessment of the assignments: the average mark obtained for the assignments will contribute 30% to the final course mark. Assessment of the final examination: the mark obtained for the final examination will contribute 70% to the final course mark.

MEC4118Z SYSTEMS ENGINEERING IN THE POWER INDUSTRY

15 NQF credits at HEQSF level 8

Convener: Associate Professor W Fuls

Course entry requirements: None

Course outline:

This course aims to enable students to structure and plan a high level system design and to generate system and sub-system development specifications as well as comprehend and apply the various technical management processes involved in Systems Engineering.

DP requirements: None

Assessment: Coursework 70%, exam 30%

MEC4119Z MECHANICAL BEHAVIOUR OF MATERIALS

15 NQF credits at HEQSF level 8

Convener: Professor R Knutsen

Course entry requirements: None

Course outline:

This course aims to provide an understanding of the relationship between structure of materials and responses to applied stress. This understanding is in turn used for problem solutions such as materials selection for design (with particular emphasis on meeting the requirements for power plant) and failure analysis case studies. Topics include: crystallography and bonding, elastic and plastic deformation, deformation and annealing mechanisms, strengthening mechanisms, steel metallurgy and heat treatment, welding metallurgy, time-dependent microstructure/property evolution (high temperature/high stress exposure), corrosion and oxidation, wear mechanisms (abrasion, erosion, slurry erosion), stress concentration and fracture mechanisms, crack propagation, factors affecting fracture toughness, fatigue, creep, LEFM approach, methods to improve toughness, fracture toughness testing, fracture surface feature identification, failure analysis investigation, as well as failure case studies.

DP requirements: Submission of all coursework assignments

Assessment: Coursework 40%, exam 60%.

MEC4120Z LEADERSHIP IN A TECHNICAL ENVIRONMENT

15 NQF credits at HEQSF level 8

Convener: Dr C Shaw

Course entry requirements: None

Course outline:

This course aims to develop the abilities required to influence a group of people towards a goal and to maximise their performance. The focus is on cultivating a personal leadership philosophy and managing technical professionals and technical projects in a diverse environment. Topics include: organisational theory and culture, strategic thinking, resource and supply chain management, ethics and the roles of managers, and maintenance management and the ability to lead change are also included.

DP requirements: None

Assessment: Coursework 40%, exam 60%.

MEC4122Z TURBINE PLANT ENGINEERING

15 NQF credits at HEQSF level 8

Convener: Dr Wim Fuls

Course entry requirements: None

Course outline:

This course aims to provide theoretical and practical foundations for modelling and analysing performance of power plant equipment associated with the steam turbine, including condensers and feed heaters. In addition, this course aims to develop methodologies for the commissioning, acceptance testing and condition monitoring of such equipment.

Topics include: Regenerative Rankine cycle overview, Steam turbines (types, function, thermodynamics, operation, control, condition monitoring), Condensers, Feedwater heaters (open and closed, shell and header types), Auxiliary equipment (ejectors, gland seals, oil system, water purification), and Valves.

DP requirements: 40% minimum for assignments

Assessment: Assignments 40% Exam 60%

**MEC5000W MASTER OF SCIENCE IN MECHANICAL ENGINEERING
DISSERTATION**

180 NQF credits at HEQSF level 9

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design; or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%.

**MEC5010Z MASTER OF SCIENCE IN MECHANICAL ENGINEERING PART
DISSERTATION**

120 NQF credits at HEQSF level 9

Course entry requirements: MEC5097Z DP

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design; or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%.

MEC5024S STRUCTURAL IMPACT

12 NQF credits at HEQSF level 9

Convener: Professor G Langdon

Course outline:

This course aims to develop an advanced understanding of the importance of structural impact. Topics include: Static plastic behaviour of beams; plates and shells; dynamic plastic behaviour of beams, plates and shells; influence of transverse shear and rotary inertia; influence of finite displacements; strain rate sensitive behaviour of materials; dynamic progressive buckling; dynamic loading effects; plastic buckling; and scaling laws and experimental techniques.

DP requirements: None

Assessment: Project(s)

MEC5025Z MASTERS DISSERTATION IN ENGINEERING MANAGEMENT

120 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course entry requirements: Completion of 60 credits of approved postgraduate coursework.

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%.

MEC5035Z PROJECT MANAGEMENT

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course outline:

This course aims to develop an advanced understanding of project management. Topics include: The need for and objectives of project management. Organising for project management. Project manager qualities and competency. Planning and implementing a human resource management, team motivation, planning, feasibility studies. Managing project time, cost and quality. Estimating budgeting cost control. Procurement and expediting. Contractual arrangements and legal aspects. Communications, controlling meetings, handling contractors. Project commissioning. Risk analysis and hazard assessment. Conflict management. Time value of money and use of discounted cash flows for project appraisal and decision making. The perspective is managerial, with emphasis on the use of the techniques to aid project decision making. Information systems, and projects in developing countries.

DP requirements: None

Assessment: Project report(s), assignments, examination.

MEC5036Z MANAGING FOR PERFORMANCE IMPROVEMENT

Not offered in 2019

20 NQF credits at HEQSF level 9

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.

MEC5037Z OPERATIONS MANAGEMENT PROJECT

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course outline:

On the recommendation of the supervisor and the programme convener, 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

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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).

MEC5046Z SYSTEMS ENGINEERING PRACTICE

Not offered in 2019

40 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course outline:

This course aims to develop an advanced understanding of systems thinking and systems practice. Topics include: management and organisational concepts; qualitative mapping and modelling; and a system's approach to problem solving.

Lecture times: Block release (two contact modules).

DP requirements: None

Assessment: Position papers 50%, portfolio of projects and reflective papers 50%.

MEC5047W MASTERS DISSERTATION IN ENGINEERING MANAGEMENT

180 NQF credits at HEQSF level 9

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design; or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%.

MEC5048S NON-DESTRUCTIVE TESTING & EVALUATION

12 NQF credits at HEQSF level 9; 24 lectures, 5 tutorials / assignments.

Convener: Mr D Findeis

Course entry requirements: BSc(Eng) degree

Course outline:

This course aims to develop an advanced understanding of non-destructive testing and evaluation. Topics include: Methods and guidance to non-destructive techniques. Selected topics in: Principles of Ultrasonic inspection and methods and their applicability. Electronic Speckle Pattern Interferometry as applied to flaw detection. Shearography as a novel optical non-contacting defect detection method. Eddy current versatility for the measurement of thickness of coatings, the detection of seams, cracks, voids and inclusions. Testing for flaws in composite materials by mechanical impedance and Infrared Thermography.

DP requirements: None

Assessment: Project, November examination 3 hours

MEC5049S ADVANCED REFRIGERATION

12 NQF credits at HEQSF level 9

Convener: Associate Professor G Vicatos

Course outline:

This course aims to develop an understanding of advanced refrigeration. Topics include: Aspects of compression refrigeration. Effects that degrade vapour compression refrigeration; multiple compression; multiple evaporators; flash chambers; and cascade systems. Aspects of absorption refrigeration. Theory of mixtures; absorption continuous cycle; mathematical and graphical analysis of the cycle; intermittent systems; lithium-bromide water system; water-ammonia-hydrogen system; and aspects of combined compression/absorption cycle: comparison of performance.

DP requirements: None

Assessment: Examination 3 hours.

MEC5051Z MECHANICAL ENGINEERING PROJECT

20 NQF credits at HEQSF level 9

Course entry requirements: Completion of appropriate postgraduate courses.

Course outline:

On the recommendation of the supervisor and with the agreement of the Head of Department, a student registered for a Master's degree may be permitted to enter into a programme of individual study on a specialised topic. A statement of objectives and/or a syllabus must be agreed upon, and the course of study will be guided by a member of the department, usually the supervisor. The programme will involve the student in about 180 hours of work. This can include assignments and projects of an appropriate nature. The course will be assessed by examination or project or both and an oral examination may be held thereafter, if required.

DP requirements: None

Assessment: Examination and/or project.

MEC5054Z INTRODUCTION TO BUSINESS ADMINISTRATION

Not offered in 2019

40 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course entry requirements: Registration for postgraduate qualification.

Course outline:

This course aims to provide an advanced introduction to business administration. Topics include: Introduction to business and the business environment; marketing management; finance management; human resources management; operations management; general management; quantitative methods in management economics, accounting, business and society.

Lecture times: Block release (two contact modules).

DP requirements: None

Assessment: Position papers 50%, portfolio of projects and reflective papers 50%.

MEC5060W MASTERS DISSERTATION SUSTAINABLE ENERGY ENGINEERING

180 NQF credits at HEQSF level 9

Course outline:

In exceptional cases and on the recommendation of the supervisor, and with the approval of the Head of Department, a student registered for the Master's degree may be permitted to enter a programme of individual study on a specialised topic, WITHOUT registering for additional course work. A research proposal must be agreed upon, and the supervisor will guide the project. The programme will involve the student in 1 440 hours of work, and a written report must be submitted, which will be examined by internal and external examiners.

DP requirements: None

MEC5061Z MASTERS DISSERTATION SUSTAINABLE ENERGY ENGINEERING

Not offered in 2019

120 NQF credits at HEQSF level 9

Course entry requirements: MEC5097Z DP.

Course outline:

The purpose of the dissertation, which complements the course work that is a requirement of the degree, is to afford the student the opportunity to demonstrate his/her ability to conduct independent research. Although the student will work under the direction of a supervisor, the quality and content of the work must be a reflection of the ability of the candidate. The subject chosen for the

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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

MEC5063Z AN INTRODUCTION TO FINITE ELEMENTS

12 NQF credits at HEQSF level 9; 36 lectures, 12 tutorials / lab sessions.

Convener: Professor BD Reddy

Course outline:

The finite element method (FEM) is a mathematical and numerical technique for finding solutions to boundary value problems for differential equations. FEM techniques are central to multiple engineering disciplines (eg Aeronautics, Biomechanics, Civil and many others) as they are particularly useful for solving differential equations over complex geometries. Topics covered in the course include: weak formulations of boundary value problems; the finite element method for one- and two-dimensional problems; coding the finite element method using Matlab; applications problems concerning heat conduction and electricity.

DP requirements: An average of 50% in all class tests. Submission of all assignments and projects.

Assessment: June examination

MEC5064Z FINITE ELEMENT ANALYSIS

12 NQF credits at HEQSF level 9; 36 lectures, 12 tutorials / lab sessions.

Convener: Professor BD Reddy

Course entry requirements: MEC5063Z.

Course outline:

This course is an extension of MEC5063Z into advanced topics. The course aims to provide students with an advanced understanding of finite element techniques and enable them to perform finite element analysis on a wider range of problems. Topics covered in the course include: incompressibility and mixed-methods; time-dependant problems; non-linear problems.

DP requirements: An average of 50% in all class tests. Submission of all projects and assignments.

Assessment: November examination.

MEC5065Z PROGRAMMING FOR SCIENTISTS AND ENGINEERS

12 NQF credits at HEQSF level 9; 36 lectures, 12 tutorials / lab sessions .

Convener: Professor BD Reddy

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: A course mark (combined tests and projects) of at least 50%.

Assessment: June examination

MEC5066Z CONTINUUM MECHANICS

12 NQF credits at HEQSF level 9; 36 lectures, 12 tutorials / lab sessions.

Convener: Professor BD Reddy

Course outline:

This course aims to present a general introduction to continuum mechanics. Topics include: 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: An average of 40% in all class tests.

Assessment: June examination.

MEC5067Z NONLINEAR MATERIAL BEHAVIOUR

12 NQF credits at HEQSF level 9; 36 lectures, 12 tutorials.

Convener: Associate Professor S Skatulla

Course entry requirements: MEC5066Z

Course outline:

This course aims to develop an advanced understanding of nonlinear material behaviour. Topics in nonlinear mechanics; nonlinear elasticity; behaviour of elastic-plastic solids and non-Newtonian fluids are included.

DP requirements: An average of 40% in all class tests.

Assessment: November examination

MEC5068Z TOPICS IN COMPUTATIONAL & APPLIED MECHANICS

12 NQF credits at HEQSF level 9

Convener: Professor BD Reddy

Course entry requirements: MEC5063Z, MEC5066Z.

Course outline:

The aim of this course is to introduce advanced computational aspects of the finite element method using the modern, open-source finite element library deal.II. The topics covered include: non-linear problems, time-dependent problems, parallelisation and adaptivity. The course is project based.

DP requirements: None

Assessment: Project.

MEC5069Z COMPUTATIONAL FLUID DYNAMICS (CFD)

12 NQF credits at HEQSF level 9

Convener: Professor AG Malan

Course entry requirements: MEC4045F

Course outline:

This course provides a postgraduate level foundation to computational fluid dynamics (CFD). It entails mastering the fundamentals of a number of aspects of modern CFD. These include edge-based discretization, incompressible and compressible flow modelling, advanced solvers, turbulence modelling and selected aspects of free-surface flow modelling. To consolidate understanding, programming assignments make out an important part of the course. You will be writing your own solver and CFD codes, which will include both incompressible and compressible flow. Due to the modern nature of the course, recent journal publications will also be used for course material.

DP requirements: None

Assessment: Assignments and Examination.

MEC5070W DISSERTATION MATERIALS ENGINEERING

180 NQF credits at HEQSF level 9

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon

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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%.

MEC5071Z MASTERS DISSERTATION MATERIALS ENGINEERING

120 NQF credits at HEQSF level 9

Course entry requirements: MEC5097Z DP

Course outline:

The dissertation should incorporate any or all of the following: design of all or part of an engineering project to a specification involving advanced concepts and theoretical principles; a research project of a theoretical or practical nature; a critical review of a specified topic based upon a comprehensive search of the literature or available data; development of an item of equipment or a technique involving novel features or advanced design; or any other study acceptable to the Faculty.

DP requirements: None

Assessment: Written work counts 100%

MEC5080Z MANAGING NEW VENTURE PROJECTS

20 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course entry requirements: Registration for a postgraduate qualification

Course outline:

The aim of this course is to assist students prepare a business plan for launching a high potential new business. Students will work in teams and be given the opportunity to pool skills and experience and apply these to a practical hands-on project, focused on developing a comprehensive plan for a new business.

Lecture times: 1 week of full time lectures with additional lectures as per schedule.

Assessment: Project, presentations and Learning Log .

MEC5089Z ENERGY PROJECT

Not offered in 2019

20 NQF credits at HEQSF level 9

Convener: Professor H Winkler

Course outline:

On the recommendation of the supervisor, and with the approval of the Director of the Energy Research Centre, a student registered for a Master's degree may be permitted to enter a programme of individual study on a specialised topic. A research proposal must be agreed upon, and the project will be guided by the supervisor. The programme will involve the student in 200 hours of work, and a written report must be submitted which will be examined by an internal and external examiner.

DP requirements: None

Assessment: Project(s) 100%.

MEC5092Z MASTERS DISSERTATION ENERGY & DEVELOPMENT STUDIES

Not offered in 2019

120 NQF credits at HEQSF level 9

Course entry requirements: MEC5097Z

Course outline:

The purpose of the dissertation, which complements the course work that is a requirement of the degree, is to afford the student the opportunity to demonstrate his/her ability to conduct independent research. Although the student will work under the direction of a supervisor, the quality and content of the work must be a reflection of the ability of the candidate. The subject chosen for the dissertation will be by mutual agreement between supervisor and student and should incorporate elements of the course work while also being relevant to the general field of sustainable energy or

energy and development. A dissertation towards a MPhil degree may incorporate any or all of the following: design of all or part of an engineering or built environment project to a specification involving advanced concepts and theoretical principles; a theoretical and/or practical research project of an inter-disciplinary nature; critical review of a specified topic based on a comprehensive search of the literature or available data of an inter-disciplinary nature; and any other study acceptable to the Faculty of Engineering & the Built Environment.

DP requirements: None

Assessment: Written work counts 100%

MEC5093W DISSERTATION ENERGY AND DEVELOPMENT STUDIES

180 NQF credits at HEQSF level 9

Course outline:

In exceptional cases and on the recommendation of the supervisor, and with the approval of the Head of Department, a student registered for the Master's degree may be permitted to enter a programme of individual study on a specialised topic, WITHOUT registering for additional course work. A research proposal must be agreed upon, and the supervisor will guide the project. The programme will involve the student in 1 440 hours of work, and a written report must be submitted, which will be examined by internal and external examiners. A dissertation towards a MPhil degree may incorporate any or all of the following: design of all or part of an engineering or built environment project to a specification involving advanced concepts and theoretical principles; a theoretical and/or practical research project of an inter-disciplinary nature; critical review of a specified topic based on a comprehensive search of the literature or available data of an inter-disciplinary nature; and any other study acceptable to the Faculty of Engineering & the Built Environment.

DP requirements: None

Assessment: Written work counts 100%.

MEC5095Z MINOR DISSERTATION ENGINEERING MANAGEMENT

60 NQF credits at HEQSF level 9

Convener: Dr C Shaw

Course entry requirements: Completion of appropriate postgraduate courses.

Course outline:

In agreement with a suitable supervisor, a research topic will be selected, a research proposal agreed, research will be undertaken and a research report prepared. This will represent at least 600 hours of work.

DP requirements: None

Assessment: The written report will be examined, and a further oral examination may be held.

MEC5097Z DISSERTATION PREPARATION

0 NQF credits at HEQSF level 9

Course outline:

The aim of this course is to allow a student to undertake preparatory work for the master's dissertation. Work required includes literature searches and reviews; identification of the research problem, objectives and hypothesis; consideration of research methodology; planning for the active research phase; and ensuring that research infrastructure (e.g. apparatus etc.) is or will be in place. The student should maintain regular contact with his/her supervisor in order to show evidence of suitable progress towards these aims. The supervisor must indicate satisfactory fulfilment of the course aims prior to the student proceeding to the dissertation.

DP requirements: None

MEC5099Z FUNDAMENTALS OF ENERGY SYSTEMS AND POLICY FOR DEVELOPMENT

Not offered in 2019

30 NQF credits at HEQSF level 9

Course outline:

The course aims to equip students with foundational understanding of basic and advanced energy concepts that can be applied in further coursework in both the MSc and MPhil energy streams, dissertation writing, and future studies or work in the field. The course is inter-disciplinary and accessible to students from a wide range of backgrounds, including engineering, science, humanities, social science, law and commerce. The course is set around overarching themes, including Energy for Development, Energy Transitions and Energy Justice, with particular application to the South African context. Through the lens of these themes, the course will explore and examine key concepts, including techno-economic, energy specific and policy concepts, thus addressing both 'qualitative' and 'quantitative' dimensions of energy analysis. Teaching of concepts and skills will be arranged around broader subject matter, such as transformations in energy markets and technologies, macroeconomics, and global climate change.

DP requirements: Attendance at lectures and seminars and submission of all assignments.

Assessment: 60% coursework (30% long paper, 30% class assignments and participation), 40% examination (20% theory and 20% quantitative).

MEC5100Z ENERGY SYSTEMS ANALYSIS

Not offered in 2019

30 NQF credits at HEQSF level 9

Course outline:

This course aims to deliver a practical introduction to techno-economic energy systems modelling and analyses in order to firstly, analyse existing energy systems to gauge deficiencies, vulnerabilities and inefficiencies: economic and technical; and secondly, inform plans of a future energy system that meets multiple objectives, including least-cost, socio-economic development and environmental sustainability.

Students will define and structure problems in order to assess model application and scope; understand the concept of scenarios and their formulation; analyse conventional and emerging energy technologies in order to quantify their relative performance against multiple criteria; construct energy system models (in context of economy, environment and social issues); comprehend their limitations and the uncertainty in model parameterisation; and translate model results into policy recommendations.

Students will be exposed to different types of energy systems models, learn how to setup and parameterise different types of models of energy demand and supply given available data, learn how to use the models to evaluate different courses of action/decisions in different uncertainty-driven scenarios.

DP requirements: Participation in practicals and completion of in-class exercises.

Assessment: Class assignments examining course content 20%-30%; examination covering key subject concepts 15%-20%; long assignment (practical modelling exercises with written report and oral presentation) 50%-60%

MEC5101Z ENERGY AND CLIMATE POLICY FOR SUSTAINABLE DEVELOPMENT

Not offered in 2019

30 NQF credits at HEQSF level 9

Course outline:

This course aims to train students to understand the importance and options in decision making in energy and climate policy and its impacts on environment and socio-economic development. The course develops an understanding of the conflicts around decision-making and provision of public goods in the energy sectors in developing countries, acknowledging the constraints of poverty and

inequality and a changing climate. Students will gain skills in methodologies from social science and humanities, and combine these with learning from the Energy Fundamentals course to be able to integrate knowledge across different disciplines to address multiple challenges. The course aims to apply methods and concepts from the following disciplines to analysis of energy and climate change: economics, geography, anthropology, sociology, law and political science.

MEC5102Z KNOWLEDGE AND PRACTICES IN ENGINEERING EDUCATION

15 NQF credits at HEQSF level 9

Course outline:

This course aims to provide Master's students with an introduction to conceptual frameworks in teaching and learning appropriate to engineering education. The aim is to provide conceptual tools to enable a critical approach to engineering knowledge and to enable reflection on higher education practice. Students should be able to: apply theoretical frameworks to engineering education practice; reflect critically on their own practices with reference to theoretical frameworks; identify and describe the principles behind curriculum design decisions; and understand the different forms of knowledge effective engineering educators draw on.

MEC6000W THESIS MECHANICAL ENGINEERING

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

MEC6002W THESIS ENGINEERING MANAGEMENT

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

MEC6003W THESIS SUSTAINABLE ENERGY ENGINEERING

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

MEC6004W THESIS MATERIALS ENGINEERING

360 NQF credits at HEQSF level 10

Course outline:

A PhD thesis is required to be an original, coherent and consistent body of work which reflects the candidate's own efforts. The thesis may not be more than 80 000 words. A candidate will undertake

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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%.

MEC6005W THESIS ENERGY AND DEVELOPMENT STUDIES

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

MEC6006W THESIS ENGINEERING EDUCATION

360 NQF credits at HEQSF level 10

Course outline:

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

DP requirements: None

Assessment: Written work counts 100%.

END5050X MASTERS JOURNAL PAPER REQUIREMENT

0 NQF credits at HEQSF level 9

Course outline:

The aim of submitting a research paper for the masters' degree is to develop an understanding of what is required for the publication of research findings. To this end a candidate shall submit a summary of the key aspects of the dissertation, presented in the form of a paper which is, potentially, of publishable standard, approved by a Panel of Assessors. This is a requirement for candidates submitting either a 180 or 120 credit dissertation for the following degrees: MSc in Construction Economics and Management, MSc(Eng), MSc(ProjMan), MPhil, MSc in Property Studies. Refer to the appropriate degree rules.

DP requirements: None

DEPARTMENTS IN OTHER FACULTIES AND COURSES OFFERED

Departments Established in the Faculty of Commerce

COLLEGE OF ACCOUNTING

Associate Professor and Head of Department:

G Modack, BCom PGDip Tax Law *Cape Town MCom Cape Town CA(SA)*

ACC2022F/S MANAGEMENT ACCOUNTING I

18 NQF credits at HEQSF level 6

Convener: J Dean

Course entry requirements: ACC1006F/S or approved equivalent.

Course outline:

An introduction to the discipline of Management Accounting; the analysis of cost systems, cost classification and cost behaviour; product costing including job costing and process costing; the allocation of costs from service departments; absorption and variable costing; activity based costing; cost-volume-profit relationships; relevant costing and cost benefit analyses; budgeting systems; standard costing and flexible budgeting.

Lecture times: ACC2022F Mon, Tues, Wed, Thurs 13:00 – 14:00; 14:00 – 15:00 ACC2022S Mon, Tues, Wed, Thurs 13:00 – 14:00; 14:00 – 15:00

DP requirements: Attendance at and submission of a minimum of 75% of tutorials AND a weighted average of 40% for class tests (excluding objective tests).

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

Centres and Departments Established in the Faculty of Humanities

SCHOOL OF AFRICAN & GENDER STUDIES, ANTHROPOLOGY & LINGUISTICS

The sections in the School share a commitment to research and teaching responsive to African political, social, cultural, and material contexts, and the interaction of those contexts with others, especially but not exclusively located in the global South. The intellectual interests of the proposed new School cohere around questions relating to the production of social, political, cultural, scientific and economic knowledge within the continent of Africa, as a platform for internationally relevant research.

The letter code for all courses offered in the School is AXL.

Departmental website: www.humanities.uct.ac.za/hum/departments/axl.

The School comprises the following Sections:

**AFRICAN STUDIES
ANTHROPOLOGY
GENDER STUDIES
LINGUISTICS**

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Professor and Director of the School:

S Vawda, BA *UDW* MA *QUB* PhD *UKZN*

AFRICAN STUDIES SECTION

The African Studies Section is housed in the Harry Oppenheimer Institute Building, Engineering Mall, Upper Campus, and can be contacted by email at: cas-africas@uct.ac.za, or telephone: 021 650 4034.

Associate Professor and Head of Section:

H Chitonge, MA PhD *KZN*

ANTHROPOLOGY SECTION

The Anthropology Section is housed in the AC Jordan Building, University Avenue, Upper Campus, and can be contacted by email at: san-admin@uct.ac.za, or telephone: 021 650 3678.

Professor and Head of Section

F C Ross, MSocSc PhD *Cape Town*

GENDER STUDIES SECTION

The Gender Studies Section is housed in Harry Oppenheimer Institute Building, Engineering Mall, Upper Campus, and can be contacted by email at: genderstudies@uct.ac.za or telephone: 021 650 2970.

Associate Professor and Head of Section:

J Bennett, BA(Hons) *Natal* MA (Linguistics) EdD (Applied Linguistics) *Columbia*

LINGUISTICS SECTION

The Linguistics Section is housed in the A C Jordan Building, University Avenue, Upper Campus, and can be contacted by email at: axl-linguistics@uct.ac.za, or telephone: 021 650 2847.

Professor and Head of Section

A Deumert, MA *Freiburg* PhD *Cape Town*

AXL4202F RACE, CULTURE & IDENTITY IN AFRICA

(Not offered in 2019)

24 NQF credits at HEQSF level 8

Convener: TBA

Course entry requirements: Acceptance for an honours 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 other 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 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.

AXL5203S CRITICAL ISSUES IN HERITAGE STUDIES

24 NQF credits at HEQSF level 9

Convener: Professor S Vawda

Course entry requirements: Acceptance for a master's programme.

Course outline:

In this course we examine a set of critical issues in the field of heritage studies, as they are currently unfolding. We take a case study approach to look at currently breaking issues in heritage theory, policy and practice. In particular, we are interested in those points at which heritage forms a cutting edge in broader contestations around culture, identity and history. In addition, as a way of making sense of heritage management discourses, we examine some of the intellectual histories and genealogies of formulations of heritage in South Africa.

DP requirements: Attendance at seminars is compulsory, failing which students' papers may not be marked.

Assessment: One major project 100%.

Departments Established in the Faculty of Law

COMMERCIAL LAW

Professor and Head of Department:

R le Roux, BJuris LLB UPE LLM Stell PG Dip (Employment Law and Social Security Law) Cape Town LLM Anglia Polytechnic PhD Cape Town Attorney and Conveyancer of the High Court

PUBLIC LAW

Professor and Head of Department:

TBC

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

PBL5045S ENVIRONMENTAL LAW FOR NON-LAWYERS

Higher postgraduate course, second semester

15 NQF credits at HEQSF level 9

Convener: Professor A Paterson

Course entry requirements: Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree or Postgraduate Diploma.

Course outline:

The inclusion of an environmental right in South Africa's Constitution has led to the emergence of many environmental laws and court decisions in the past 15 years. These developments are of key relevance to those working in the environmental sector including developers, consultants, biologists, zoologists, planners, sociologists and anthropologists. This course provides students undertaking postgraduate studies relevant to the environment with an insight into relevant principles of international and domestic environmental law. Key content covered in the course includes: an introduction to basic legal principles and resources; constitutional aspects (environmental rights, access to information, administrative justice and access to courts); framework environmental laws; land-use planning laws (planning law, environmental impact assessment and protected areas);

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natural resource laws (biodiversity, water and marine living resources); and pollution laws (fresh water, land and air pollution).

DP requirements: Satisfactory attendance of lectures and completion of essay

Assessment: Coursework 50% (Short assignment 10%, Long assignment 40%), Examination 50%

CENTRES AND OTHER ENTITIES ESTABLISHED IN THE FACULTY

Centres and Units Accredited by the University Research Committee

African Centre for Cities

The African Centre for Cities (ACC) was established in 2007 as a UCT signature research theme cutting across three Faculties (Engineering & the Built Environment, Science and Humanities). The mission of ACC is to facilitate critical urban research and policy discourse for the promotion of vibrant, democratic and sustainable urban development in the global South. ACC researchers undertake research and policy work on a wide range of urban issues in Cape Town, South Africa, Africa and the global South, and collaborate with a number of other institutions across the globe (for example, as part of the Mistra Urban Futures network). Over the past decade, ACC has established an impressive international profile and reputation as a dynamic home for analysis of urban issues and policies. ACC also runs a new urban studies teaching programme (M.Phil in Urban Studies – Southern Urbanism) to help build a new generation of urbanists who are able to deal with the challenges faced by cities in the global South.

Professor and Director:

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

Associate Professor and Deputy Director:

A Tucker, BA(Hons) MPhil PhD *Cambridge*

Research and Academic Staff:

J Battersby, BSc(Hons) *London* MA *Newcastle-upon-Tyne* DPhil *Oxford*
 M Brown-Luthango, BSocSc(Hons) MSocSc *Cape Town* DPhil *Stellenbosch*
 LR Cirolia, BA *UCBerkeley* MCRP *Cape Town*
 S Croese, BA MA *Groningen* PhD *Stellenbosch*
 J Duminy, BSc *Rhodes* MTRP *UKZN* MA *Leicester* PhD *CapeTown*
 A Fortuin, BSc City Planning (Hons) MCRP *CapeTown*
 NR Hassan, BA(Hons) MA *Stellenbosch*
 G Haysom, MPhil *Stellenbosch* PhD *CapeTown*
 B Knemeyer, BAFA(Hons) *CapeTown* MLA *Edinburgh*
 N Marrengane, BA *Earlham* MA *Clark Atlanta*
 N Ngwenya, BA(Hons) MPhil MCRP *CapeTown*
 L Nkula-Wenz, Dipl (MA equivalent) DPhil *Münster*
 S Oldfield, BA(Hons) MA *Syracuse* PhD *Minnesota*
 A Pulker, BSocSci MCRP *CapeTown*
 V Sadie, BTech(Hons) MTech *DUT*
 R Sitas, BA *CapeTown* BA(Hons) *UKZN* MA *DUT* PhD *CapeTown*
 C Skinner, BSocSci *CapeTown* MSc *Natal*
 W Smit, BSc MCRP PhD *CapeTown*
 A Tomás, BSc *Lisbon* MSc PhD *Columbia*
 A Weimann, BSocSci(Hons) MSocSci *CapeTown*

Finance and Operations Manager:

I Najaar, BCom *UWC*

Administrative Officer:

M Joubert

Administrative Assistant:

M Waglay, BSocSc (Hons) *CapeTown*

Communications Officer:

A Viviers, BSc (Architecture) *Pretoria*

Applied Thermofluid Process Modelling Research Unit (ATProM)

Thermofluid process modelling applies the fundamental principles of fluid mechanics, thermodynamics and heat and mass transfer to model industrial processes. To accurately model such processes the governing equations of mass, energy and momentum conservation need to be solved for steady-state and transient operating modes in a computationally inexpensive manner. By having access to representative models engineers can:

- Analyse the operation and performance of individual components, sub-systems or complete integrated plants to improve the design and operation to meet changing consumer demands.
- Detect changes that might indicate impending equipment or process degradation, thereby enabling pro-active and preventative planned maintenance outages.

The ATProM Research Unit offers students the opportunity to do applied research on projects related to industry.

Professor and Director

PG Rousseau, PrEng BEng(Mech) MEng (Mech) PhD *Pretoria* OPM HBS

Associate Professor and Deputy Director

WF Fuls, BSc(Eng) MSc(Eng) PhD *NWU*

Associated Academic and Research Staff

AG Malan, PrEng BEng(Mech) MEng(Mech) PhD *Swansea*

HD Mouton, BSc(Eng) BSc BEng Hons MEng PhD *NWU*

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

A Mishra, BE (*REC India*) PhD *Edinburgh* SMIEEE

R Laubscher BEng(Mech) MEng(Mech) PhD *Stellenbosch*

P Gosai BSc(Eng) MSc(Eng) UCT GDE(Mech) *Witwatersrand*

Administrative Officer

S Ferguson

Website: www.atprom.uct.ac.za

Blast Impact & Survivability Research Unit (BISRU Centre)

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 and Biomechanics
- High rate material characterisation

Professor and Director

GS Langdon, BEng PhD *Liverpool* MIMechE CEng

Associated Academic Staff

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

TJ Cloete, BIng *Stell* MIng *Stell*

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

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

Website: www.bisru.uct.ac.za

Catalysis Institute

The Catalysis Institute, proclaimed by the University Research Committee in 2016, concerns itself with catalytic technologies, principally for fuels and energy production, and is comprised of three centres, viz. the Centre for Catalysis Research (CatCentre), the DST – NRF Centre of Excellence in Catalysis (c*change) and the DST Hydrogen Catalysis Competence Centre (*HySA/Catalysis*) - see elsewhere for detailed entries concerning the associated centres.

The Institute's beginnings stem from a long history in heterogeneous catalysis within the Department of Chemical Engineering and dating back to 1980. Currently, the activities of some 30 staff and 30 – 45 postgraduate/postdoctoral researchers fall within the ambit of the Institute at UCT, ranging from theoretical computational studies, catalyst synthesis & characterisation, to device (reactor) and technology development across a range of applications from liquid transportation fuels and petrochemicals to hydrogen production and low temperature fuel cells.

It is governed by a Management Committee comprising the Directors and Deputy Directors of the associated Centres and enjoys the services of an extensive Advisory Board representing Academia, Government and Industry.

Professor and Director of the Institute:

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

Associated Academic & Research Staff

S Blair, PhD Materials Chemistry *Simon Fraser University (Canada)*

W Böhringer, DiplChem *Karlsruhe*

J Chamier, PhD(Chem), Stellenbosch University

M Claeys, Dipl.Ing Dr-Ing(Chem Eng) *Karlsruhe*, FRSC

N Fischer, Chem MSc(Eng) Chem PhD(Eng) *Cape Town*

N Hussain, BSc(Eng) Chem MSc (Eng) Chem *Cape Town* MSACIhE

P Kooyman, PhD(Eng), *TU-Delft*

P Levecque, MSc(Eng) Bio PhD *Leuven*

N Luchters, BSc(Eng) *Leiden* Chem MSc(Eng) *Cape Town*

R Mohamed, BSc(Eng), Chem MSc(Eng), Chem PhD(Eng) *Cape Town*

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CT O'Connor, PrEng BSc *Unisa STD Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM
FSAICHE FSAAE FRSSAf
E van Steen, MSc(Eng) *Eindhoven* PhD *Karlsruhe* FSAICHE FSAAE

Technical & Scientific Staff

T Chivengwa, MSc Chem Eng(UCT) *Cape Town*
R Cupido, NDip(Analytical Chemistry), BTech(Chemistry), MTech(Chem) CPUT *Cape Town*
F Hendricks, NDip(Mech) BTech(Mech) CPUT *Cape Town*
P Johnston, BSc(UCT) *Cape Town*
G Kaufmann, PGDip(UCT-GSB), MTech Chem, BTech Chem CPUT, MSRM, EMT-B *Cape Town*
T Khoza, BSc(Eng) Chem MSc(Eng) Chem *Cape Town*
W Koorts, BTech Chem Eng, MTech Chemistry CPUT *Cape Town*
C Le Roux, NDip CPUT, BTech(Chem) *Unisa Cape Town*
S. Mbalo, NDip Chem Eng(CPUT) *Cape Town*

Postdoctoral Researchers

Mohamed I. Fadlalla, BSc(Hons), MSc and PhD (Heterogeneous catalysis) *UKZN, South Africa*.
JV Fletcher MSc(Applied Science) *Cape Town South Africa*, PhD(Chemical Engineering and Chemistry) *Eindhoven, Netherlands*
GM Leteba BSc(Hons) MSc(Materials Science) *Cape Town* PhD *Cape Town & Macquarie, Australia*
RK Marella, BSc ANU, India MSc(Medicinal Chemistry), SVU, *India* PhD(Heterogeneous Catalysis) CSIR-IICT, *India*
S Sayed BSc, BSc Honours MSc & PhD(Chemistry)

Honorary Professors

GJ Hutchings BSc(Chem)UCL PhD (Chem) UCL DSC (Heterogeneous Catalysis) London
FICHEM FRS CBE
JW Niemantsverdriet, BSc(Phys+Math) *Amsterdam* MSc (Exp Phys) *Amsterdam* PhD
Delft(TechSciences)

Management Staff

LK. Kallam, NDip Accounting & Computers Protea College, BCom (IS) *Unisa Cape Town*
SJ Roberts, BSc (Eng) Chem MSc(Eng) Chem *Cape Town*
RW Weber, BSc (Eng) Chem MSc(Eng) Chem PhD (Eng) MBA *Cape Town*

Finance & Administrative Officers

Y Amsterdam, Dip HR & Training Varsity College *Cape Town*
S Heugh, Dip Bookkeeping Institute of Certified bookkeepers *Cape Town*

Website: www.catcentre.uct.ac.za

Catalysis Institute: 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.

Deputy and Acting Director

SJ Roberts, BSc (Eng) Chem MSc (Eng) Chem *Cape Town*

Catalysis Institute: 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*, FRSC

Catalysis Institute: 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 Centre, established in 2007, is one of three Competence Centres that 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 and platinum-based fuel cell components by 2020, thereby diversifying the applications of the nation's platinum group metal resources.

Director

S Blair, PhD Materials Chemistry *Simon Fraser University (Canada)*

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. CeBER 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:

<input type="checkbox"/>	the education of engineers and scientists to the postgraduate level with key expertise to excel in careers in the bioprocess arena, both in research and in industry,
<input type="checkbox"/>	the provision of research expertise in key aspects of bioprocess engineering relevant to South Africa through contract research,

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<input type="checkbox"/>	the contribution to fundamental insights in bioprocess engineering and related processes, and
<input type="checkbox"/>	the transfer and application of knowledge across disciplines in which bioprocesses play a role, contributing to the South African bioeconomy and process industries.

CeBER maintains a productive balance between research centred on the application of biological principles through process development, on the fundamental understanding of biological processes at the mechanistic level, and on the interaction of these processes with their environment. Our key foci include biohydrometallurgy for the extraction of metals in tank and heap bioleaching processes; ARD prevention and remediation of metal rich effluents; production of fine chemicals through bacterial and fungal processes; algal biotechnology for bioenergy products, commodities and fine chemicals; biotransformation for value addition; biorefineries, including the wastewater biorefinery, product liberation and recovery; bioprocess integration and optimisation through modelling; and design and development of bioprocesses for environmental sustainability. In addressing these research areas, the Centre brings together key skills in chemical engineering science, mathematical modelling, hydrometallurgy, environmental engineering, biochemistry, microbiology and molecular biology. CeBER hosts the DST/NRF SARCHI Research Chair in Bioprocess Engineering.

Professor and Director

STL Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAiChE FSAMM SASM FSAAE ASSAF

Associated Academic and Research Staff

MA Fagan-Endres, BSc(Eng)Chem *Cape Town* PhD *Cambridge*

E Govender-Opitz, BSc(Eng)Chem PhD *Cape Town*

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

A Kotsiopoulos, BSc(Eng)Chem MSc(Eng)Chem PhD *Cape Town*

M Smart, BSc(Hons) MSc *Stellenbosch* PhD *Cape Town*

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

Technical Staff

TM Golela, NDip BTech *Cape Peninsula*

E Ngoma, BTech *TUT* MTech *CPUT*

S Rumjeet, BSc(Eng)Chem MSc(Eng)Chem *Cape Town*

S Rademeyer, NDip BTech(Chem Eng) *CPUT*

T Samkanga, NITC NTC NHD *Harare Polytechnic* MBA *Rhodes*

Postdoctoral Researchers

JR Amaral Filho, BSc(Eng) Environmental PhD *Rio Grande do Sul – Brazil*

Research Associates

C Bryan, BSc(Hons) *Nottingham* PhD *Bangor*

MJ Griffiths, BSc(Hons) *Cape Town* MPhil *Cambridge* PhD *Cape Town*

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

Administrative Staff

R Ederies, Dip(Bookkeeping) *Damelin* HR Cert *CPUT*

SH Jobson, BA *Rhodes* HDE *Cape Town*

CH Lowin, BA(Print Journalism) *Cape Town*

LD Mostert, BSc(Eng)Chem *Cape Town* MTh *Stellenbosch*

Website: www.ceber.uct.ac.za Instagram: [ceber_uct](#) Facebook: [CeBER UCT](#)

Centre for Materials Engineering (CME)

The Centre has the objectives of educating and training students in the techniques and fundamentals in the broad field of Materials Engineering. We are concerned with the physical, chemical, electrical and mechanical properties of ceramic, polymeric, metallic and composite materials. The Centre is supported by the NRF, DST and materials processing, producing, manufacturing and user industries and undertakes extensive research programmes, which prepare candidates for the degrees of MSc(Eng) in Materials Engineering and PhD. Of particular significance is the BSc(Hons) in Materials Science that is specifically designed for graduates with degrees in Physics, Chemistry or Geology and related sciences. We promote quality research by maintaining international liaisons and publication in reputable journals. The Centre also aims to support and assist both large and developing industries through research projects, practical solutions and human resource development.

Professor and Director

RD Knutsen, BSc PhD *Cape Town*

Associated Academic Staff

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

CD Woolard, BSc(Hons) PhD *Cape Town* MSc *London*

Visiting Lecturers

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

M Topic, BSc *Belgrade* PhD *Cape Town*

T Rampai, BSc(Hons) *Cape Town* MSc *Wits*

P Evans, BA(Nat Sci) *Cambridge* PhD *Cambridge*

RA Ricks, BSc(Hons) *Leeds* PhD *Cambridge*

Emeritus Professor

RB Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMEchE

Senior Technical Officer

P Louw, BSc(Hons) *Cape Town*

Scientific Officer

S von Willingh, BSc(Hons) MSc(Eng) *Cape Town*

Senior Research Officer

RJ Curry, BSc(Eng) MSc(Eng) PhD(Eng) *Cape Town*

Website: www.mateng.uct.ac.za

Centre for Minerals Research (CMR)

The Centre for Minerals Research at the University of Cape Town is a multi-disciplinary, inter-departmental research centre based in the Department of Chemical Engineering with close associate activities in Mechanical Engineering; geology and physics. The main focus of research is on the processes of froth flotation and comminution, arguably two of the most important unit operations in mineral beneficiation. Research is conducted through industrial, laboratory and computational studies. The Centre enjoys extensive support from local and international mining companies as well as statutory funding agencies. The Centre has an excellent reputation in its field and has strong links with a number of international research institutes. The Centre is a research partner in a highly successful collaborative venture with the Julius Kruttschnitt Mineral Research Centre, University of Queensland.

Professor and Director:

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

Associated Academic and Research Staff:

L Bbosa, BSc(Hons) MSc PhD *Cape Town* MSAIMM

M Becker, BSc(Hons) MSc *Cape Town* PhD *Pretoria* MSAIMM FGSSA

P Bepswa, BSc(Eng)UZ PhD *Cape Town*

K Corin, BSc(Hons) PhD *Cape Town* MSAIMM

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

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

B McFadzean, BSc PhD *NMMU*

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

FSAICHE FSAAE FRSSAf

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

J Waters, BTech(Chem Eng) *Cape Technikon* MSc *Cape Town* MSAIMM

Honorary Professor:

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

Honorary Adjunct Professors:

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

J Mann, BSc(Eng) *Wits* MBL *UNISA*

Administrative Staff:

H Sundström PGDip BA *Cape Town*

N Davies

C Pomario

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, with a focus on cardiovascular mechanics.

Professor and Director

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

Members

T Chinyoka, MSc *Zimbabwe* PhD *Virginia Tech*

F Ebobisse Bille, BSc(Hons) *Yaounde' I Cameroon* PhD *Pisa*

EB Ismail, BSc(Eng) MSc(Eng) *Cape Town*

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

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

Associate members

TJ Cloete, MIng *Stell*

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

Research Officer

Vacant

Administrative Assistant

N Bent

Website: www.cerecam.uct.ac.za

Centre for Research in Engineering Education (CREE)

CREE is an interdisciplinary research centre established to promote engineering education. The work of the CREE community focuses on establishing and promoting engineering education research to improve teaching and learning and further our understanding of the educational environment more broadly. This work has strong links with the fields of academic development and higher education studies, as well as being influenced by other discipline-based education research areas such as physics and mathematics education. As such, the CREE community values an interdisciplinary approach, and seeks to develop theoretically-informed and research-based ways of understanding the education process and the tertiary learning environment. Given our location in South Africa, we have a particular interest in student success in relation to issues of race, gender and disadvantage. We are actively involved in building the capacity of academic staff at UCT and at other universities in South Africa to meaningfully engage in engineering education research and its application in teaching contexts. We are also involved in co-operation between various national and international bodies involved in supporting engineering education in order to move the field of engineering education forward as it continues to grow. CREE offers post graduate qualifications specializing in engineering education including a structured PhD programme.

Director

N Wolmarans, PhD *Cape Town*

Administrative Staff

TBC

Centre for Transport Studies (CfTS)

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 MITSSA MIMESA
M Zuidgeest, MSc PhD *Twente*

Research Officer

H Schalekamp, BAS BArch MPhil PhD *Cape Town*

Website: www.cfts.uct.ac.za

Concrete Materials and Structural Integrity Research Unit (CoMSIRU)

The Concrete Materials and Structural Integrity Research Unit (CoMSIRU) became an accredited UCT Research Unit in 2010. The unit's research is focused on quality, durability and sustainability of concrete construction, structural health monitoring, structural integrity assessment, and repair and rehabilitation strategies for concrete structures. The guiding principle for CoMSIRU is developing high-level manpower for industry, research and academia, while engaging in innovative and impactful research. The unit maintains healthy and active links with industry through an advisory board, involvement in professional bodies and continuing professional development courses, as well as postgraduate training. CoMSIRU's well-established international links provide opportunities for collaborative research and benchmarking, which enables the research unit to continuously evolve and strengthen its niche research focus. The Research Programme is closely integrated with the postgraduate teaching programmes in Civil Infrastructure Management and Maintenance and Structural Engineering and Materials in the Department of Civil Engineering.

Professor and Director

P Moyo, Pr Eng BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang* FSAAE
MISAICE MIABSE MISHMII

Professor and Co-Director

H Beushausen, Dipl-Ing HAW *Hamburg* MSc(Eng) PhD *Cape Town*

Emeritus Professor & Senior Research Scholar

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

Honorary Research Associates

V Collis, PrEng PrArch BSc(Eng) *Cape Town*
M Santhanam, BTech *IIT Madras* MS PhD *Purdue*

Administrative Staff

A Sulo

Laboratory assistant

L Adams

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 MASSAF
FSAAE FICHEM

Associated Academic and Technical Staff

J Chivavava, BEng(Chem) *NUST* MSc(Chem) *Cape Town* AMICHEM
HR Heydenrych, BSc(Eng) Chem MSc(Eng) *Cape Town*
N Mukombe BEng(Chem) *NUST*

Administrative Staff

Zaeem Najaar

Website: www.crystal.uct.ac.za

Energy Research Centre (ERC)

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 have the option of registering for a Masters by dissertation only. This route opens opportunities for students who are unable to relocate to Cape Town and who have a good energy background.

Energy & Climate Change Group Leader

H Winkler, MSc *Berkeley* MA PhD *Cape Town*
B Rennkamp, Diplom Regional Sciences Latin America *Cologne* PhD *Twente*

Energy, Poverty and Development Group Leader:

J de Groot, BSc(Int Dev) *Wageningen* MA(Cult Anthropology) *Leiden* MSc(Dev Studies)
Wageningen

Energy Efficiency Group Leader

M Moorlach, MSc *Eindhoven*

Energy Modelling Group Leader

AG Hughes, BEng *Stell* MSc(Eng) *Cape Town*
B Merven, MSc(Eng) MSc(FinMaths) *Cape Town*

Renewable Energy Group Leader

A Madlopha, BSc MSc *Malawi* PhD *Strathclyde*

Research Staff

S Keen, BSc MPhil *Cape Town*

F Ahjum, MSc(Eng) *Cape Town*

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

R Larmour, BSc(Eng) *Cape Town*

A Marquard, BA *Cape Town* BA(Hons) MA *Rhodes* PhD *Cape Town*

B McCall, MSc(Eng) *Cape Town*

M Moorlach, MSc *Eindhoven*

A Moyo, MSc in Applied Economics *Cape Town*

D Sparks, MSc PhD *Cape Town*

A Stewart, MSc(Eng) *Cape Town*

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

Operations Manager

L Hassan

Administrator, Postgraduate & Human Resources

F Harribi

Assistant Administrator

B Matubatuba

Publications & Media Staff

T James, BA *Wits* BA(Hons) *Cape Town* MA *Essex* PhD *Cape Town*

M Roberts, MSc (Eng) PhD *Wits*

Website: www.erc.uct.ac.za

Future Water Research Institute

Future Water was established in 2016 as a transdisciplinary research institute at UCT, with the main aim of providing the intellectual framework and knowledge base to address issues of water scarcity and to underpin improved quality of life and sustainable development in South Africa. Future Water seeks to integrate technical, environmental and socio-economic aspects of water management through the adoption of inter- and trans-disciplinary (IDTD) approaches and scholarship as well as multi-stakeholder and/or user perspectives. It is hosted in the EBE faculty but includes discipline specialists as well as generalists from nine departments across six faculties, such that research is based within an over-arching systems framework supported by strong sociological, technical and environmental expertise. The research programme comprises environmental (protection of natural water resources), industrial (technical options and uses of water, water as part of the process, water as a waste resource), economic (cost benefits and viability) and people-focused (addressing social-cultural and institutional challenges and resistance) aspects of water management and includes a clear focus on the interactions between all of these. Future Water understands the need for strong collaboration in grappling with complex issues, in partnership with government at all levels, industry, communities, and other academic partners both locally and internationally.

Professor and Director

STL Harrison, BSc *Cape Town* PhD *Cambridge* FIWA FWISA FSAICHe FSAIMM FSAAE

Professor and Deputy Director

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

Key Academic Staff

J Broadhurst, BSc MSc *Port Elizabeth* PhD *Cape Town* MIMWA SACNASP
 K Carden, BSc MSc PhD *Cape Town* FWISA
 H Chitonge, BA *Zimbabwe* MA PhD *Natal*
 T Sanya, BArch *Makerere* MPlan *Stuttgart* PhD *Oslo*
 A Spiegel, BA MA PhD *Cape Town* MIUAES MASA
 K Winter, BA HDE *Cape Town* MA *London* PhD *Cape Town*

Key Research Staff and Postdoctoral Fellows

A Abrams, BA *Columbia* MPhil *Cape Town*
 G Owen, BSc Buea MSc *Western Cape* PhD *Western Cape*
 C Selela, BSc MSc *Western Cape* PhD *Pretoria*
 B Verster, BSc *Pretoria* MRes *York*
 J Fell, BSc MSc *Cape Town*

Finance Manager

S Jobson

Administrative Officer

G Verster

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 address the challenges facing the minerals industry in an integrated, comprehensive and holistic manner. Technology choices are developed and evaluated not only in terms of the conventional economic returns, but also with regard to their impact on the natural and human environments, which allows stakeholders to make more holistically informed decisions. Thus solutions are developed that focus on enhanced value addition and resource productivity through the conversion of minerals to metals in a manner congruent with providing a sustainable future for African people and their environment. This is achieved through three inter-connected activity areas, viz., research, education and engagement, which are aligned with UCT's mission 'to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society'. The United Nations' Global Sustainable Development Goals (SDGs), accepted in September 2015 provide the structure by which to understand, frame and address these challenges. MtM is participating in the international effort being led by the Sustainable Development Solutions Network (SDSN) and the World Economic Forum (WEF) focused on operationalising the SDGs in the mining sector. The Master of Philosophy program specialising in Sustainable Mineral Resource Development, inaugurated in 2014, was established as part of the Education for Sustainable Development in Africa project of the United Nations University Institute for Sustainability and Peace. The programme is delivered jointly with the University of Zambia and includes courses at the UCT Graduate School of Business and the Sustainability Institute at the University of Stellenbosch. Strong collaborative partnerships exist within UCT, particularly with Mineral Law in Africa, the Development Policy Research Unit, Future Water and others, with other universities, organisations and institutions in South Africa, Africa and globally.

Professor and Interim Director

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

Associated Academic Staff

M Becker, BSc(Hons) MSc Geology *Cape Town* PhD *Pret*
JL Broadhurst, BSc(Hons) MSc *Port Elizabeth* PhD *Cape Town*
DA Deglon, BSc(Eng) *Wits* MBA PhD *Cape Town* MSAIMM
J-P Franzidis, BSc(Eng) MSc(Eng) *Cape Town* PhD *Open* MSAICHe MSAIMM
STL Harrison, BSc(Hons) *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
A Mainza, BSc(Eng) UNZA PhD *Cape Town*
HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *UNISA* MSc(Eng) *Cape Town* Dr.-Ing.
RWTHAachen MSAICHe

Finance and Administrative Officer

E Jacobs

UCT-Nedbank Urban Real Estate Research Unit (URERU)

The research unit was approved by the UCT Council in June 2015 under the directorship of Associate Professor Francois Viruly. The research unit is managed by an advisory board which includes academics and property professionals. The aim of the unit is to provide an inter-disciplinary platform that promotes the identification of issues and seeks solutions to Urban Real estate investment, Finance, Economics and management problems in Africa. It offers an opportunity to initiate a unique research alliance in the built environment between UCT, universities across the continent, as well as Industry and society at large. It also provides an opportunity to further define and enhance the existing research thrusts of the department of Construction Economics & Management.

URERU is driven by four broad thrusts:

- Urban Real Estate markets dynamics and Trends
- Urban Real Estate Investment and Finance,
- Urban Real Estate land economics and management
- African Urban Real estate markets

URERU promotes academic research and disseminates research and data to the private and public sectors based on a research agenda for the period 2015-2020.

The primary source of funding of the research unit is Nedbank Corporate Property Finance who have committed to the amount of R1 million per year for four years. The intention of the unit is to raise further funding from a variety of sources. These are likely to include:

- Private sector funding
- Public sector funding
- Professional bodies (RICS)
- International bodies

Associate Professor and Director

F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

Associated Academic and Research staff

KA Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MSAFMA
RPT McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*
MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate)
Pret
LD Boyle BSc(QS) *Cape Town* MPhil (Urban Sustainability) *Cape Town*

Other entities

Continuing Professional Development

Co-ordinator

H Tait, BHE *Stell*

Administrator

S Jemaar

The CPD programme offers short courses, workshops and conferences. These provide a means for the on-going education of engineers and other technical staff, outside of the formal academic courses offered at UCT for degree purposes. Engineering education is considered to include all subjects which will benefit engineers and technical staff in their professional and vocational activities, and this covers a wide field. Generally there are no formal academic qualification 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.

Website: www.cpd.uct.ac.za

Geographical Information Systems Unit

Administrators

N Lindenberg, BSc(Hons) *Cape Town*

T Slingsby, MSc(Eng) *Cape Town*

The UCT GIS Laboratory acts as a consulting and resource centre for Geographic Information Systems researchers and postgraduate students. We administer the ESRI site license for Campus, act as a central data warehouse, offer support for GIS-related queries and provide a consulting service for project planning, course design and lecturing. The Lab also offers a small computing facility with PC's equipped with the latest ESRI software, an A0 digitizer, and a number of hand-held GPS receivers for field data collection.

Website: www.gis.uct.ac.za

Professional Communication Studies

Associate Professor and Convener

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

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Professional Communication Studies (PCS) courses aim to equip students with essential theory and skills in the areas of oral, written and interpersonal communication, as recommended by professional bodies such as ECSA, (SA)IMechE and IEEE.

Outcomes of the courses are knowledge and ability in:

- research methods using libraries, academic sources, Internet; referencing and citation; professional ethics; reports; executive summaries to company and public readership;
- business proposals; letters of application and detailed CVs; posters; presentation skills;
- visual literacy and graphics.

Website: www.pcs.uct.ac.za

SCHOLARSHIPS, PRIZES, CLASS MEDALS AND DEAN'S MERIT LIST

Scholarships/Awards

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

Architecture, Planning and Geomatics

Architecture and Planning

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

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

Geomatics

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

Twamley Postgraduate Scholarship: Awarded on the recommendation of the Chair of Surveying on the basis of academic achievement and other appropriate experience for postgraduate study in Geomatics.

Construction Economics and Management

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

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

JT Ross (Pty) Ltd scholarships: Three awards of R20 000 towards the tuition fees for the BSc Honours in Property Studies : these will be awarded to three of the best students in the final year of the BSc Property Studies degree. These awards are for obtaining a cumulative GPA above 70% and will be awarded to previously disadvantaged students who are in financial need. On completion of their studies they will be required to do an internship/work experience with JT Ross.

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

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.

Klaus-Jürgen Bathe Scholarships: Awarded to students in the final 2 years of study who show evidence of high intellectual power and commitment to the achievement of excellence in the field of Engineering.

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).

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.

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.

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:

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

Construction Economics and Management and Engineering

Class medals may be awarded to the best students in each of the following first year core courses: CHE1005W, CIV1005W, CON1004W, CON1011F, CON1012S, CON1018W, CON1019F/S, EEE1006F, EEE1007S, MEC1002W and MEC1005W.

Class medals are also awarded to each of the second, third and (where applicable) fourth years of study to students with the best weighted average in core, core-elective, elective and optional courses in the following programmes:

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

Prizes

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

General

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

Joseph Arenow Prizes: (two x R3000) (i) for the best Master's dissertation in the Faculty of Engineering & the Built Environment (ii) for the best PhD thesis in the Faculty of Engineering & the Built Environment.

Architecture, Planning and Geomatics

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

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

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

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

Cape Institute for Architecture Prize: R2000 for the best student in Design and Theory Studio II.

Cape Institute for Architecture Prize: R2000 for the best student in Design and Theory Studio III.

Cape Institute for Architecture Prize: R2000 for the best student graduating in the postgraduate Architecture degree programmes.

The Carl Borckenhagen Memorial Prize: R3000 to be awarded to the best student over the two years of study in the MCRP programme.

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

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

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

CNdV Landscape Architects' Prize: R500 for the best student in Landscape Construction in the second year of the Master of Landscape Architecture programme.

CNdV Landscape Architects' Prize: R500 for the best student in History and Theory of Landscape Architecture across first and second year in the Master of Landscape Architecture programme.

Essay Prize: R300 awarded to the BAS(Hons) student who produces the best essay.

General JBM Hertzog Prize: R1250 awarded annually to the best final year student in the MArch(Prof) programme.

George Menzies Prize: R2000 awarded on the results of the final examinations to the best student in Geomatics.

Helen Gardner Travel Prize: Two prizes of R20 000 each awarded by UCT to students who have completed the third year of the BAS degree but who have not yet been admitted to the BAS(Hons) degree. Applications to the Director, School of Architecture and Planning.

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

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

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

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

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

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

Ivor West Memorial Prize: R4000 for the best second or third year Geomatics student.

John Perry Prize: R2000 for the best work done in the third year of study of the BAS degree.

Lisa Blane Memorial Prize: R1000 for the best student in the Technology II course.

Lisa Blane Memorial Prize: R1000 for the most improved student in the Technology II course.

Lisa Blane Memorial Prize: R2000 for the best student in the Technology III course.

Lisa Blane Memorial Prize: R2000 for the student who displays the most innovative use of technology in 3rd year.

Molly Gohl Memorial Prize: R3000 for books or instruments to the best woman student completing the third year of study of the BAS degree.

New World Associates Prize: R300 voucher for the student with the best use of plants in Landscape Design.

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

Patrick McAuslan Prize: R1000 prize to the best student in the Regulatory & Legal Framework course in the Planning 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 Association of Consulting Professional Planners (SAACPP) Prize: R2000 and certificate for the best dissertation in the MCRP programme.

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 student in the MArch (Professional) programme.

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

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

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

South African Planning Institute Prize: R1000 and certificate for the most improved student over the 2 year Planning and Urban Design curricula.

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

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

The Western Cape Government Prize for the best Local Area Planning Project (Project A): Certificate and six-month internship prize for the best Local Area Planning Project.

The Western Cape Government Prize for the best Metropolitan Planning Project (Project B): Certificate and six-month internship prize for the best Metropolitan Planning Project.

The Western Cape Government Prize for the best Regional Planning Project (Project C): Certificate and six-month internship prize for the best Regional Planning Project.

Construction Economics and Management

Association of Construction 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 department 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: R900, R1100, R1300 and R1600 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: R3000 to the best all-round student in the final year of study of the BSc(Hons) in Quantity Surveying.

Bell-John Prize: R1600 for the best all-round student registered for BSc(Construction Studies) or BSc(Hons) in Quantity Surveying in any year of study.

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

Capital Land Prize: R1500 for the best student collectively in the subjects of Property Investment, Finance and Portfolio Management (CON2024S, CON3034F and CON4048F)

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.

SCHOLARSHIPS, PRIZES, CLASS MEDALS AND DEAN'S MERIT LIST 249

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

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

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

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

Grinaker-LTA Book Prizes: R1000 for the best student registered for the BSc(Hons) in Construction Management (CON4038F, CON4039S and CON4049S) (Minimum First Class Pass); R1000 for the best student registered for the BSc(Hons) in Quantity Surveying in the subject of Measurement and Design Appraisal III (CON4032F and CON4037S) (Minimum First Class Pass).

Master Builders Association of the Western Cape Prize (for South African Students): R1000 for the best BSc(Construction Studies) in the second year of study; R1500 for the best BSc(Construction Studies) in the third year of study; R2000 plus floating shield for the best BSc(Hons) student in Construction Management.

Mbata, Walters and Simpson Prize: R1000 for the best all round student in third year of study for the BSc(Construction Studies) degree.

The Nedbank Corporate and Investment Bank Property Finance Division Academic Achievement Award: R10 000 for the MSc in Property Studies graduating student who has achieved the highest cumulative grade point average in the taught courses of the degree.

The Nedbank Corporate and Investment Bank Property Finance Division Academic Achievement Award: R10 000 for the BSc Honours in Property Studies graduating student who has achieved the highest cumulative grade point average in the degree.

The Nedbank Corporate and Investment Bank Property Finance Division Academic Achievement Award: R10 000 for the BSc in Property Studies graduating student who has achieved the highest cumulative grade point average in the degree (to be assessed over the three years of the degree).

The Occupier Institute Prize: R1000 voucher for the best all round student in the second year of study for the BSc(Property Studies) degree.

Paragon Lending Solutions Prizes: R2500 plus job-shadow opportunity with the Paragon Lending Solutions CEO for the best student in the subject of Property Finance (CON3034F). R2500 for the best postgraduate student in the course Property Finance (CON5009Z).

PMSA (WC) Prize: R2000 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 winner will be awarded a certificate recognising their achievement at the department prize giving event. PMSA will award the prize itself at a branch meeting convenient for the winning student. At the branch meeting the student will be required to present their research to the PMSA membership. The decision of the award will be made at the sole

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discretion of PMSA (WC) based on an assessment from a pool of three dissertations submitted for consideration by UCT.

Robin Marten Prize: (value to be announced) for the student with the highest average final year examination results for the third (final) year of the BSc(Property Studies) and the BSc(Hons) Property Studies degrees, taken together, subject to a minimum average of 75% having been achieved each year. In the event of a tie, the student with the higher average for the Property Valuation courses within the two year period should be selected.

Tower Property Fund Academic Book Prize: R5000 for the Honours Research Report which best encapsulates Green Building technologies and/or initiatives.

Engineering

General

Bain Merit Awards: A first prize of R5000 and a second prize of R3000 to the best third-year students in Engineering, and a first prize of R5000 and a second prize of R3000 to the best second-year students in Engineering.

Bain Celebrating Women in Engineering Award: Awards of R3000 each to the top woman academic achiever in second and third year in the Engineering Departments.

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

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

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

Sammy Sacks Memorial Prize: Two prizes of R4000 each for the best classwork in MEC1002W Engineering Drawing.

Chemical Engineering

4th 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.

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

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

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

SA Institution of Chemical Engineers' Silver Medal: for outstanding performance over the four year curriculum, based on best overall year and credit-weighted GPA, including a fourth year credit-weighted GPA of above 75%.

Sasol Prize for CHE3006F: Certificate and R1000 for the best student in the course CHE3006F (Fundamentals of Chemical Engineering III).

Sasol Prize for CHE3007S: Certificate and R1000 for the best student in the course CHE3007S (Non-ideal systems in Chemical Engineering).

Sasol Prize for CHE3008S: Certificate and R1000 for the best student in the course CHE3008S (Chemical Engineering Project Management and Unit Operation Design).

Civil Engineering

Adina Award for Excellence in Computational Engineering Mechanics: R3000 for the best undergraduate final year project on any aspect of computational engineering mechanics by a student in Civil Engineering.

Aurecon Best overall Achievement Prizes: R2500, R1500, R1000 for the three best performing students.

Aurecon Prize for Water Engineering: R2000 to the student achieving the highest aggregate score in Water Engineering courses (CIV2040S, CIV3043F, CIV3044F, CIV3046S, CIV3047S, CIV4042F).

Concrete Society of SA (WP Branch) Award: R1000 and a book 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.

George Menzies Prize: R2000 awarded on the results of the final examinations to the best student in Civil Engineering.

Gibb Student Contribution Prize: R2000, for the student with the greatest all-round contribution to the undergraduate programme.

Gibb Prize for Transport Engineering: R2000, for the student showing the most promise in the field of transportation and traffic engineering.

JG Afrika: R2000 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.

Mott MacDonald Africa 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.

Paterson & Cooke Prize: R2000 for the best work in the final year research project.

PPC Cement Prize: R2500 and a book for the best undergraduate project on concrete technology.

PRDW Prize: R3500 for the best Water/Coastal Engineering final year project.

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Professor Derrick Sparks Geotechnical Engineering Prize (donated by the South African Institution of Civil Engineering, Western Cape Branch): R1000 for the best final year project in Geotechnical Engineering.

SA Institute of Steel Construction Prize: R1500 for the best structural steel design project submitted by an undergraduate student.

South African Institution of Civil Engineering Professional Practice Prize: R1000 for the best performance in Professional Practice (CIV4041F)

Thesis Poster/e-Portfolio Prize: R500

Thesis Talk Prize: R500

UWP Health and Safety Prize: R1500 for the best performing student in the Health and Safety module in Professional Practice (CIV4041F).

UWP Prize: R1500 for the student with the best result for the Urban Water Services course (CIV3047S).

Electrical Engineering

Peralex Electronics prize: R1500 for the best student in EEE3096S.

Peralex Electronics prize: R1500 for the best student in EEE4114F.

Peralex Electronics prize: R1500 for the best student in EEE4120F.

Siemens Prize: R2500 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

Mechanical Engineering/Mechanical & Mechatronic 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 MEC4091Z Honours Research Project involving the use or application of aluminium.

Best Student in Engineering Dynamics: R500 awarded to the student with the top mark in MEC2047F/S Engineering Dynamics.

Best Student in Dynamics II: R500 awarded to the student with the top mark in MEC3031S Dynamics II.

Best Student in Solid Mechanics I: R500 awarded to the student with the top mark in MEC2049F Solid Mechanics I.

Best Student in Solid Mechanics II: R500 awarded to the student with the top mark in MEC3023F Mechanics of Solids II.

Best Final-Year BScEng Project or BSc (Hons) Project: R1000 awarded for the top mark in the final-year BScEng project or BSc (Hons) project in an Impact-Related topic.

Element Six (Pty) Ltd and DST/NRF Centre of Excellence in Strong Materials Award: A gold medal and letter of commendation to a student for excellence in BSc (Hons) in Materials Science and Engineering:

The Gerald Nurick Prize for Excellence in Impact-Related Postgraduate Research: R1500 awarded to either an MSc student (the dissertation must be awarded with distinction) or PhD student (the thesis must have excellent reviews).

The Penny Wilson Memorial Award: Certificate and cash prize to the most congenial final year student as voted for by the class.

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

SASOL Prize for MEC2048S: Achievement certificate and R750 for the best second-year student in the course MEC2048S, Mechanical Engineering Design.

SASOL Prize for MEC3072F: Achievement certificate and R1000 for the best third-year student in the course MEC3072F, Machine Element Design II.

SASOL Prize for MEC3073S: Achievement certificate and R1000 for the best third-year student in the course MEC3073S, Machine Element Design III.

SASOL Prize for MEC4103F: Achievement certificate and R1500 for the best fourth-year student in the course MEC4103F, Product Design.

SASOL Prize for MEC4108S: Achievement Certificate and R1500 for the best fourth-year student in the course MEC4108S, System Design.

SASOL Achievement Certificate and R2000 Cash Prize: Awarded to the best Masters Dissertation in the field of Mechanical Engineering

SASOL Achievement Certificate and R2000 Cash Prize: Awarded to the postgraduate student who produced the best published paper in the field of metallurgy/materials/corrosion science.

Dean's Merit List

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

•	a first-year ASPECT student must have earned not less than 96 credits and obtain a year average of not less than 75 %; a student who was in the ASPECT programme in the first year of study must earn not less than 110 credits of approved coursework in any subsequent year and obtain a year average of not less than 70%.
•	a student in any other undergraduate programme must have earned not less than 132 credits of approved course work for the year in question and obtain a year average of not less than 70%.

Note: For credits to count for Dean's Merit List purposes, they must have been taken and passed in the current year. Transferred credits from another year, degree or institution do not count.

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

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

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

(a)	An applicant for registration may be recommended by the Council for admission to the Special Qualifying Examination. The nature and extent of the examination shall be determined in each case by the Council after consideration of all available evidence with regard to the standard and quality of the candidate's qualifications. If necessary, the Council may interview an applicant or require him or her to sit a written test in order to come to a decision as to the standard of the qualification. Only qualifications requiring a minimum of four years full-time study in architecture at a university or like educational establishment will be considered to be of a standard sufficient to give admission to the Special Qualifying Examination. An applicant who obtains a recommendation from the Council may be required to attend lectures and/or practical training at a university of his or her choice and to pass the examination(s) set by the University. The University or body conducting the Special Qualifying Examination shall determine when the examination(s) shall be held and when the fees are to be paid. A candidate who completes the examination(s) will be furnished with a certified statement to that effect.
(b)	All applicants who have not passed a qualifying examination recognised in terms of Section

19(2)(b) and 19(7)(c)(ii) of the Architects' Act 1970 must apply to the South African Council for Architects for admission to the Special Qualifying Examination. The following courses of action may be adopted: An applicant who, in the opinion of the Council, cannot be admitted to the Special Qualifying Examination shall be referred to the University of his or her choice which will decide what will be required of him or her in order to graduate.

Geomatics

Registration

The South African Geomatics Council recognises the BSc(Geomatics) degree, under The Geomatics Professions Act 19 of 2013, as a suitable theoretical qualification for registration as a Professional Land Surveyor and Professional Surveyor in the categories of Engineering and Photogrammetry and as a Professional Geoinformatics Practitioner. In addition to the degree, a graduate wishing to register in any of the above categories is required to undergo a period of practical training with a practising Professional and to undertake various professional examinations. Professional Land, Engineering and Photogrammetric Surveyors, as well as Professional Geoinformatics Practitioners, enjoy a status equivalent to that of an Associate Member or Fellow of the Royal Institution of Chartered Surveyors (RICS) in most parts of the world.

Representation and professional organisations

Holders of a degree in Geomatics, after registration with the SA Geomatics Council can apply for membership of the South African Geomatics Institute (SAGI). Graduates specialising in geoinformatics may prefer to become members of the Geo-Information Society of South Africa (GISSA), while those in the hydrographic surveying field may be interested in associating with the Hydrographic Society of South Africa. Internationally, Geomatics disciplines are represented by a number of organisations, the primary one being the Federation International Geodesic (FIG) and the International Society of Photogrammetry and Remote Sensing (ISPRS). These organisations represent the interests of their members at national or international level and are involved in various workshops, lectures and conference organisations.

Construction Economics and Management

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

Association of South African Quantity Surveyors (ASAQS)

Graduates in Quantity Surveying and Construction Management are eligible for corporate membership of the Association of South African Quantity Surveyors.
Address: The Director, ASAQS, PO Box 3527, Halfway House, 1685.

South African Council for the Quantity Surveying Profession (SACQSP)

The BSc in Construction Studies together with the BSc(Hons) in Quantity Surveying and Construction Management degrees are accredited by the South African Council for the Quantity Surveying Profession as fulfilling all the academic requirements for registration as Quantity Surveyors (in terms of the Quantity Surveyors Profession Act No 49 of 2000 as amended). The BSc in Property Studies, together with the BSc(Hons) in Property Studies, enjoys similar accreditation. Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Quantity Surveyor before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Quantity Surveyor.
Address: The Registrar, South African Council for the Quantity Surveying Profession, PO Box 3527, Halfway House, 1685.

The Royal Institution of Chartered Surveyors (RICS)

Graduates in Quantity Surveying, Construction Management and Property Studies are eligible to register with the Royal Institution as Probationers. Thereafter, a period of three years in-service training must be undertaken under the supervision of an approved mentor before being admitted to the Assessment of Professional Competence leading to membership of the Institution. Graduates of the MSc Programmes in Property Studies and Project Management enjoy similar accreditation.

Address: The Secretary-General, RICS, 12 Great George Street, Parliament Square, London SW1P 3AD, England.

Chartered Institute of Building (CIOB)

Graduates in Construction Management and Quantity Surveying are admitted to the Graduate Class of the Chartered Institute without further examination. Thereafter, a period of three years in-service training must be undertaken before being admitted to the Professional Interview leading to membership of the Institute. Address: The Secretariat, CIOB, Englemere, Kings Ride, Ascot, Berkshire SL5 8BJ, England.

South African Council for the Project and Construction Management Professions (SACPCMP)

The South African Council for the Project and Construction Management Professions registers professionals and candidates in the project and construction management professions. The BSc in Construction Studies together, with the Bsc (Hons) in Construction Management is accredited by the SACPCMP. A minimum of four years post-graduation relevant practical experience must be attained under the supervision of a registered Professional Construction Manager or Professional Construction Project Manager before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Construction Manager or Professional Construction Project Manager. Address: The Registrar, South African Council for the Project and Construction Management Professions, PO Box 653141, Benmore 2010.

The South African Council for the Property Valuers' Profession (SACPVP)

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

Address: The Registrar, SACPVP, PO Box 114, Menlyn 0063.

Engineering

The current BSc(Eng) degrees in Chemical, Civil, Electrical, Electrical and Computer, Electro-Mechanical, Mechanical Engineering and Mechatronics are accepted by the Engineering Council of South Africa (ECSA) as fulfilling all the academic requirements for registration as a Professional Engineer. In terms of the Washington Accord signed in June 2000, of which South Africa is a signatory, the Faculty's engineering qualifications have been recognised by professional engineering accrediting bodies in the United States of America, Canada, Australia, New Zealand, the United Kingdom, Ireland and Hong Kong.

In terms of the Engineering Profession Act (Act No 46 of 2000), ECSA has stipulated a minimum period of three years' approved practical training and experience after graduation under the guidance of a Professional Engineer before a candidate may register as a Professional Engineer. This period may be shortened by up to one year in recognition of successful postgraduate degree work. It is of the utmost importance that every graduate should register immediately as a candidate engineer.

The University of Cape Town enjoys a special relationship with the Association of Commonwealth Universities. The curricula, systems and standards of engineering education at the University

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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, Pinetown, 3198.

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 SW1P3AA.

The South African Institution of Civil Engineering

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

The Institution of Structural Engineers

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

The Institution of Engineering and Technology (IET)

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

The South African Institute of Electrical Engineers (SAIEE)

Graduates in Electrical Engineering may be admitted to membership, without further examination. Address: 18a Gill Street, Observatory, Johannesburg, 2198.

The South African Institution of Mechanical Engineers

Graduates in Mechanical Engineering may be admitted to membership, without further examination. Address: PO Box 34008, Rhodes Gift, 7707.

The South African Institution of Certificated Engineers

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

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