2022

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FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT UNDERGRADUATE STUDIES

Handbook 7a in this series of handbooks

UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT (UNDERGRADUATE)

2022

Postal Address:	University of Cape Town Private Bag X3 7701 RONDEBOSCH
Dean's & Faculty Offices:	New Engineering Building Upper Campus
Office Hours:	Mondays to Fridays: 08h30 - 16h30
Fax:	(021) 650 3782
Telephones:	Dean's Office (021) 650 2702 Faculty Office (021) 650 2699 Accounts and Fees (021) 650 1704 Admissions (021) 650 2128
Internet:	UCT's Home Page http://www.uct.ac.za Engineering & the Built Environment Home Page http://www.ebe.uct.ac.za Dean's Office ebe-dean@uct.ac.za Faculty Office ebe-faculty@uct.ac.za International Academic Programmes Office iapo@uct.ac.za

The Registrar's and General Enquiries offices are located in the Bremner Building and remain open during the lunch hour. The Admissions Office and Student Records Office are located in the 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

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

(a)   *General Information:* This section includes information on officers in the faculty, student councils, minimum requirements for admission, degrees and diplomas awarded by the faculty, lecture times, course codes and terminology and the credit system. Detailed information on the undergraduate entrance requirements can be found in the University Prospectus.

(b)   *Rules for degrees:* This section covers the Faculty rules for each of the degree programmes. These rules should be read in conjunction with the general University rules in the General Rules and Policies Handbook (Handbook 3), which also contains the rules for the PhD degree. Students are expected to acquaint themselves with the rules in both handbooks and to check annually whether the rules or curriculum requirements have changed since the last edition, taking particular note of the following:

      i.   rules relating to registration and examinations;
      ii.   rules relating to changes of curriculum;
      iii.   rules relating to leave of absence;
      iv.   rules on Academic Conduct, especially the rules concerning dishonest conduct and plagiarism.

(c)   *Programmes of Study:* This section gives a brief introduction to each programme and lists the curricula (required courses) in table form. The curriculum tables must be read together with the course outlines in the Departments in the Faculty and Courses Offered section.

(d)   *Departments in the Faculty and Courses Offered:* This section contains entries for each department in the Faculty, and lists members of staff and programmes of study, as well as course outlines of each course offered by the departments.

(e)   *Departments in other Faculties and Courses Offered:* This section contains entries for departments located in other faculties, with course outlines for courses commonly taken by students in the Faculty of Engineering & the Built Environment.

(f)   *Centres and other entities established in the Faculty:* There are entries for the principal faculty entities, centres and units which do not fall directly under academic departments, such as the Centre for Research in Engineering Education, and Continuing Professional Development.

(g)   *Scholarships, Prizes, Class Medals and the Dean's Merit List:* This section lists the various prizes, medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.

(h)   *Professional Status and Recognition of Degrees:* This section includes information on the professional status and recognition of the Faculty's degrees and its links with professional bodies.

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 MASSAf FSAAE FIChemE

Personal Assistant to the Dean
M Scheepers

Deputy Deans
Undergraduate Studies: Associate Professor KA Michell, BSc(QS) MPhil Cape Town PhD Salford PrQS PMAQS MRICS

Postgraduate Studies: Professor A Windapo, BSc(Building) IfE MSc(Construction Management) PhD Lagos FNIOB PrCPM

Research and Strategic Innovation: Professor H Beushausen, Dipl-Ing HAW Hamburg MSc(Eng) PhD Cape Town

Transformation and Social Responsiveness: Professor M Vanderschuren, BSc(Eng) Tilburg MScEng Delft PhD Enschede FSAICE MITSSA

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 MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*

Electrical Engineering
Associate Professor F Nicolls, MSc(Eng) PhD *Cape Town*

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

Academic Administration

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

Undergraduate Manager (Academic Administration)
C Wilson

Postgraduate Manager (Academic Administration)
Khanyisa Tivaringe, PGDip (Project Management) BScHons MSc (Materials Engineering) *Cape Town*

Administrative Assistants
N Hartley, NDip Bus Mgmt *College of Cape Town*
C Hewitson, BSocSc PGDip LIS *Cape Town*
R Jakoet, BSocSci *Cape Town*
L Johannes
Jamie-lee Swarts, PGDip GSB *Cape Town*

Senior Secretary - Receptionist
I Likhoele, BSocSci *Cape Town*

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

Communications, Marketing and Development

Manager
M Hilton

Finance

Faculty Finance Manager
S Kriel, BCom *Cape Town*

Assistant Faculty Finance Manager
N Daniels

Senior Finance Officer
M Sigonyela, BSocSc *Cape Town*

Finance Officer
A Dlamini, Advanced Diploma in Management *UWC*

Human Resources

Human Resources Officer
N Hendricks, Btech: Human Resources *CPUT*

IT and Facilities

Manager
TBC

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.

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.

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)
Professor M Claeys	(Chemical Engineering)
Emeritus Professor D Dewar	(Architecture, Planning and Geomatics)
Emeritus Professor GA Ekama	(Civil Engineering)
Professor STL Harrison	(Chemical Engineering)
Professor AE Lewis	(Chemical Engineering)
Professor A Mainza	(Chemical Engineering)
Emeritus Professor G Nurick	(Mechanical Engineering)
Emeritus Professor CT O'Connor	(Chemical Engineering)
Professor E Pieterse	(African Centre for Cities)
Emeritus Professor H Rüther	(Architecture, Planning and Geomatics)
Professor V Watson	(Architecture, Planning and Geomatics)
Professor E van Steen	(Chemical Engineering)
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	116420
Bachelor of Science in Property Studies	11693
Bachelor of Architectural Studies Honours	66569
Bachelor of City Planning Honours	94845
Bachelor of Landscape Architecture Honours	103122
Bachelor of Science Honours in Geographical Information Systems	104753
Bachelor of Science Honours in Construction Management	11701
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	101491
Master of Architecture	101991
Master of Architecture Professional	3977
Master of City and Regional Planning	94631
Master of Engineering	67426
Master of Engineering in Civil Infrastructure Management and Maintenance	109599
Master of Geotechnical Engineering	97913
Master of Landscape Architecture	101298
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 Structural Engineering and Materials	110082
Master of Transport Studies	97727
Master of Urban Design	98987
Master of Water Engineering	111182
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 2022

Please refer to the website: http://www.staff.uct.ac.za/staff/calendar/terms

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
ASL	African Studies and 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 AAAnnnnB, where

AAA   represents the department offering the course;

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

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

The following suffixes are used:

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

The following example shows how this works:

CIV2031S Structural Engineering

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

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

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

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

Courses: Guide To Terminology

Core courses:	These courses form a central part of a Bachelor's degree programme. Inclusion of such courses in a curriculum is compulsory.
Co-requisites:	A co-requisite course is one for which a student must be registered together with (i.e. concurrently) another specified course.
Elective core courses:	This category comprises groups of courses from which the selection of one course or more is mandatory for a Bachelor's degree curriculum. Selection of these courses is made on the basis of specialisation (stream) or on the basis of interest.
Elective courses:	Courses required for degree purposes (e.g. to make up required number of programme credits), but in which the choice of courses is left to the student, except that a broad field of study may be specified (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 papers, master's dissertations or PhD theses must have undergone an ethics review process before submission for examination. Review generally entails approval of a research proposal by a Research Ethics or Animal Ethics Committee, prior to commencement of evidence gathering.

RULES FOR UNDERGRADUATE DEGREES

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

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

Minimum Formal Admission Requirements
BAS, BSc(ConstStudies), BSc(PropStudies), BSc(Eng) and BSc(Geomatics) candidates
FB1   Candidates who wish to be considered for one of the above-mentioned degrees must hold:
   (a)   a National Senior Certificate endorsed by Umalusi to state that they have met the minimum admission requirements for degree study; or
   (b)   a senior certificate with matriculation endorsement issued by the South African Certification Council; or
   (c)   a certificate of complete or conditional exemption issued by the Matriculation Board; or
   (d)   a degree of this, or another university recognised for the purpose by the Senate.

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

Duration of Degree
BAS, BSc(ConstStudies) and BSc(PropStudies) candidates
FB2.1   The curriculum shall extend over not less than 3 academic years of study.

BSc(Eng) and BSc(Geomatics) candidates
FB2.2   The curriculum shall extend over not less than 4 academic years of study.

Curriculum
BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates
FB3.1   Candidates must comply with the curriculum and course requirements prescribed by Senate which are published in the Programmes of Study and Courses Offered sections of this Handbook.

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

FB3.3   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.

FB3.4   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.

FB3.5   Except by permission of the Dean candidates may not withdraw from a course which they are repeating.

Credit for and Exemption from Courses
BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

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

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

Progress through the Degree
FB5   Candidates academic year of study shall be determined on the basis of the year in which they are expected to graduate.

Method of Assessment
BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates

FB6.1   *General*
         Courses are assessed by formal examination, by review or by satisfactory performance of the duly performed certificate (DP) requirements. If a course is assessed by formal examination or review, 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.

FB6.2   *Formal Examination*
         Assessment by formal examination may be by means of written and/or oral examination, tutorials, class tests, term papers, notebooks or other course assignments. An external examiner is appointed for each course assessed by examination.

FB6.3   *Duly Performed (DP) Certificate*
         A DP certificate may be withheld unless (i) all parts of each project, tutorial and other assignments are completed to an acceptable standard and submitted for assessment at stipulated times; (ii) there is satisfactory attendance (as prescribed by Senate) and satisfactory participation in all sections of the course.

FB6.4   *Duly Performed (DP) Courses*
         In courses where the DP certificate constitutes the final result, 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).

FB6.5   *Review*
         Assessment by review consists of a review by the internal examiner(s) of the course work completed by means of written and/or oral class tests, tutorials, term papers, notebooks or other course assignments.

Supplementary Examinations

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

FB7   FB 7.1

Senate may permit candidates to take supplementary examinations in undergraduate and honours courses offered by a department, subject to supplementary examinations being offered in the department concerned, inclusive of undergraduate service courses <u>that have final written examinations</u>, and subject to the following:

- Students must have DP for the course, and
- Students must have achieved at least 45% in the course.

(Note: Courses in the Department of Chemical Engineering with mandatory reassessments do not offer supplementary examinations).

FB 7.2

Senate may identify undergraduate or honours courses for a Tutored Reassessment Programme (TRP). A TRP consists of a period of one to three weeks outside of formal teaching time where students are provided with a structured tutoring environment, after having failed the final examination for the course. Senate may permit candidates to take a second final examination in undergraduate and honours courses, <u>that have final written examinations</u>, subject to the following:

- Students must have DP for the course,
- Students must have obtained marks from 40% to 44% in the course, and
- Attended the TRP.

(Note: Students in the mark range 45-49% may apply to attend the TRP before writing the supplementary examination in accordance with FB7.1 above).

FB 7.3

Senate may permit a candidate an additional assessment <u>once</u>, for <u>one</u> single undergraduate or honours course which a candidate is registered for in the final year that prevents graduation, subject to the following:

- The course does not qualify for a supplementary examination, mandatory reassessment or TRP (see FB7.1 and FB7.2 above)
- The student achieved at least 45% in the course.

(Note: Additional assessment is <u>not</u> offered for courses where the candidate has failed an official deferred or supplementary final written examination, or mandatory reassessment. Where an additional assessment is undertaken, the maximum mark obtainable is 50%, failing which the mark remains un-changed).

Readmission Requirements

BAS candidates

FB8.1   BAS candidates shall not be permitted to renew their registration except by permission of the Senate, if they:

(a)   at the end of first year fail either APG1020W or APG1003W;
(b)   fail any major course prescribed for second or third year, after having been registered twice for the course;
(c)   fail in any semester to obtain a DP for either or both major courses;
(d)   fail to complete the courses prescribed for first year within two years; the courses prescribed for second year within four years;
(e)   fail to complete 50% of the credits for which they are registered.

BSc(Eng) and BSc(Geomatics) candidates

FB8.2   Except by permission of the Senate candidates may not renew their registration if:

    (a)   they are in their first year of registration at a tertiary institution, and in the courses recognised for the degree fail to obtain at least 80 credits or, if registered through the Academic Development Programme, ASPECT, to obtain at least 60 credits; or

    (b)   they are transferees from another tertiary institution or another qualification at UCT, in their first year of registration in the current qualification, and fail in the courses recognised for the degree to obtain at least 96 credits, or if registered through ASPECT, to obtain at least 80 credits; or

    (c)   they have re-registered in the Faculty after a break of one or more years, or are granted a concession to continue and fail in the courses recognised for the degree to obtain at least 96 credits in their first year of re-registration or, if first registered through ASPECT, to obtain at least 80 credits; or

    (d)   they, in any subsequent year of registration, fail in the courses recognised for the degree to obtain at least 192 credits over each successive two-year period, or if first registered through ASPECT, to obtain at least 160 credits over each successive two-year period.

BSc(ConstStudies) and BSc(PropStudies) candidates

FB8.3   Except by permission of the Senate candidates may not renew their registration if:

    (a)   they are in their first year of registration at a tertiary institution and in the courses recognised for the degree fail to obtain at least 72 credits; or

    (b)   they are transferees from another tertiary institution or another qualification at UCT, in their first year of registration in the current qualification, and fail in the courses recognised for the degree to obtain at least 80 credits; or

    (c)   they have re-registered in the Faculty after a break of one or more years, or are granted a concession to continue and fail in the courses recognised for the degree to obtain at least 80 credits in their first year of re-registration; or

    (d)   they, in any subsequent year of registration, fail in the courses recognised for the degree to obtain at least 160 credits over each successive two-year period.

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

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

    (a)   the credit count shall include supplementary (if offered) and deferred examinations;

    (b)   neither years registered nor credit points obtained in a previous year towards another qualification in another faculty or another institution will be counted;

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

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

FB8.5   Candidates who have not been readmitted in terms of rule FB8.1, FB8.2 or FB8.3, who do not appeal, or whose appeal is unsuccessful, may be considered for readmission by the Senate, after an interval of at least one year, if they show evidence of academic rehabilitation or evidence of significantly improved motivation to the satisfaction of the Senate.

FB8.5.1 *BAS* Candidates who have been readmitted to the programme should complete a managed credit load of no more than 96 credits for the year.

Award of Degree with Distinction, Honours or First Class Honours
BAS candidates
FB9.1   To be awarded the degree with distinction, candidates must obtain a first class pass in the Design and Theory Studio III Examination and a first class pass or a second class (Division 1) pass in one of the other Design and Theory Studio Examinations and three additional first class passes in BAS course work. The degree may only be awarded with distinction if completed in the minimum time.

BSc(Eng) and BSc(Geomatics) candidates
FB9.2   To be considered for the award of the degree with first class honours or honours, students must (i) complete the requirements for the degree in the minimum time possible and, (ii) for first class honours obtain at least a first class pass for the research project or, (iii) for honours, a minimum of a second class pass in the research project.

NOTES:
(a)   For students who registered for the first time in 2016 or later, the award of honours or first class honours will be assessed on the student's cumulative credit weighted average, with 65% required for honours and 75% for first class honours. For students who registered for the first time prior to 2016, please refer to previous handbooks.
(b)   The research project is defined as one of APG4003Z/CHE4045/CHE4036/ CIV4044/EEE4022/MEC4110W.
(c)   In the case of students who have transferred from other faculties recognition will be given for those courses for which the student was granted credit - based on (a) above.
(d)   In view of the difficulty of assessing cases of students who have transferred from other universities, the dean, in consultation with the departmental head concerned may recommend that a student be awarded the degree with honours or first class honours, if satisfied that this is merited.

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

BSc(ConstStudies) and BSc(PropStudies) candidates
FB9.3   To be considered for the award of the degree with distinction a candidate must obtain a minimum credit weighted average of 75% for the degree.

Exemption from or Modification of Rules
BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates
FB10   Any exemption or deviation from the rules requires the approval of Senate.

PROGRAMMES OF STUDY
Architecture, Planning and Geomatics

Bachelor of Architectural Studies
BAS[EB012APG01]

Programme Convenor:
Dr P Tumubweinee, BSc (Arch) *Witwatersrand*, Honours *Witwatersrand*,M.Arch *Pretoria*, PhD *Bloemfontein*

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

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

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1003W	Technology I (major course)	24	5
APG1004F	History & Theory of Architecture I	12	5
APG1005S	History & Theory of Architecture II	12	5
APG1017F	Academic Development Class I	0	5
APG1018S	Academic Development Class II	0	5
APG1020W	Design & Theory Studio I (major course)	72	5
APG1021W	Representation I	24	5
	Total credits per year	**144**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2000F	History & Theory of Architecture III 8		6
APG2003S	History & Theory of Architecture IV 8		6
APG2009F	Theory of Structures III 6		6
APG2011S	Theory of Structures IV 6		6
APG2021W	Technology II (Major Course)......................................24		6
APG2038W	Environment & Services II 18		6
APG2039W	Design & Theory Studio II (Major Course)..................74		6
APG2027X	Work Experience 0		6
	Total credits per year **144**		

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3000F	History & Theory of Architecture V 8		7
APG3001S	History & Theory of Architecture VI 8		7
APG3023W	Technology III (major course).....................................24		7
APG3028X	Independent Research...0		7
APG3034W	Environment & Services III..6		7
APG3035F	Theory of Structures V 6		7
APG3036F	Management Practice Law III 12		7
APG3037W	Design & Theory Studio III (major course)..................80		7
	Total credits per year **144**		

Course descriptions are set out in the sections under Departments in the Faculty and Courses Offered. The course code abbreviation for Architecture courses is APG.

NOTES:

(i)   *Core courses are sequential.*

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

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

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

Bachelor of Science in Geomatics [EB019]

The courses given in the Geomatics programme comprise lectures, tutorials, laboratory sessions, computation sessions, and practical fieldwork. Students must show satisfactory performance in each aspect of the work to obtain a duly performed certificate. Students are required to complete approved courses of a value not less than 576 credits and to comply with the prescribed curriculum requirements. Students may choose a stream in Surveying or Geoinformatics. The Surveying stream is targeted at students wishing to register as a Geomatics Professional in a range of categories with the South African Geomatics Council; the Geoinformatics stream is targeted at students wishing to work in the spatial information industry and for registration as a Geomatics Professional with the South African Geomatics Council in the category of Geo-Information Sciences.

The design of the degree is outcomes-based, with a strong emphasis on the ability to plan, execute and report on Geomatics projects with demonstrated knowledge of underlying theory and the ability to critically analyse the project outputs. Graduates are equipped to meet the challenges of professional geomatics practice in African and international contexts through excellent teaching in a research-led environment. Problem solving, ethics, professionalism, professional communication and working in a team are critical outcomes.

Streams in Geomatics: There are two streams in the Geomatics programme: Surveying and Geoinformatics. If a first-year student is considering the Geoinformatics stream, then certain first and second year courses must be taken to allow that option. Course advice is given at registration, but students should think about whether to take environmental and geographical science or computer science to third year level, as these options will affect the choice of second semester courses in the first year. These can be changed up until the first week of the second semester (July).

Department of Agriculture, Land Reform and Rural Development Bursaries: The Department of Agriculture, Land Reform and Rural Development offers bursaries to students who are South African citizens to study in a range of geomatics qualifications including our BSc in Geomatics (all streams, four-year or five-year programmes). Applicants will be expected to enter into a contract with the Department. The bursary is for a full programme, but annually renewable based on performance. It covers academic fees (including registration, tuition and examination fees), book allowance, meal allowance, accommodation allowance (residential fees if applicable), and living allowance, as would be set out in the agreement.

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

- **Surveying:** Standard and advanced survey equipment is available. This includes electronic, total stations, automatic and precise levels, Global Navigation Satellite System (GNSS) receivers, laser scanners, and robotic total stations. A number of survey control points on and in the vicinity of the University campus provide the basis for a variety of assignments, and vehicles are available for field work off the campus.
- **Geographic Information Systems (GIS):** Computation facilities include access to the Faculty and Geomatics computer laboratories. The workstations in the Geomatics computer laboratory run ESRI's ArcGIS, and QGIS Open Source software in support of the GIS courses. There is also an operational ArcGIS Server to allow for web mapping services. Surveying equipment includes hand-held GNSS receivers for data collection.
- **Geodesy:** There are facilities for undertaking fundamental geodetic surveys, gravity surveys and levelling, and control network adjustment. Research interest in geodesy is centred currently on satellite and terrestrial gravimetry, horizontal and vertical geodetic datums, geoid determination and analysis, effective application of GNSS in local and regional positioning and surveying, determination and monitoring of Earth deformations and plate tectonics, geodetic network design and adjustments, numerical and approximation methods in geodesy and geomatics engineering, datum transformation and analysis of underground andsurface mass.
- **Photogrammetry and Remote Sensing:** The Geomatics computer laboratory has ENVI, ERDAS, UASMaster, SURE and Agisoft software. These are industry-leading products which provide extensive digital image processing functionality. There is also a variety of in-house software and Open Source software available to support ongoing remote sensing and photogrammetric research activities. Digital SLR and video cameras form the basis for image capture for both research and practical assignments.

Bachelor of Science in Geomatics: Surveying Stream 4-year curriculum [EB019APG09]

Senior Lecturer and Programme Convener:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1017F	Introduction to Programming	16	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics I B for Engineers	18	5
STA1000S	Introductory Statistics	18	5
	Elective	18	5
	Total credits per year	**124**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2015F	Geographic Information Systems I	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
APG2041S	Applied Surveying & GISc	14	6
MAM2083S	Vector Calculus for Engineers	16	6
MAM2084F	Linear Algebra and Differential Equations for Engineers	16	6
PHY1031F	General Physics A	18	5
PHY1032S	General Physics B	18	5
	Total credits per year	**148**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7
APG3016C	Surveying II	12	7
APG3017D	Surveying III	12	7
APG3027Z	Cadastral Survey & Registration Projects	24	7
APG3033W	Land & Cadastral Survey Law	16	7
APG3038F	Professional Communication Studies	12	7
APG3040C	Advanced Spatial Data Analysis	12	7
CON2033F	Real Property Law	16	6
	Total credits per year	**144**	

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4001S	Geodesy	24	8
APG4002Z	Land Use Planning & Township Design	16	8
APG4003Z	Geomatics Project	40	8
APG4005F	Engineering Surveying & Adjustment	18	8
APG4010X	Geoinformatics Camp	4	8
APG4011F	Geomatics IV	24	8
APG4012S	Geomatics Management & Professionalism	24	8
	Total credits per year	**150**	

Students who have taken both APG1022X and APG2019X do not need to take APG3015X.

Students who may wish to register as a Professional Geoinformatics Practitioner (as well as the options of registering in the professional categories of land, engineering and photogrammetric surveyor), should take APG3039B as their elective.

Bachelor of Science in Geomatics: Surveying Stream 5-year curriculum [EB819APG09]

Senior Lecturer and Programme Convener:

S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1017F	Introduction to Programming	16	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics I B for Engineers Extended	18	5
PHY1014S	Physics A for Aspect	18	5
STA1000S	Introductory Statistics	18	5
	Total credits per year	**124**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MAM2085F	Vector Calculus for Aspect	16	6
PHY1015F	Physics B for Aspect	18	5
	Elective	18	5
	Total credits per year	**110**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2015F	Geographic Information Systems I	24	6
APG2041S	Applied Surveying & GISc	14	6
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7
APG3040C	Advanced Spatial Data Analysis	12	7
	Elective	0	0
	Total credits per year	**90**	

Students who have taken both APG1022X and APG2019X do not need to take APG3015X.
Students who may wish to register as a Professional Geoinformatics Practitioner (as well as the options of registering in the professional categories of land, engineering and photogrammetric surveyor), should take APG3039B as their elective.

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3016C	Surveying II	12	7
APG3017D	Surveying III	12	7
APG3027Z	Cadastral Survey & Registration Projects	24	7
APG3038F	Professional Communication Studies	12	7
APG3033W	Land & Cadastral Survey Law	16	7
APG4002Z	Land Use Planning & Township Design	16	8
APG4010X	Geoinformatics Camp	4	8
APG4011F	Geomatics IV	24	8
CON2033F	Real Property Law	16	6
	Total credits per year	**136**	

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4001S	Geodesy	24	8
APG4003Z	Geomatics Project	40	8
APG4005F	Engineering Surveying & Adjustment	18	8
APG4012S	Geomatics Management & Professionalism	24	8
	Total credits per year	**106**	

Bachelor of Science in Geomatics: Geoinformatics Stream 4-year curriculum
Computer Science Specialisation[EB019APG11]

Senior Lecturer and Programme Convener:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1015F	Computer Science 1015	18	5
CSC1016S	Computer Science 1016	18	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
STA1000S	Introductory Statistics	18	5
	Total credits per year	**126**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2015F	Geographic Information Systems I	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
APG2041S	Applied Surveying & GISc	14	6
MAM2083S	Vector Calculus for Engineers	16	6
MAM2084F	Linear Algebra and Differential Equations for Engineers	16	6
PHY1031F	General Physics A	18	5
PHY1032S	General Physics B	18	5
	Total credits per year	**148**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7
APG3016C	Surveying II	12	7
APG3038F	Professional Communication Studies	12	7
APG3039B	Spatial Data Infrastructures	12	7
APG3040C	Advanced Spatial Data Analysis	12	7
CSC2001F	Computer Science 2001	24	6
CSC2002S	Computer Science 2002	24	6
CSC2004Z	Programming Assessment	0	6
INF2009F	Systems Analysis	18	6
	Total credits per year	**154**	

Students who have taken both APG1022X and APG2019X do not need to take APG3015X

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4002Z	Land Use Planning & Township Design	16	8
APG4003Z	Geomatics Project	40	8
APG4010X	Geoinformatics Camp	4	8
APG4011F	Geomatics IV	24	8
APG4012S	Geomatics Management & Professionalism	24	8
CSC3002F	Computer Science 3002	36	7
CSC3003S	Computer Science 3003	36	7
	Total credits per year	**180**	

Bachelor of Science in Geomatics: Geoinformatics Stream 5-year curriculum
Computer Science Specialisation[EB819APG11]

Senior Lecturer and Programme Convener:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1015F	Computer Science 1015	18	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics I B for Engineers Extended	18	5
PHY1014S	Physics A for Aspect	18	5
STA1000S	Introductory Statistics	18	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
	Total credits per year	**126**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
CSC1016S	Computer Science 1016	18	5
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6

Code	Course	NQF Credits	NQF Level
MAM2085F	Vector Calculus for Aspect	16	6
PHY1015F	Physics B for Aspect	18	5
	Total credits per year	**110**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2015F	Geographic Information Systems I	24	6
APG2041S	Applied Surveying GISc	14	6
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7
APG3039B	Spatial Data Infrastructures	12	7
APG3040C	Advanced Spatial Data Analysis	12	7
CSC2001F	Computer Science 2001	24	6
CSC2002S	Computer Science 2002	24	6
CSC2004Z	Programming Assessment	0	6
	Total credits per year	**150**	

Students who have taken both APG1022X and APG2019X do not need to take APG3015X

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3016C	Surveying II	12	7
APG3038F	Professional Communication Studies	12	7
APG4010X	Geoinformatics Camp	4	8
CSC3002F	Computer Science 3002	36	7
CSC3003S	Computer Science 3003	36	7
APG4012S	Geomatics Management & Professionalism	24	8
INF2009F	Systems Analysis	18	6
	Total credits per year	**142**	

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4002Z	Land Use Planning & Township Design	16	8
APG4003Z	Geomatics Project	40	8
APG4011F	Geomatics IV	24	8
	Total credits per year	**80**	

Bachelor of Science in Geomatics: Geoinformatics Stream 4-year curriculum
Environmental and Geographical Science Specialisation[EB019APG11]

Senior Lecturer and Programme Convener:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1017F	Introduction to Programming	16	5

Code	Course	NQF Credits	NQF Level
EGS1003S	Geography, Development & Environment	18	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
STA1000S	Introductory Statistics	18	5
	Total credits per year	**124**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2015F	Geographic Information Systems I	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
APG2041S	Applied Surveying & GISc	14	6
MAM2083S	Vector Calculus for Engineers	16	6
MAM2084F	Linear Algebra and Differential Equations for Engineers	16	6
PHY1031F	General Physics A	18	5
PHY1032S	General Physics B	18	5
	Total credits per year	**148**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7
APG3016C	Surveying II	12	7
APG3038F	Professional Communication Studies	12	7
APG3039B	Spatial Data Infrastructures	12	7
APG3040C	Advanced Spatial Data Analysis	12	7
EGS2013F	The Physical Environment	24	6
EGS2015S	Society and Space	24	6
	Total credits per year	**136**	

Students who have taken both APG1022X and APG2019X do not need to take APG3015X

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4002Z	Land Use Planning & Township Design	16	8
APG4003Z	Geomatics Project	40	8
APG4010X	Geoinformatics Camp	4	8
APG4011F	Geomatics IV	24	8
APG4012S	Geomatics Management & Professionalism	24	8

Choose two of the following electives

Code	Course	NQF Credits	NQF Level
EGS3012S	Atmospheric Science	36	7
EGS3021F	Sustainability & Environment	36	7
EGS3022S	Geographic Thought	36	7
EGS3023F	Anthropocene Environments in Perspective	36	7
	Total credits per year	**180**	

Bachelor of Science in Geomatics: Geoinformatics Stream 5-year curriculum
Environmental and Geographical Science Specialisation[EB819APG11]

Senior Lecturer and Programme Convener:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
APG1016H	Geomatics I	18	5
APG1022X	Practical Training in Geomatics	0	5
CSC1017F	Introduction to Programming	16	5
GEO1009F	Introduction to Earth and Environmental Sciences	18	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics I B for Engineers Extended	18	5
PHY1014S	Physics A for Aspect	18	5
STA1000S	Introductory Statistics	18	5
	Total credits per year	**124**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2014S	Geomatics II	24	6
APG2019X	Practical Training I	0	6
APG2040F	Surveying I	18	6
EGS1003S	Geography, Development & Environment	18	5
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MAM2085F	Vector Calculus for Aspect	16	6
PHY1015F	Physics B for Aspect	18	5
	Total credits per year	**110**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2015F	Geographic Information Systems I	24	6
APG2041S	Applied Surveying & GISc	14	6
APG3012S	Geomatics III	24	7
APG3013F	Numerical Methods in Geomatics	16	7
APG3015X	Practical Training II	0	7

Code	Course	NQF Credits	NQF Level
APG3039B	Spatial Data Analysis...12		7
APG3040C	Advanced Spatial Data Analysis 12		7
	Total credits per year **102**		

Students who have taken both APG1022X and APG2019X do not need to take APG3015X

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG3016C	Surveying II 12		7
APG3038F	Professional Communication Studies 12		7
APG4002Z	Land Use Planning & Township Design 16		8
APG4010X	Geoinformatics Camp...4		8
APG4011F	Geomatics IV 24		8
APG4012S	Geomatics Management & Professionalism...................24		8
EGS2013F	The Physical Environment..24		6
EGS2015S	Society and Space...24		6
	Total credits per year **140**		

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
APG4003Z	Geomatics Project..40		8

Choose two of the following electives

Code	Course	NQF Credits	NQF Level
EGS3012S	Atmospheric Science 36		7
EGS3021F	Sustainability & Environment 36		7
EGS3022S	Geographic Thought 36		7
EGS3023F	Anthropocene Environments in Perspective..................36		7
	Total credits per year **112**		

Curriculum for University of Technology/University Transferees to the Bachelor of Science in Geomatics
[EB019APG09/EB019APG11]

Senior Lecturer and Programme Convenor:
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *Unisa* PrL(SA) PhD *Cape Town*

Transferees from Universities of Technology should have obtained matriculation exemption or the NSC endorsed for degree studies before they started their National Diploma, and have achieved a minimum of 70% aggregate.

Suitably qualified BTech and university graduates entering the BSc Geomatics degree programmes may be granted credit and exemption on a course by course basis, up to a maximum of 288 credits. All degree requirements must be complied with and students need to meet the knowledge and learning outcomes specified by South African Geomatics Council for the professional accreditation categories related to their chosen stream.

Chemical Engineering

Bachelor of Science in Engineering in Chemical Engineering

A four-year undergraduate chemical engineering degree is offered which prepares graduates for careers in the chemical, metallurgical, biotechnical and process industries. The degree focuses on the development of technical expertise, problem-solving, teamwork and communication skills, and is accredited by the Engineering Council of South Africa. There is an opportunity to stream the degree programme with a strong flavour in either minerals processing, bioprocess engineering, catalytic processing, process modelling, or environmental process engineering.

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

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

Bachelor of Science in Engineering in Chemical Engineering 4-year curriculum
BSc(Engineering)(Chemical Engineering)[EB001CHE01]

Programme Convener:
MA Fagan-Endres, BSc (Eng)Chem *Cape Town* PhD *Cantab*

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1000W	Chemistry 1000	36	5
CHE1005W	Chemical Engineering I	44	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
PHY1012F	Physics A for Engineers	18	5
STA1008S	Statistics for Engineers	12	5
	Total credits per year	**146**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE2000X	Field Trip	4	6
CHE2005W	Chemical Engineering II	72	6
MAM2083S	Vector Calculus for Engineers	16	6
MAM2084F	Linear Algebra and Differential Equations for Engineers	16	6
	Approved elective courses	36-48	
	Total credits per year	**144-156**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE3006F	Fundamentals of Chemical Engineering III	54	7
CHE3007S	Non-ideal systems in Chemical Engineering	22	7
CHE3008S	Chemical Engineering Project Management & Unit Operation Design	16	7
CHE3000X	Workplace Experience	0	7
	Approved elective courses	50-58	
	Total credits per year	**142-150**	

Fourth Year Core Courses

Students must be in their final year of study. Up to 34 credits of electives are considered to be part of the regular programme. Concessions to take additional credits (consisting of more electives or outstanding core courses) will be considered. Note: No concessions for 4th year core courses will be granted to students who have not passed CHE3008S/CHE3009S.

Code	Course	NQF Credits	NQF Level
CHE4036Z	Chemical Engineering Design 36		8
CHE4045Z	Chemical Engineering Research..36		8
CHE4048F	Business, Society & Environment 20		8
CHE4049F	Process Synthesis & Equipment Design.......................................20		8
	Approved elective courses...16-34		
	Total credits per year **128-146**		

ELECTIVE COURSES

1.   **Science Electives**

Students must do at least 42 credits of Science electives, with a minimum of 24 credits at HEQSF level 6. Approved options are shown below. Students may apply for other combinations of Science electives in this category**.**

Biotechnology
Code	Course	NQF Credits	NQF Level
BIO1000F	Cell Biology..18		5
CHE2006S	Introduction to Biotechnology...24		6

Chemical Sciences
Code	Course	NQF Credits	NQF Level
CEM2005W	Intermediate Chemistry... 48		6

Mineralogical Sciences
Code	Course	NQF Credits	NQF Level
GEO1009F	Introduction to Earth and Environmental Sciences 18		5
GEO2006S	Applied Mineralogy for Chemical Engineering 24		6

2.   **Language elective (18 credits minimum)**

Students must do any language course at UCT that will give them exposure to a language other than English that they do not already speak at this level. Most students will select from the intensive courses that are offered at first level, but students may alternatively select to study at the second level course a language they have previously studied at school.

3.   **Humanities selection (18 credits minimum)**

This selection involves courses that will broaden students' capacity to cope with complex social questions that they may be exposed to in their professional practice. These courses will also require students to read academic texts and produce extended written responses, usually in the form of essays. These are outcomes that are also valued by the engineering programme and will build skills that students will take forward in the core courses. Students may select any course for which they meet the admission criteria with the following UCT course code prefix:

- AGE Archaeology
- ASL/ANS/AFS African Studies, Gender Studies and Anthropology (excluding Linguistics courses)
- HST History
- PHI Philosophy
- POL Politics (note only option here is POL1004L/P offered in winter/summer term)
- SOC Sociology

Other courses included in this elective group are:
- ASL1301S Introduction to Sociolinguistics
- END1023S Citizen Professionals in Engineering & the Built Environment
- END1019L Social Infrastructures: Engaging with Community for Change (offered during the winter term)
- FAM1001F/L/P Media and Society
- REL1006S Judaism, Christianity and Islam

If students would like to do a course not mentioned here that they believe fulfils the objectives of this elective category, they may apply for it to be considered.

Please note that ECO (Economy) courses, FAM1000 and SLL1002 (Wordpower) do NOT count as a Humanities elective. If you wish to do these courses they can only count as a free elective.

4.   **Advanced Engineering Electives**

Students must do at least 32 credits of advanced engineering electives, with a minimum of 16 credits at HEQSF level 8.

HEQSF Level 7 electives

Code	Course	NQF Credits	NQF Level
CHE3067S	Design and Operation of Catalytic Reactors	16	7
CHE3068S	Bioprocess Engineering	16	7
CHE3069S	Mineral and Metallurgical Processing	16	7
CHE3070S	Numerical Simulation for Chemical Engineers	16	7

HEQSF Level 8 electives

Code	Course	NQF Credits	NQF Level
CHE4057F	Industrial Ecology for Chemical Engineers	8	8
CHE4058Z	Life Cycle Assessment	8	8
CHE4067F	Heterogeneous Catalysis	16	8
CHE4068F	Bioprocess Engineering Design	16	8
CHE4069F*	Mineral & Metallurgical Processing II	16	8
CHE4070F	Numerical Optimisation for Chemical Engineers	16	8

* CHE4069F is compulsory for mining-house bursars.

Alternatively, students may wish to take any EBE course at or above the third year level for which they meet the course entry requirements, and where they have not already covered that content in another course. Such courses must be approved by the Programme Convener.

5. Free Elective (16 credits minimum)

Students may do any course at UCT for which they meet the prerequisites, and where they have not already covered that content in another course. Note: that due to the introduction of Statistics in first year you cannot take an equivalent Statistics course (e.g. STA1000) as a free elective.

Bachelor of Science in Engineering in Chemical Engineering 5-year curriculum
BSc(Engineering)(Chemical Engineering)[EB801CHE01]

Programme Convener:
MA Fagan-Endres, BSc (Eng)Chem *Cape Town* PhD *Cantab*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1000W	Chemistry 1000	36	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics IB for Engineers Extended	18	5
PHY1014F	Physics A for ASPECT	18	5
STA1008S	Statistics for Engineers	12	5
	Total credits per year	**102**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE1005W	Chemical Engineering I	44	5
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MAM2085F	Vector Calculus for ASPECT	16	6
	Approved elective courses	36-48	
	Total credits per year	**112-124**	

Elective Note: First Semester - BIO1000F or GEO1009F (science elective) or free/humanities/language elective. Please refer to the Elective Courses section under the 4-year programme for more details. Students opting for GEO1009F must take the mathematics courses in the order MAM2084F and MAM2085S.

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE2000X	Field Trip	4	6
CHE2005W	Chemical Engineering II	72	6
	Approved elective courses	36-48	
	Total credits per year	**112-124**	

Elective Note: Science (CEM2005W or CHE2006S) and/or free/humanities/language elective. Please refer to the Elective Courses section under the 4-year programme for more details.

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE3006F	Fundamentals of Chemical Engineering III 54		7
CHE3007S	Non-ideal systems in Chemical Engineering 22		7
CHE3008S	Chemical Engineering Project Management & Unit Operation		
	Design.. 16		7
CHE3000X	Workplace Experience 0		7
	Approved elective courses.......................................34-42		
	Total credits per year..**126-134**		

Elective Notes: Students who took a Chemistry and Biology elective previously must take a free/humanities/language elective in the first semester, and Advanced Engineering Elective in the second semester. Students who took a Mineralogy elective previously must take Advanced Engineering electives and GEO2006S. Please refer to the Elective Courses section under the 4-year programme for more details.

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
CHE4036Z	Chemical Engineering Design.. 36		8
CHE4045Z	Chemical Engineering Research..................................... 36		8
CHE4048F	Business, Society & Environment.................................. 20		8
CHE4049F	Process Synthesis & Equipment Design......................... 20		8
	Approved elective courses... 16		
	Total credits per year... **128**		

Three-Year Programme for Transferees into Bachelor of Science in Engineering in Chemical Engineering
[EB001CHE06]

This programme is available only to students who have completed at least one year of a Bachelor of Science or Bachelor of Science in Engineering programme. The entrance requirements are: 70% or above in each of Mathematics I, Chemistry I and Physics IA (PHY1012 or equivalent). Applications from students who have completed Mathematics I, Chemistry I and Physics IA but have not met the 70% requirement, will be considered on their merits.

Students who are provisionally accepted into the three-year transferee programme must first complete the course CHE1001Z Introduction to Chemical Engineering (HEQSF credits 22, HEQSF Level 5), which takes place over the four weeks prior to registration. If this course is successfully completed, students will be registered for the second year of the degree.

In addition to completing Mathematics I, Chemistry I, Physics IA and CHE1001Z, students on the three-year transferee programme are required to complete 464 credits. This requirement needs to be fulfilled by completing STA1008S (if not granted exemption with credit for a previously taken course), all second, third and fourth year core courses, as well as meeting the rules for elective credits.

In addition, since CHE1001Z Introduction to Chemical Engineering (22 credits) carries fewer credits than CHE1005W Chemical Engineering I (44 credits), students are required to take up at least 8 (Chemical Sciences elective) or 14 (Biotechnology and Mineralogical Sciences electives) additional elective credits to meet the required number of credits for graduation.
Students may apply for exemption with credit for MAM2083S and MAM2084F and elective courses, if equivalent courses have been completed previously.

Three Year Conversion Programmes for Bachelor of Science Graduates to Bachelor of Science in Engineering in Chemical Engineering
[EB001CHE06]

The entrance requirements are: a BSc degree in minimum time with Mathematics I, Chemistry I and Physics IA (PHY1012 or equivalent).

BSc graduates who are provisionally accepted into the three-year conversion programme must first complete the course CHE1001Z Introduction to Chemical Engineering (HEQSF credits 22, HEQSF Level 5), which takes place over the four weeks prior to registration. If this course is successfully completed, students will be registered for the second year of the degree

In addition to completing Mathematics I, Chemistry I, Physics IA and CHE1001Z, students on the three-year conversion programme are required to complete 464 credits. This requirement needs to be fulfilled by completing STA1008S (if not granted exemption with credit for a previously taken course), all second, third and fourth year core courses, as well as meeting the rules for elective credits.

In addition, since CHE1001Z Introduction to Chemical Engineering (22 credits) carries fewer credits than CHE1005W Chemical Engineering I (44 credits), students on the three-year transferee programme are required to take up at least 8 (Chemical Sciences elective) or 14 (Biotechnology and Mineralogical Sciences electives) additional elective credits to meet the required number of credits for graduation.

Students may apply for exemption with credit for MAM2083S and MAM2084F and elective courses, if equivalent courses have been completed in their initial degree.

Access Programme for University of Technology Transferees
[EB001CHE01]

The entrance requirements are: a National Diploma in Chemical Engineering achieved in minimum time, with a 70% overall average and 75% in each of the two Mathematics courses. It is also necessary to have qualified for matriculation exemption or the NSC endorsed for degree studies before commencement of the National Diploma programme.

Students accepted on to this programme will be exempted from CHE3000X. This leaves the majority of each year's core courses to complete, and is therefore nominally a four year programme.

Students may choose however to register as occasional students in the year prior to entering the programme, and to attend classes and write the examinations for MAM1020F, MAM1021S, CEM1000W, PHY1012F and STA1008S (or any equivalents of these courses). Should these courses all be passed, students will be provisionally accepted into the three-year conversion programme, i.e. they must first complete the course CHE1001Z Introduction to Chemical Engineering (HEQSF credits 22, HEQSF Level 5), which takes place over the four weeks prior to registration. If this course is successfully completed, students will be registered for the second year of the degree. In addition to completing the abovementioned courses, students on the three-year conversion programme are required to complete 452 credits. This requirement needs to be fulfilled by completing all second, third and fourth year core courses (except for CHE3000X), as well as meeting the rules for elective credits.

In addition, since CHE1001Z Introduction to Chemical Engineering (22 credits) carries fewer credits than CHE1005W Chemical Engineering I (44 credits), students are required to take up at least 8 (Chemical Sciences elective) or 14 (Biotechnology or Mineralogical Sciences electives) additional elective credits to meet the required number of credits for graduation.

Students may apply for exemption with credit for elective courses, if equivalent courses have been completed in their initial diploma.

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

Civil Engineering

Bachelor of Science in Engineering in Civil Engineering

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements (which may exceed 576). Note: The core courses listed below, plus one elective course of 18 or more credits, constitute the courses recognised for the degree in terms of Rule FB8.2. DP and examination requirements to pass the core courses are set out in the course information sheets issued at the start of all Civil Engineering core courses.

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

Professional aspects are covered in courses on Professional Practice and Civil Engineering practical experience.

In order to promote and enhance learning within the degree, the Department of Civil Engineering requires all students to have their own laptop or desktop computer with access to the internet. The minimum specifications of the computer required can be obtained from the Department.

Bachelor of Science in Engineering in Civil Engineering 4-year curriculum
BSc(Engineering)(Civil Engineering)[EB002CIV01]

Professor and Programme Convener:
MHP Zuidgeest, MSc(Eng) PhD (Eng) *Twente*

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
CIV1005W	Introduction to Engineering	24	5
CIV1007S	Engineering Mechanics	16	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
MEC1007F	Introduction to Engineering Drawing	8	5
MEC1008S	Introduction to Mechanical Design	8	5
PHY1012F	Physics A for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
	Total credits per year	**144**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2026S	Construction Surveying	16	6
CIV2011F	Mechanics of Materials	16	6
CIV2039S	Geotechnical Engineering I	16	6
CIV2040S	Fluid Mechanics	8	6
CIV2041S	Structural Analysis I	16	6
CIV2042F	Construction Materials	16	6
GEO1008F	Introduction to Geology for Civil Engineers	12	5
MAM2083F	Vector Calculus for Engineers	16	6

Code	Course	NQF Credits	NQF Level
MAM2084S	Linear Algebra and Differential Equations for Engineers............. 16		6
STA1008F	Statistics for Engineers.. 12		5
CIV2020X	Practical Experience 0		6
	Total credits per year.. **144**		

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV3042F	Geotechnical Engineering II.. 16		7
CIV3043F	Hydraulic Engineering 16		7
CIV3044F	Engineering Hydrology 8		7
CIV3045S	Transportation Planning 16		7
CIV3046S	Water Treatment.. 12		7
CIV3047S	Urban Water Services.. 16		7
CIV3048F	Structural Analysis II... 16		7
CIV3049S	Structural Design I... 16		7
ECO1007S	Economics for Engineers... 18		5
	Humanities Elective 18		
	Total credits per year.. **152**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV4035C	Design Project 24		8
CIV4041F	Professional Practice 12		8
CIV4042F	Wastewater Treatment.. 12		8
CIV4044S	Research Project.. 48		8
CIV4045F	Structural Design II 18		8
CIV4046F	Transportation Engineering... 18		8
EGS1005F	Introduction to Environmental Assessment & Management......... 12		5
	Total credits per year.. **144**		

Students are reminded of the university rules for undergraduate degrees as printed in this handbook. In particular it should be noted that timetable clashes are not allowed (this rule also applies to courses that are repeated) and that preference should be given to courses in arrears (Rule FB3.4). In the final year of study students may get concessions for a maximum of 18 credits per semester over and above the published fourth year core curriculum to repeat outstanding courses from prior years or attempt additional electives subject to the requirements of the three capping courses: CIV4041F, CIV4035C and CIV4044S. All applications for concessions must be made on the prescribed form for consideration by the Programme Convenor and the departmental Concessions Committee for a final decision.

Elective Courses

It is a requirement of the Engineering Council of South Africa (ECSA) that all engineering graduates be exposed to complementary studies which, inter alia, broaden the student's perspective in the humanities, social sciences or other areas to support an understanding of the world. To this end, every prospective graduate must take at least one course from a list of approved electives. It is the responsibility of the student to ensure that there are no lecture or tutorial or examination timetable clashes for courses which s/he wishes to take.

The core curriculum changes from time to time and it is the responsibility of each student to check the accumulating total of core course credits he or she has completed at any stage, in order to determine any shortfall from the minimum number of 576 credits and the courses required for graduation. In the event of a shortfall, s/he may have to register for additional elective courses.

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

Bachelor of Science in Engineering in Civil Engineering 5-year curriculum
BSc(Engineering)(Civil Engineering)[EB802CIV01]

Professor and Programme Convener:
MHP Zuidgeest, MSc(Eng) PhD (Eng) *Twente*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
CIV1007S	Engineering Mechanics	16	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics I B for Engineers Extended	18	5
PHY1014F	Physics A for ASPECT	18	5
PHY1015S	Physics B for ASPECT	18	5
	Total credits per year	**104**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV1005W	Introduction to Engineering	24	5
CIV2011F	Mechanics of Materials	16	6
CIV2041S	Structural Analysis I	16	6
MAM2085F	Vector Calculus for ASPECT	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MEC1007F	Introduction to Engineering Drawing	8	5
MEC1008S	Introduction to Mechanical Design	8	5
	Total credits per year	**104**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
APG2026S	Construction Surveying	16	6
CIV2039S	Geotechnical Engineering I	16	6
CIV2040S	Fluid Mechanics	8	6
CIV2042F	Construction Materials	16	6
CIV3046S	Water Treatment	12	7
CIV3048F	Structural Analysis II	16	7
CIV3049S	Structural Design I	16	7
GEO1008F	Introduction to Geology for Civil Engineers	12	5

Code	Course	NQF Credits	NQF Level
STA1008F	Statistics for Engineers 12		5
	Total credits per year **124**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV3042F	Geotechnical Engineering II 16		7
CIV3043F	Hydraulic Engineering 16		7
CIV3044F	Engineering Hydrology 8		7
CIV3045S	Transportation Planning 16		7
CIV3047S	Urban Water Services 16		7
CIV4045F	Structural Design II 18		8
ECO1007S	Economics for Engineers 18		5
	Humanities Elective 18		
	Total credits per year **126**		

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV2020X	Practical Experience 0		6
CIV4035C	Design Project 24		8
CIV4041F	Professional Practice 12		8
CIV4042F	Wastewater Treatment 12		8
CIV4044S	Research Project 48		8
CIV4046F	Transportation Engineering 18		8
EGS1005F	Introduction to Environmental Assessment & Management 12		5
	Total credits per year **126**		

Students are reminded of the university rules for undergraduate degrees as printed in this handbook. In particular it should be noted that timetable clashes are not allowed (this rule also applies to courses that are repeated) and that preference should be given to courses in arrears (Rule FB3.4). In the final year of study students may get concessions for a maximum of 18 credits per semester over and above the published final year core curriculum to repeat outstanding courses from prior years or attempt additional electives subject to the requirements of the three capping courses: CIV4041F, CIV4035C and CIV4044S. All applications for concessions must be made on the prescribed form for consideration by the Programme Convenor and the departmental Concessions Committee for a final decision.

Elective Courses

It is a requirement of the Engineering Council of South Africa (ECSA) that all engineering graduates be exposed to complementary studies which, inter alia, broaden the student's perspective in the humanities, social sciences or other areas to support an understanding of the world. To this end, every prospective graduate must take at least one course from a list of approved electives. It is the responsibility of the student to ensure that there are no lecture or tutorial or examination timetable clashes for courses which s/he wishes to take.

The core curriculum changes from time to time and it is the responsibility of each student to check the accumulating total of core course credits he or she has completed at any stage, in order to determine any shortfall from the minimum number of 576 credits and the courses required for graduation. In the event of a shortfall, s/he may have to register for additional elective courses.

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

Programme for University of Technology Transferees to Bachelor of Science in Engineering in Civil Engineering
[EB002CIV01]

The Senate criteria for granting course credits and exemptions to Technikon/University of Technology transferees entering the BSc(Eng) Civil Engineering degree programme require Technikon/University of Technology students to have obtained a matriculation exemption or the NSC endorsed for degree studies before they started their National Diploma studies, an average of at least 70% for all prescribed final year subjects and a minimum of 75% for every Mathematics course in the National Diploma examinations. Students who satisfy these criteria will be granted credits and be exempted from the following courses; CIV1005W, CIV1007S, MEC1002W, CIV2011F, CIV2020X, APG2026S and CIV2042F. Such students may register for the following courses in their first year at UCT, provided that there are no timetable clashes:

First Year Core Modules

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
MAM1020F	Mathematics 1A for Engineers	18	5
MAM1021S	Mathematics 1B for Engineers	18	5
PHY1012F	Physics A for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
CIV2039S	Geotechnical Engineering I	16	6
CIV2040S	Fluid Mechanics	8	6
GEO1008F	Introduction to Geology for Civil Engineers	12	5
	Total credits per year	**124**	

After completing the above courses, subject to rule FB8.2, students will be required to complete the remainder of all prescribed Second Year, Third Year, Fourth Year courses including the elective in complementary studies. Note that it will not ordinarily be possible for Technikon/University of Technology transferees to complete the degree in less than four years.

Construction Economics and Management

Bachelor of Science in Construction Studies
BSc (Construction Studies)[EB015CON04]

Programme Convener:
Ms K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS

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

A candidate shall complete approved courses of a value not less than 450 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CIV1006S	Building Science I	16	5
CON1004W	Construction Technology I	32	5
CON1010S	Construction Information Systems	8	5
BUS1036F	Evidence-based Management	18	5
ECO1010F	Microeconomics	18	5
ECO1011S	Macroeconomics	18	5
MAM1010F	Mathematics 1010	18	5
MEC1002W	Engineering Drawing	16	5
CON1007X	Practical Training	0	5
	Total credits per year	**144**	

Second Year Core Modules

Code	Course	NQF Credits	NQF Level
ACC1006S	Financial Accounting I	18	5
APG2026F	Construction Surveying	16	6
CML1001F	Business Law I	18	5
CML2005F	Labour Law	18	6
CON1019S	Professional Communication	16	5
CON2006W	Construction Technology II	32	6
CON2020S	Construction Management I	16	6
CON2022W	Measurement & Design Appraisal I	16	6
CON2013X	Practical Training	0	6
	Total credits per year	**150**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
CON3012W	Construction Technology III 32		7
CON3030S	Construction Costing 16		7
CON3031W	Measurement & Design Appraisal II...32		7
CON3032W	Applied Contract Law I 12		7
CON3033F	Property Studies I 16		7
CON3038W	Construction Management II...32		7
CON3043W	Cost Engineering under Uncertainty 16		7
CON3023X	Practical Training 0		7
	Total credits per year **156**		

Bachelor of Science in Property Studies
BSc(Property Studies)[EB017CON03]

Programme Convener:
SD Nurick, BCom BSc(Hons)(Property Studies), MPhil *Cape Town* MRICS

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

A candidate shall complete approved courses of a value not less than 468 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CON1021F	Property and Planning I 16		5
CON1022F	Building Construction I 16		5
CON1023S	Building Construction II...16		5
CON1024S	Property Economics I 16		5
CON1025S	Property and Technology..16		5
ECO1010F	Microeconomics 18		5
ECO1011S	Macroeconomics..18		5
MAM1010F	Mathematics 1010 18		5
STA1000S	Introductory Statistics...18		5
	Total credits per year **152**		

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
ACC1006F/S	Financial Accounting I	18	5
CML1001F	Business Law I	18	5
CON2032S	Property Investment and Finance I	16	6
CON2033F	Real Property Law I	16	6
CON2034S	Professionalism in the Built Environment	12	6
CON2035S	Property and Planning II	16	6
CON2036F	Property Valuation I	16	6
FTX2020F	Business Finance	18	6
STA2020S	Applied Statistics	24	6
	Total credits per year	**154**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
CON3046S	Property and Facilities Management	16	7
CON3047F	Property Investment and Finance II	16	7
CON3048F	Property Development II	16	7
CON3050F	Property and Contract Law	16	7
CON3051F	Property Valuation II	16	7
CON3052S	Property Economics II	16	7
CON3053S	Property and Environment	16	7
CON3054S	Property Development II	16	7
CON3055S	Property and Planning III	16	7
CSC1015F	Computer Science 1015	18	5
	Total credits per year	**162**	

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

Electrical Engineering

Bachelor of Science in Engineering in Electrical Engineering 4-year curriculum
BSc(Engineering)(Electrical Engineering)[EB009EEE01]

Programme Convener:
Dr DTO Oyedokun, BSc (Eng) MSc(Eng) PhD *Cape Town* SMIEEE SAIEE

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

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

First Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015	18	5
EEE1006F	Introduction to Electronic Engineering	12	5
MAM1020F	Mathematics IA for Engineers	18	5
MEC1003F	Engineering Drawing	8	5
PHY1012F	Physics A for Engineers	18	5
ASL1200S	Africa: Culture, Identity & Globalisation*	8	5
CSC1016S	Computer Science 1016	18	5
EEE1007S	Introduction to Electrical Engineering	12	5
MAM1021S	Mathematics IB for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
EEE1000X	Practical Training	0	5
	Total credits per year	**148**	

ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting

Second Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE2045F	Analogue Electronics	16	6
EEE2046F	Embedded Systems I	16	6
EEE2048F	Professional Communication for Electrical Engineering	8	6
MAM2083F	Vector Calculus for Engineers	16	6
MEC1009F	Introduction to Engineering Mechanics	16	5
EEE2044S	Introduction to Power Engineering	16	6
EEE2047S	Signals and Systems I	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
CON2026S	Project Management for Engineers	8	6
PHY2010S	Electromagnetism for Engineers	16	6
	Total credits per year	**144**	

Third Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE3088F	Electrical Engineering Design Principles	8	7
EEE3089F	Electromagnetic Engineering	16	7
EEE3090F	Electronic Devices and Circuits	16	7
EEE3091F	Energy Conversion	16	7
EEE3092F	Signals & Systems II	16	7
EEE3093S	Communication & Network Engineering	16	7
EEE3094S	Control Systems Engineering	16	7
EEE3098S	Engineering Design: Electrical Engineering	8	7
EEE3100S	Power Systems Engineering	16	7
	*Approved Complementary Studies Elective F/S/P/L	18	
EEE3000X	Practical Training	0	7
	Total credits per year (minimum)	**146**	

*See separate list of approved complementary studies courses

Fourth Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design	16	8
CML4607F	Law for Engineers	10	8
EEE4125C	New Ventures: Planning, Practice & Professionalism	16	8
EEE4124C	Impact of Engineering on the Natural & Social Environment	8	8
EEE4022S	Research Project	40	8
	Core credits per year (minimum)	**90**	

Fourth Year Elective Core Courses (EE)

Select courses amounting to **at least 48 credits** from the following:

At least one course from:

Code	Course	NQF Credits	NQF Level
EEE4115F	Power Distribution & Transmission Networks	16	8
EEE4118F	Process Control & Instrumentation	16	8
EEE4121F	Mobile and Wireless Networks	16	8

And further courses from (timetable and pre-requisite permitting):

Code	Course	NQF Credits	NQF Level
EEE4114F	Digital Signal Processing	16	8
EEE4105C	RF & Microwave Devices & Circuits	10	8
EEE4116F	Power Systems Analysis, Operation & Control	16	8
EEE4117F	Electrical Machines & Power Electronics	16	8
EEE4122C	Communication Engineering	8	8
EEE4123C	Electrical Machines & Drives	8	8
HUB4045F	Introduction to Medical Imaging & Image Processing	12	8
	Total credits per year (minimum)	**138**	

Note: Some elective core courses in the first semester are in the same timetable slots and cannot be taken concurrently.

Bachelor of Science in Engineering in Electrical Engineering 5-year curriculum
BSc(Engineering)(Electrical Engineering)[EB809EEE01]

Programme Convener:
Dr DTO Oyedokun, BSc (Eng) MSc(Eng) PhD *Cape Town* SMIEEE SAIEE

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE1006F	Introduction to Electronic Engineering	12	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
PHY1014F	Physics A for ASPECT	18	5
EEE1007S	Introduction to Electrical Engineering	12	5
MAM1024S	Mathematics IB for Engineers Extended	18	5
PHY1015S	Physics B for ASPECT	18	5
	Total credits per year	**96**	

Second Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015	18	5
EEE2045F	Analogue Electronics	16	6
MAM2085F	Vector Calculus for ASPECT	16	6
MEC1003F	Engineering Drawing	8	5
CSC1016S	Computer Science 1016	18	5
EEE2047S	Signals and Systems I	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
CON2026S	Project Management for Engineers	8	6
EEE1000X	Practical Training	0	5
	Total credits per year	**116**	

Third Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE2046F	Embedded Systems I	16	6
EEE2048F	Professional Communication for Electrical Engineering	8	6
EEE3090F	Electronic Devices and Circuits	16	7
MEC1009F	Introduction to Engineering Mechanics	16	5
ASL1200S	Africa: Culture, Identity & Globalisation*	8	5
EEE2044S	Introduction to Power Engineering	16	6

Code	Course	NQF Credits	NQF Level
EEE3094S	Control Systems Engineering	16	7
PHY2010S	Electromagnetism for Engineers	16	6
	Total credits per year	**112**	

ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting

Fourth Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE3088F	Electrical Engineering Design Principles	8	7
EEE3089F	Electromagnetic Engineering	16	7
EEE3091F	Energy Conversion	16	7
EEE3092F	Signals & Systems II	16	7
CML4607F	Law for Engineers	10	8
EEE3093S	Communication & Network Engineering	16	7
EEE3098S	Engineering Design: Electrical Engineering	8	7
EEE3100S	Power Systems Engineering	16	7
	*Approved Complementary Studies Elective F/S/P/L	18	7
EEE3000X	Practical Training	0	7
	Total credits per year (minimum)	**124**	

*See separate list of approved complementary studies courses

Fifth Year Core Courses (EE)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design	16	8
EEE4125C	New Ventures: Planning, Practice & Professionalism	16	8
EEE4124C	Impact of Engineering on the Natural & Social Environment	8	8
EEE4022S	Research Project	40	8
	Core credits per year (minimum)	**80**	

Fifth Year Elective Core Courses (EE)

Select courses amounting to **at least 48 credits** from the following:

At least one course from:

Code	Course	NQF Credits	NQF Level
EEE4115F	Power Distribution & Transmission Networks	16	8
EEE4118F	Process Control & Instrumentation	16	8
EEE4121F	Mobile and Wireless Networks	16	8

And further courses from

Code	Course	NQF Credits	NQF Level
EEE4114F	Digital Signal Processing	16	8
EEE4105C	RF& Microwave Devices & Circuits	10	8
EEE4116F	Power Systems Analysis, Operation & Control	16	8
EEE4117F	Electrical Machines & Power Electronics	16	8
EEE4122C	Communication Engineering	8	8
EEE4123C	Electrical Machines & Drives	8	8
HUB4045F	Introduction to Medical Imaging & Image Processing	12	8
	Total credits per year (minimum)	**128**	

Note: some elective core courses in the first semester are in the same timetable slots and cannot be taken concurrently.

Bachelor of Science in Engineering in Electrical and Computer Engineering 4-year curriculum
BSc(Engineering)(Electrical and Computer Engineering)[EB022EEE02]

Programme Convener:
Dr S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town* MIEEE

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

Electrical and Computer engineers in industry generally possess expertise across a broad range of engineering disciplines, and are especially well-suited to a career in network engineering, control & instrumentation, power systems or telecommunications. Electrical and Computer engineers may also become involved in diverse fields such as bio-medical engineering, machine vision, power electronics and machines, or signal and image processing.

The Electrical and Computer Engineering programme is administered as a distinct programme within the Department of Electrical Engineering, and advice specific to the needs of Electrical and Computer Engineering undergraduates is available to students enrolled in the programme.

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

First Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015	18	5
EEE1006F	Introduction to Electronic Engineering	12	5
MAM1020F	Mathematics IA for Engineers	18	5
MEC1003F	Engineering Drawing	8	5
PHY1012F	Physics A for Engineers	18	5
ASL1200S	Africa: Culture, Identity & Globalisation*	8	5
CSC1016S	Computer Science 1016	18	5
EEE1007S	Introduction to Electrical Engineering	12	5
MAM1021S	Mathematics IB for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
EEE1000X	Practical Training	0	5
	Total credits per year	**148**	

*ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting

Second Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
EEE2045F	Analogue Electronics	16	6
EEE2046F	Embedded Systems I	16	6
EEE2048F	Professional Communication for Electrical Engineering	8	6
MAM2083F	Vector Calculus for Engineers	16	6

Code	Course	NQF Credits	NQF Level
MEC1009F	Introduction to Engineering Mechanics 16		5
EEE2044S	Introduction to Power Engineering 16		6
EEE2047S	Signals and Systems I... 16		6
MAM2084S	Linear Algebra and Differential Equations for Engineers............. 16		6
CON2026S	Project Management for Engineers 8		6
PHY2010S	Electromagnetism for Engineers 16		6
	Total credits per year.. **144**		

Third Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
CSC2001F	Computer Science 2001.. 24		6
EEE3088F	Electrical Engineering Design Principles.. 8		7
EEE3089F	Electromagnetic Engineering 16		7
EEE3090F	Electronic Devices and Circuits 16		7
EEE3092F	Signals & Systems II 16		7
EEE3096S	Embedded Systems II 16		7
EEE3097S	Engineering Design: Electrical & Computer Engineering 8		7
F/S/P/L	*Approved Complementary Studies Elective F/S/P/L 18		7
EEE3000X	Practical Training 0		7
	Core credits per year (minimum) **122**		

* See separate list of approved complementary studies courses

Third Year Elective Core Courses (EC)
Select two out of the following three courses. Your choices will have an impact on which 4th year electives can be taken the following year.

Code	Course	NQF Credits	NQF Level
CSC2002S	Computer Science 2002.. 24		6
EEE3093S	Communication & Network Engineering...................................... 16		7
EEE3094S	Control Systems Engineering 16		7
	Total credits per year (minimum)...**154-162**		

Note: (i) All three elective 3rd year core courses can be taken; however, but then the complementary studies elective should then be taken in the winter or summer term.
(ii) If an EC student wants to take any CSC3xxx course, they must also register for and pass CSC2004Z Programming Assessment.

Fourth Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design 16		8
CML4607F	Law for Engineers 10		8
EEE4125C	New Ventures: Planning, Practice & Professionalism 16		8
EEE4124C	Impact of Engineering on the Natural & Social Environment 8		8
EEE4022S	Research Project.. 40		8
	Core credits per year (minimum) **90**		

Fourth Year Elective Core Courses (EC)
Select courses amounting to **at least 48 credits** from the following:
At least two courses from:

Code	Course	NQF Credits	NQF Level
EEE4114F	Digital Signal Processing 16		8
EEE4118F	Process Control & Instrumentation 16		8
EEE4120F	High Performance Digital Embedded Systems 16		8
EEE4121F	Mobile and Wireless Networks 16		8

And further courses from (timetable and pre-requisite permitting):

Code	Course	NQF Credits	NQF Level
EEE4105C	RF Microwave Devices & Circuits..10		8
EEE4122C	Communication Engineering..8		8
CSC3xxx	Approved 3rd year Computer Science course..................................24		7
HUB4045F	Introduction to Medical Imaging & Image Processing..................12		8
	Total credits per year (minimum)..**138**		

Bachelor of Science in Engineering in Electrical and Computer Engineering 5-year curriculum
BSc(Engineering)(Electrical and Computer Engineering)[EB822EEE02]

Programme Convener:
Dr S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town* MIEEE

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
EEE1006F	Introduction to Electronic Engineering 12		5
MAM1023F	Mathematics IA for Engineers Extended......................................18		5
PHY1014F	Physics A for ASPECT..18		5
EEE1007S	Introduction to Electrical Engineering...12		5
MAM1024S	Mathematics IB for Engineers Extended......................................18		5
PHY1015S	Physics B for ASPECT..18		5
	Total credits per year (minimum)..**96**		

Second Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015...18		5
EEE2045F	Analogue Electronics..16		6
MAM2085F	Vector Calculus for ASPECT...16		6
MEC1003F	Engineering Drawing...8		5
CSC1016S	Computer Science 1016...18		5
EEE2047S	Signals and Systems I..16		6
MAM2084S	Linear Algebra and Differential Equations for Engineers.............16		6
CON2026S	Project Management for Engineers 8		6
EEE1000X	Practical Training 0		5

Code	Course	NQF Credits	NQF Level
	Total credits per year (minimum).. **116**		

Third Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
CSC2001F	Computer Science 2001.. 24		6
EEE2046F	Embedded Systems I 16		6
EEE2048F	Professional Communication for Electrical Engineering 8		6
MEC1009F	Introduction to Engineering Mechanics 16		5
ASL1200S	Africa: Culture, Identity & Globalisation*...................................... 8		5
EEE2044S	Introduction to Power Engineering 16		6
PHY2010S	Electromagnetism for Engineers 16		6
F/S/P/L	**Approved Complementary Studies Elective F/S/P/L 18		
	Total credits per year (minimum).. **122**		

ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting
**See separate list of approved complementary studies courses*

Fourth Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
EEE3088F	Electrical Engineering Design Principles.. 8		7
EEE3089F	Electromagnetic Engineering 16		7
EEE3090F	Electronic Devices and Circuits 16		7
EEE3092F	Signals & Systems II 16		7
CML4607F	Law for Engineers 10		8
EEE3096S	Embedded Systems II... 16		7
EEE3097S	Engineering Design: Electrical & Computer Engineering 8		7
EEE3000X	Practical Training 0		7
	Core credits per year (minimum) **90**		

Fourth Year Elective Core Courses (EC)
Select two out of the following three courses. Your choices will have an impact on which 4th year electives can be taken the following year.

Code	Course	NQF Credits	NQF Level
CSC2002S	Computer Science 2002.. 24		6
EEE3093S	Communication & Network Engineering...................................... 16		7
EEE3094S	Control Systems Engineering.. 16		7
	Total credits per year (minimum)..**122-130**		

Note: (i) All three elective 3rd year core courses can be taken, but then the complementary studies elective must be taken in the winter or summer term.
 (ii) If an EC student wants to take any CSC3xxx courses, they must also register for and pass CSC2004Z Programming Assessment.

Fifth Year Core Courses (EC)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design 16		8
EEE4125C	New Ventures: Planning, Practice & Professionalism 16		8
EEE4124C	Impact of Engineering on the Natural & Social Environment 8		8
EEE4022S	Research Project... 40		8
	Total credits per year (minimum) **80**		

Fifth Year Elective Core Courses (EC)
Select courses amounting to **at least 48 credits** from the following:
At least two courses from:

Code	Course	NQF Credits	NQF Level
EEE4114F	Digital Signal Processing..16		8
EEE4118F	Process Control & Instrumentation 16		8
EEE4120F	High Performance Digital Embedded Systems 16		8
EEE4121F	Mobile and Wireless Networks 16		8

And further courses from (timetable and pre-requisite permitting:

Code	Course	NQF Credits	NQF Level
EEE4105C	RF & Microwave Devices & Circuits 10		8
EEE4122C	Communication Engineering...8		8
CSC3xxx	Approved 3rd year Computer Science course.................24		7
HUB4045F	Introduction to Medical Imaging & Image Processing.................12		8
	Total credits per year (minimum)...............................**128**		

Bachelor of Science in Engineering in Mechatronics 4-year curriculum
BSc(Engineering)(Mechatronics)[EB011EEE05]

Programme Convener:
Associate Professor A Patel, MSc(Eng) PhD *Cape Town* MIEEE

Mechatronics is an interdisciplinary branch of engineering which combines electronics, mechanical and software engineering. The degree offered in the Electrical Engineering department is grounded in electronics and software engineering with some courses in fundamental mechanical engineering. This equips students with the ability to develop electronic and software systems to automate various processes and systems.

The Mechatronics Engineer will be especially well-suited to a career in light manufacturing, process control or automation. Mechatronics engineers may become involved in fields such as instrumentation, automation, robotics, bio-medical engineering, machine learning or machine vision. The Mechatronics Programme at UCT aims to equip its graduates with a solid and broad-based engineering education, including the skills in design and the knowledge of computers and other digital systems hardware, that will be necessary for a successful future career in any of these environments. The Mechatronics programme is administered as a distinct programme within the Department of Electrical Engineering, and student advice specific to the needs of Mechatronics undergraduates is available to students on the programme.

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

First Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015..18		5
EEE1006F	Introduction to Electronic Engineering 12		5
MAM1020F	Mathematics IA for Engineers......................................18		5
MEC1003F	Engineering Drawing..8		5
PHY1012F	Physics A for Engineers 18		5
ASL1200S	Africa: Culture, Identity & Globalisation*....................8		5
CSC1016S	Computer Science 1016..18		5
EEE1007S	Introduction to Electrical Engineering..........................12		5
MAM1021S	Mathematics IB for Engineers......................................18		5
PHY1013S	Physics B for Engineers..18		5
EEE1000X	Practical Training 0		5

Code	Course	NQF Credits	NQF Level
	Total credits per year (minimum)... **148**		

ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting

Second Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE2045F	Analogue Electronics 16		6
EEE2046F	Embedded Systems I 16		6
EEE2048F	Professional Communication for Electrical Engineering 8		6
MAM2083F	Vector Calculus for Engineers 16		6
MEC1009F	Introduction to Engineering Mechanics 16		5
EEE2044S	Introduction to Power Engineering 16		6
EEE2047S	Signals and Systems I 16		6
MAM2084S	Linear Algebra and Differential Equations for Engineers............. 16		6
CON2026S	Project Management for Engineers 8		6
PHY2010S	Electromagnetism for Engineers 16		6
	Total credits per year (minimum).. **144**		

Third Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE3088F	Electrical Engineering Design Principles......................... 8		7
EEE3090F	Electronic Devices and Circuits 16		7
EEE3091F	Energy Conversion 16		7
EEE3092F	Signals & Systems II 16		7
MEC2047F	Engineering Dynamics 16		6
EEE3094S	Control Systems Engineering.. 16		7
EEE3096S	Embedded Systems II.. 16		7
EEE3099S	Engineering Design: Mechatronics 8		7
MEC2045S	Applied Engineering Mechanics 16		6
F/S/P/L	*Approved Complementary Studies Elective F/S/P/L 18		
EEE3000X	Practical Training 0		7
	Total credits per year (minimum) **146**		

*See separate list of approved complementary studies courses

Fourth Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design 16		8
CML4607F	Law for Engineers 10		8
EEE4124C	Impact of Engineering on the Natural & Social Environment 8		8
EEE4125C	New Ventures: Planning, Practice & Professionalism 16		8
EEE4022S	Research Project... 40		8
	Core credits per year (minimum) **90**		

Fourth Year Elective Core Courses (ME)

Select courses amounting to **at least 48 credits** from the following:

At least two courses from:

Code	Course	NQF Credits	NQF Level
EEE4117F	Electrical Machines & Power Electronics..................................... 16		8
EEE4118F	Process Control & Instrumentation 16		8
EEE4119F	Mechatronics 16		8

Fourth Year Further Elective Core Courses (ME)
And further courses from (timetable and pre-requisite permitting):

Code	Course	NQF Credits	NQF Level
EEE4114F	Digital Signal Processing	16	8
EEE4120F	High Performance Digital Embedded Systems	16	8
EEE4123C	Electrical Machines & Drives	8	8
HUB4045F	Introduction to Medical Imaging & Image Processing	12	8
	Total credits per year (minimum)	**138**	

Optional Courses
The following courses may be of interest, timetable and pre-requisite permitting, and require approval:

Code	Course	NQF Credits	NQF Level
EEE2051L	Practical Electronics, Components, Modules & Design	8	6
HUB2005F	Introduction to Medical Engineering	8	6

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

Bachelor of Science in Engineering in Mechatronics 5-year curriculum
BSc(Engineering)(Mechatronics)[EB811EEE05]

Programme Convener:
Associate Professor A Patel, MSc(Eng) PhD *Cape Town* MIEEE

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

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

First Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE1006F	Introduction to Electronic Engineering	12	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
PHY1014F	Physics A for ASPECT	18	5
EEE1007S	Introduction to Electrical Engineering	12	5
MAM1024S	Mathematics IB for Engineers Extended	18	5
PHY1015S	Physics B for ASPECT	18	5
	Total credits per year (minimum)	**96**	

Second Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
CSC1015F	Computer Science 1015	18	5
EEE2045F	Analogue Electronics	16	6
MAM2085F	Vector Calculus for ASPECT	16	6
MEC1003F	Engineering Drawing	8	5
CSC1016S	Computer Science 1016	18	5
EEE2047S	Signals and Systems I	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
CON2026S	Project Management for Engineers	8	6
EEE1000X	Practical Training	0	5
	Total credits per year (minimum)	**116**	

Third Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE2046F	Embedded Systems I	16	6
EEE2048F	Professional Communication for Electrical Engineering	8	6
EEE3090F	Electronic Devices and Circuits	16	7
MEC1009F	Introduction to Engineering Mechanics	16	5
ASL1200S	Africa: Culture, Identity & Globalisation*	8	5
EEE2044S	Introduction to Power Engineering	16	6
EEE3094S	Control Systems Engineering	16	7
PHY2010S	Electromagnetism for Engineers	16	6
	Total credits per year (minimum)	**112**	

ASL1200S may be replaced with an approved humanities course of at least 8 credits timetable permitting

Fourth Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE3088F	Electrical Engineering Design Principles	8	7
EEE3091F	Energy Conversion	16	7
EEE3092F	Signals & Systems II	16	7
MEC2047F	Engineering Dynamics	16	6
CML4607F	Law for Engineers	10	8
EEE3096S	Embedded Systems II	16	7
EEE3099S	Engineering Design: Mechatronics	8	7
MEC2045S	Applied Engineering Mechanics	16	6
EEE3000X	Practical Training	0	7
F/S/P/L	*Approved Complementary Studies Elective F/S/P/L	18	
	Total credits per year (minimum)	**124**	

*See separate list of approved complementary studies courses

Fifth Year Core Courses (ME)

Code	Course	NQF Credits	NQF Level
EEE4113F	Engineering System Design	16	8
EEE4125C	New Ventures: Planning, Practice & Professionalism	16	8
EEE4124C	Impact of Engineering on the Natural & Social Environment	8	8
EEE4022S	Research Project	40	8
	Core credits per year (minimum)	**80**	

Fifth Year Elective Core Courses (ME)
Select courses amounting to **at least 48 credits** from the following:
At least two courses from:

Code	Course	NQF Credits	NQF Level
EEE4117F	Electrical Machines & Power Electronics 16		8
EEE4118F	Process Control & Instrumentation 16		8
EEE4119F	Mechatronics 16		8

And further courses from (timetable and pre-requisite permitting):

Code	Course	NQF Credits	NQF Level
EEE4105C	RF & Microwave Devices & Circuits 10		8
EEE4114F	Digital Signal Processing... 16		8
EEE4120F	High Performance Digital Embedded Systems 16		8
EEE4123C	Electrical Machines & Drives... 8		8
HUB4045F	Introduction to Medical Imaging & Image Processing.................. 12		8
	Total credits per year (minimum)... **128**		

Optional Courses
The following courses may be of interest, timetable and pre-requisite permitting, and require approval:

Code	Course	NQF Credits	NQF Level
EEE2051L	Practical Electronics, Components, Modules & Design.................. 8		6
HUB2005F	Introduction to Medical Engineering.. 8		6

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

Access for University of Technology Transferees

Students who have completed a National Diploma or Bachelor of Technology Degree in Engineering in minimum time and with a grade average of at least 70% and a minimum of 75% for Mathematics courses will be considered for entry into the Electrical Engineering, Electrical and Computer Engineering and Mechatronics degree programmes. Students must have qualified for matriculation exemption or the NSC endorsed for degree studies prior to commencement of the ND programme. Credits and exemptions may be granted on a course by course basis, but students must complete all the core and elective core courses, or their equivalent, prescribed for the degree and pass at least 288 credits at UCT, resulting in a total credit value of at least 576 credits. All students need to meet the knowledge and learning outcomes specified by ECSA.

Mechanical Engineering

There are two programmes of study in the Department of Mechanical Engineering: (i) Mechanical Engineering; and (ii) Mechanical & Mechatronic Engineering. Each of these programmes consist of a 4- and 5-year curriculum. Note that the 'Mechanical & Mechatronic' programme offered by Mechanical Engineering is different from the 'Mechatronics' curriculum that is offered by the Department of Electrical Engineering. More details of the differences between these two programmes can be found on the Department of Mechanical Engineering website: www.mecheng.uct.ac.za.

Bachelor of Science in Engineering in Mechanical Engineering 4-year curriculum
BSc(Engineering)(Mechanical Engineering) [EB005MEC01]

Programme Convener:
A/Prof S Chung Kim Yuen, BSc(Eng) MSc(Eng) PhD *Cape Town*

The Mechanical Engineering curriculum is structured to provide students with a fundamental understanding of solid mechanics, dynamics, thermodynamics, fluid mechanics and materials, which is conveyed via formal lectures, experimental investigations, laboratory sessions and the solving of structured problem sets. Engineering design is made central to the curriculum and thus forms the core of the programme. The programme draws in content from other Mechanical Engineering courses with design philosophies and principles of best practice, and develops both team and individual skills. The knowledge and skills that are developed through the curriculum are brought together through a number of capstone design courses and, towards the end of the degree, equip students with the skills to enter the broad area of professional engineering practice associated with the processing and manufacturing industries.

A candidate shall complete approved courses to a value of at least 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
MEC1005W	Introduction to Mechanical Engineering	24	5
MEC1007F	Introduction to Engineering Drawing	8	5
MEC1008S	Introduction to Mechanical Design	8	5
MEC1009S	Introduction to Engineering Mechanics	16	5
PHY1012F	Physics A for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
MEC1000X	Practical Training I	0	5
	Total credits per year	**144**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CSC1019F	Foundations of Computer Programming for Engineers	12	5
EEE2041F	Introduction to Electrical Engineering & Power Utilisation	16	6
EEE2042S	Introduction to Analogue & Digital Electronics	8	6
MAM2083F	Vector Calculus for Engineers	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MEC2046F	Materials Science in Mechanical Engineering	12	6

Code	Course	NQF Credits	NQF Level
MEC2047S	Engineering Dynamics 16		6
MEC2048S	Mechanical Engineering Design................................... 16		6
MEC2049F	Solid Mechanics I 16		6
MEC2050S	Thermofluids 1 16		6
MEC2000X	Practical Training II.. 0		7
	Total credits per year **144**		

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC3074F	Measurement and Actuators.. 8		7
MEC3075F	Computer Methods for Mechanical Engineers............................ 12		7
MEC3076F	Stress Analysis and Materials 16		7
MEC3077F	Thermofluids II 16		7
MEC3078S	Mechanics of Machines.. 8		7
MEC3079S	Control Systems 12		8
MEC3080S	Thermofluids III... 16		7
MEC3081S	Manufacturing Sciences.. 12		7
MEC3082S	Mechanical Engineering Machine Element Design 16		7
MEC3083W	Engineer in Society 16		8
STA1008F	Statistics for Engineers.. 12		5
	Total credits per year... **144**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC4047F	Mechanical Vibrations 12		8
MEC4108S	System Design.. 12		8
MEC4123F	Engineer in Business 16		8
MEC4124W	Engineering Product Design 22		8
MEC4125F	Thermofluids IV 20		8
MEC4128S	Final Year Engineering Project...................................... 20		8
	*Approved Complementary Studies (b) elective 18		5-8
	**Approved F and S Open electives ...Totalling at least 24		5-8
	Total credits per year.. **144**		

*Elective Complementary Studies Courses
Complementary Studies courses cover disciplines outside of engineering sciences, basic sciences and mathematics and are split into two categories according to the requirements of ECSA: (a) are essential to the practice of engineering: economics, the impact of technology on society, management and effective communication, and (b) broaden a student's perspective in the humanities or social sciences to support an understanding of the world. Students must select at least 18 credits worth of approved courses which fulfil the requirements of category (b).

**Open Electives
 You are required to take 24 credits' worth of Open Electives. These credits can be made up from any courses at UCT that are not part of your core curriculum and that you can register for (i.e. you meet the entrance requirements and have the appropriate pre- and co-requisites). While the 18 credits of Complementary B credits that you need to take are limited, Open Elective courses are not: they can be from any faculty, including Humanities, but also Law, Commerce, Science, Music or even from within the EBE Faculty. We suggest that you choose something that interests you and you would like to explore and/or that you think may be useful once you graduate. Your choices will need to be checked and approved by a student advisor and must fit into your timetable.

Bachelor of Science in Engineering in Mechanical Engineering 5-year curriculum
BSc(Engineering)(Mechanical Engineering) [EB805MEC01]

Programme Convener:
A/Prof S Chung Kim Yuen, BSc(Eng) MSc(Eng) PhD *Cape Town*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

A candidate shall complete approved courses to a value of at least 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics IB for Engineers Extended	18	5
MEC1005W	Introduction to Mechanical Engineering	24	5
MEC1007F	Introduction to Engineering Drawing	8	5
PHY1014S	Physics A for ASPECT	18	5
MEC1000X	Practical Training I	0	5
	Total credits per year	**102**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CSC1019F	Foundations of Computer Programming for Engineers	12	5
MAM2085F	Vector Calculus for ASPECT	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MEC1008S	Introduction to Mechanical Design	8	5
MEC1009S	Introduction to Engineering Mechanics	16	5
MEC2000X	Practical Training II	0	7
MEC2046F	Materials Science in Mechanical Engineering	12	6
PHY1015S	Physics B for ASPECT	18	5
	Total credits per year	**98**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
EEE2041F	Introduction to Electrical Engineering & Power Utilisation	16	6
EEE2042S	Introduction to Analogue & Digital Electronics	8	6
MEC2047S	Engineering Dynamics	16	6
MEC2048S	Mechanical Engineering Design	16	6
MEC2049F	Solid Mechanics I	16	6
MEC2050S	Thermofluids 1	16	6

Code	Course	NQF Credits	NQF Level
MEC3074F	Measurement and Actuators 8		7
	*Approved Complementary Studies (b) elective 18		5-8
	Total credits per year **114**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC3075F	Computer Methods for Mechanical Engineers 12		7
MEC3076F	Stress Analysis and Materials 16		7
MEC3077F	Thermofluids II 16		7
MEC3078S	Mechanics of Machines 8		7
MEC3079S	Control Systems 12		8
MEC3080S	Thermofluids III 16		7
MEC3081S	Manufacturing Sciences 12		7
MEC3082S	Mechanical Engineering Machine Element Design 16		7
MEC3083W	Engineer in Society 16		8
STA1008F	Statistics for Engineers 12		5
	Total credits per year **136**		

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC4047F	Mechanical Vibrations 12		8
MEC4108S	System Design 12		8
MEC4123F	Engineer in Business 16		8
MEC4124W	Engineering Product Design 22		8
MEC4125F	Thermofluids IV 20		8
MEC4128S	Final Year Engineering Project 20		8
	*Approved F and S Open electives ....(Totalling at least) 24		5-8
	Total credits per year **126**		

*Elective Complementary Studies Courses

Complementary Studies courses cover disciplines outside of engineering sciences, basic sciences and mathematics and are split into two categories according to the requirements of ECSA: (a) are essential to the practice of engineering: economics, the impact of technology on society, management and effective communication, and (b) broaden a student's perspective in the humanities or social sciences to support an understanding of the world. Students must select at least 18 credits worth of approved courses which fulfil the requirements of category (b).

**Open Electives

You are required to take 24 credits' worth of Open Electives. These credits can be made up from any courses at UCT that are not part of your core curriculum and that you can register for (i.e. you meet the entrance requirements and have the appropriate pre- and co-requisites). While the 18 credits of Complementary B credits that you need to take are limited, Open Elective courses are not: they can be from any faculty, including Humanities, but also Law, Commerce, Science, Music or even from within the EBE Faculty. We suggest that you choose something that interests you and you would like to explore and/or that you think may be useful once you graduate. Your choices will need to be checked and approved by a student advisor and must fit into your timetable.

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

Bachelor of Science in Engineering in Mechanical & Mechatronic Engineering 4-year curriculum
BSc(Engineering)(Mechanical & Mechatronic Engineering)[EB010MEC05]

Programme Convener:

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

The programme in Mechanical & Mechatronic Engineering (formerly Electro-Mechanical Engineering) comprises courses selected from the Electrical Engineering and Mechanical Engineering curricula. Engineering design is made central to the curriculum and thus forms the core of the programme. The programme places an emphasis on integrated studies, in the broad area of professional engineering practice associated with the processing and manufacturing industries, developing both team and individual skills. Furthermore, the programme aims to meet the increasing demand for engineers with cross-discipline skills, particularly in the fields of robotics, automated manufacturing and electro-mechanical power systems.

A candidate shall complete approved courses to a value of at least 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
MAM1020F	Mathematics IA for Engineers	18	5
MAM1021S	Mathematics IB for Engineers	18	5
MEC1005W	Introduction to Mechanical Engineering	24	5
MEC1007F	Introduction to Engineering Drawing	8	5
MEC1008S	Introduction to Mechanical Design	8	5
MEC1009S	Introduction to Engineering Mechanics	16	5
PHY1012F	Physics A for Engineers	18	5
PHY1013S	Physics B for Engineers	18	5
MEC1000X	Practical Training I	0	5
	Total credits per year	144	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CSC1019F	Foundations of Computer Programming for Engineers	12	5
EEE2041F	Introduction to Electrical Engineering & Power Utilisation	16	6
EEE2042S	Introduction to Analogue & Digital Electronics	8	6
MAM2083F	Vector Calculus for Engineers	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MEC2046F	Materials Science in Mechanical Engineering	12	6
MEC2047S	Engineering Dynamics	16	6
MEC2048S	Mechanical Engineering Design	16	6
MEC2049F	Solid Mechanics I	16	6
MEC2050S	Thermofluids I	16	6
MEC2000X	Practical Training II	0	7
	Total credits per year	144	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
EEE2046S	Embedded Systems I	16	6
MEC3074F	Measurement and Actuators	8	7
MEC3075F	Computer Methods for Mechanical Engineering	12	7
MEC3076F	Stress Analysis and Materials	16	7

Code	Course	NQF Credits	NQF Level
MEC3077F	Thermofluids II 16		7
MEC3078S	Mechanics of Machines.. 8		7
MEC3079S	Control Systems 12		8
MEC3081S	Manufacturing Sciences 12		7
MEC3082S	Mechanical Engineering Machine Element Design 16		7
MEC3083W	Engineer in Society 16		8
STA1008F	Statistics for Engineers.. 12		5
	Total credits per year... **144**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC4047F	Mechanical Vibrations 12		8
MEC4108S	System Design.. 12		8
MEC4123F	Engineer in Business 16		8
MEC4124W	Engineering Product Design 22		8
MEC4126F	Integrating Embedded Systems..................................... 16		8
MEC4127F	Mechatronic Systems 16		8
MEC4128S	Final Year Engineering Project..................................... 20		8
	*Approved Complementary Studies (b) elective 18		5-8
	*Approved S Open elective 12		5-8
	Total credits per year... **144**		

*Elective Complementary Studies Courses:
Complementary Studies courses cover disciplines outside of engineering sciences, basic sciences and mathematics and are split into two categories according to the requirements of ECSA: (a) are essential to the practice of engineering: economics, the impact of technology on society, management and effective communication, and (b) broaden a student's perspective in the humanities or social sciences to support an understanding of the world. Students must select at least 18 credits worth of approved courses which fulfil the requirements of category (b).

**Open Electives
You are required to take 12 credits' worth of Open Electives. These credits can be made up from any courses at UCT that are not part of your core curriculum and that you can register for (i.e. you meet the entrance requirements and have the appropriate pre- and co-requisites). While the 18 credits of Complementary B credits that you need to take are limited, Open Elective courses are not: they can be from any faculty, including Humanities, but also Law, Commerce, Science, Music or even from within the EBE Faculty. We suggest that you choose something that interests you and you would like to explore and/or that you think may be useful once you graduate. Your choices will need to be checked and approved by a student advisor and must fit into your timetable.

Bachelor of Science in Engineering in Mechanical & Mechatronic Engineering 5-year curriculum
BSc(Engineering)(Mechanical & Mechatronic Engineering)[EB810MEC05]

Programme Convener:
Dr R Govender, BSc(Eng) MSc(Eng) PhD *Cape Town*

Students on the 5-year curriculum take the same courses and credits as in the 4-year curriculum, but the courses are spaced out over 5 years to allow more time for learning new concepts, grappling with assignments, asking questions, and obtaining feedback. The 5-year curriculum is supported by ASPECT to ensure student success.

All students are admitted into the 4-year curriculum, and there are two opportunities in the first year to change to the 5-year curriculum and receive additional support from ASPECT. The first opportunity is after the initial set of class tests in the first term. The second opportunity is after the first semester's final examinations.

There are no additional tuition fees or charges for changing to the 5-year curriculum. Changing at the end of the first term is preferable as this enables students to switch before any courses are failed. Courses that are failed must be repeated and will be charged for.

A candidate shall complete approved courses to a value of at least 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Code	Course	NQF Credits	NQF Level
CEM1008F	Chemistry for Engineers	16	5
MAM1023F	Mathematics IA for Engineers Extended	18	5
MAM1024S	Mathematics IB for Engineers Extended	18	5
MEC1005W	Introduction to Mechanical Engineering	24	5
MEC1007F	Introduction to Engineering Drawing	8	5
PHY1014S	Physics A for ASPECT	18	5
MEC1000X	Practical Training I	0	5
	Total credits per year	**102**	

Second Year Core Courses

Code	Course	NQF Credits	NQF Level
CSC1019F	Foundations of Computer Programming for Engineers	12	5
MAM2085F	Vector Calculus for ASPECT	16	6
MAM2084S	Linear Algebra and Differential Equations for Engineers	16	6
MEC1008S	Introduction to Mechanical Design	8	5
MEC1009S	Introduction to Engineering Mechanics	16	5
MEC2000X	Practical Training II	0	7
MEC2046F	Material Science in Mechanical Engineering	12	6
PHY1015S	Physics B for ASPECT	18	5
	Total credits per year	**98**	

Third Year Core Courses

Code	Course	NQF Credits	NQF Level
EEE2041F	Introduction to Electrical Engineering & Power Utilisation	16	6
EEE2042S	Introduction to Analogue & Digital Electronics	8	6
MEC2047S	Engineering Dynamics	16	6
MEC2048S	Mechanical Engineering Design	16	6
MEC2049F	Solid Mechanics I	16	6
MEC2050S	Thermofluids 1	16	6

Code	Course	NQF Credits	NQF Level
MEC3074F	Measurement and Actuators 8		7
	*Approved Complementary Studies (b) elective 18		5-8
	Total credits per year **114**		

Fourth Year Core Courses

Code	Course	NQF Credits	NQF Level
EEE2046F	Embedded Systems I 16		6
MEC3075F	Computer Methods for Mechanical Engineering 12		7
MEC3076F	Stress Analysis and Materials 16		7
MEC3077F	Thermofluids II 16		7
MEC3078S	Mechanics of Machines 8		7
MEC3079S	Control Systems 12		8
MEC3081S	Manufacturing Sciences 12		7
MEC3082S	Mechanical Engineering Machine Element Design 16		7
MEC3083W	Engineer in Society 16		8
STA1008F	Statistics for Engineers 12		5
	Total credits per year **136**		

Fifth Year Core Courses

Code	Course	NQF Credits	NQF Level
MEC4108S	System Design 12		8
MEC4047F	Mechanical Vibrations 12		8
MEC4123F	Engineer in Business 16		8
MEC4124W	Engineering Product Design 22		8
MEC4126F	Integrating Embedded Systems 16		8
MEC4127F	Mechatronic Systems 16		8
MEC4128S	Final Year Engineering Project 20		8
	*Approved S Open Elective 12		5-8
	Total credits per year **126**		

*Elective Complementary Studies Courses:
Complementary Studies courses cover disciplines outside of engineering sciences, basic sciences and mathematics and are split into two categories according to the requirements of ECSA: (a) are essential to the practice of engineering: economics, the impact of technology on society, management and effective communication, and (b) broaden a student's perspective in the humanities or social sciences to support an understanding of the world. Students must select at least 18 credits worth of approved courses which fulfil the requirements of category (b).

**Open Electives
You are required to take 12 credits' worth of Open Electives. These credits can be made up from any courses at UCT that are not part of your core curriculum and that you can register for (i.e. you meet the entrance requirements and have the appropriate pre- and co-requisites). While the 18 credits of Complementary B credits that you need to take are limited, Open Elective courses are not: they can be from any faculty, including Humanities, but also Law, Commerce, Science, Music or even from within the EBE Faculty. We suggest that you choose something that interests you and you would like to explore and/or that you think may be useful once you graduate. Your choices will need to be checked and approved by a student advisor and must fit into your timetable.

Access for Transferees from Universities of Technology

Students who have completed a National Diploma or Bachelor of Technology Degree in Engineering in minimum time and with a grade average of at least 70% and a minimum of 75% for Mathematics courses will be considered for entry into the Mechanical Engineering or Mechanical and Mechatronic Engineering degree programmes. It is also a requirement to have qualified for matriculation exemption or the NSC endorsed for degree studies prior to commencement of the ND programme. Although there are situations where exemption with credit for equivalent courses may be granted, it will not ordinarily be possible to complete the degree in less than four years.

Academic Development in the Faculty of Engineering and the Built Environment

The ASPECT Programme
[EB801/EB802/EB805/EB809/EB810/EB811/EB819/EB822]

The Academic Support Programme for Engineering in Cape Town (ASPECT) is designed to help engineering students who, after being accepted into the EBE faculty, find they struggle to adapt to the initial load and pace of the degree. Students who are struggling are given opportunities during the year to transfer to the 5–year curriculum while receiving academic support from ASPECT. The programme provides a supportive environment that is sensitive to students' academic, social and emotional needs.

In the first year, ASPECT support is focused on the Mathematics and Physics courses, where ASPECT staff teach in these courses. Students also register for up to two more credit-bearing courses, specific to their programme of study, which are taught in the departments by the department responsible.

In the second year of the 5-year curriculum, students complete the remaining first year courses, two second year courses in Mathematics, the first of which is taught by ASPECT, and up to two courses from the second year engineering curriculum. After second year, the remaining courses needed to graduate are spread out to maintain an even credit load of approximately 120 credits per year.

ASPECT continues to provide non-academic support and counselling throughout the degree, monitoring and advising students as they complete the remaining degree requirements.

ASPECT STAFF

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

Senior Lecturers
P. Padayachee, Bsc(Hons) Mathematics *UNISA* MED Vista PhD *NMMU*
A. L. Campbell, Bsc(Hons) Applied Maths HDE *Natal* MSc *UKZN*

Lecturer
K. Ramesh Kanjee, BSc(Eng) MSc(EngMan) *Cape Town*

Administrative Staff
X. K. Klaasen

DEPARTMENTS IN THE FACULTY AND COURSES OFFERED

ARCHITECTURE, PLANNING AND GEOMATICS

The School offers the following Undergraduate Degree Programmes:

Bachelor of Architectural Studies
Bachelor of Science (Geomatics)

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

Staff

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

Professors
T Berlanda, Dipl Arch, *USI*, PhD (Arch &Design) *Turin*
N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand* RTPI
E Pieterse, BA(Hons) *UWC* MA Development Studies *ISS* PhD *LSE*
JF Whittal, BSc(Surv) MSc(Eng) *Cape Town,* PhD *Calgary* PrL(SA) MSAGI

Emeritus Professors
D Dewar, BA(Hons) MURP PhD *Cape Town* TRP(SA) MSAPI BP Chair of Urban and Regional Planning
I Low, BArch *Cape Town* MArch(Urban Design) *Penn* PrArch MIArch CIA
H Rüther, Dipl-Ing *Bonn* PhD *Cape Town* PrS*(SA)* FRSSAf FSAAE

Associate Professors
P Odera, BSc(Surv) MSc (Surv) Nairobi PhD (Earth and Planetary Sciences) Kyoto
JL Smit, BSc(Surv) PhD *Cape Town*, PS PS(*ph*) PGP (SA)
W Smit, BSc MCRP PhD *Cape Town*
A Steenkamp, BArch MArch *Pretoria* PhD *Delft* PrArch
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), PhD *Cape Town*
F Isaacs, BArch *Cape Town* MIP *Stuttgart*
T Katzschner, BSocSc MCRP *Cape Town*
M Louw, BArch *Pretoria* MPhil *Stellenbosch* PrArch(SA) MIArch
C Madell, BA(Hons) UWC, MCRP UCT, MScLED) University of Glasgow, PhD *Cape Town*
SS Papanicolaou, BArch MPhil *Cape Town*
T Sanya, BArch *Makerere* MIP *Stuttgart* PhD *Oslo*

M Shoko, BSc(Hons) (Surv & Geomatics) *Zimbabwe* MBA *Zimbabwe* Masters (Geo-Information & Earth Observation) *Netherlands* PhD *Cape Town*

Senior Research Officer
G Haysom MPhil *Stellenbosch* PhD *CapeTown*

Adjunct Senior Lecturer
N Roux, BFA *Rhodes* MA *Witwatersrand* PhD *Birkbeck*

Lecturers
C Abrahams, ND Arch *PTech* BTech(Architecture) *CPUT* MArch(Prof) *Cape Town*
H Boulanger, BSc.Arch *UP*, B.Arch (Hons) *UP*, M(Arch)(Prof) *UP*
S Le Grange, BArch *Cape Town* M Urban Design *UC Berkeley*
B Mathole, BAS *UCT* MArch *UP*
C Price, BAS *Cape Town*, MLA *Cape Town,* PhD *Cape Town*
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)
M Wells

Departmental Manager
J Meyer

Administrative Officers
F Bennett
N Davids
M Joubert

Administrative Assistants
N Gihwala
N Pickover
M Waglay
J Abrahams
M Mdluli

Print Room Manager
T Swarts

Departmental Assistant
C Ohlson

Laboratory Assistant
S Schroeder

Technical Officers
S Matthews
N Stanley

IT Liaison
L Coetzee

Course Outlines

APG1003W   TECHNOLOGY I
24 NQF credits at NQF level 5; First year undergraduate.
Convener: Dr P Tumubweinee
Course entry requirements: None
Co-requisites: APG1020W
Course outline:
This course is an introduction to the basic principles and concepts of construction and structure with emphasis on the tectonic qualities and sustainability properties of architectural materials. Familiarity with technical terminology and technical drawing conventions are developed.
Lecture times: Tuesday, 2nd to 8th periods (refer to departmental timetable)
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1004F/S   HISTORY & THEORY OF ARCHITECTURE I
12 NQF credits at NQF level 5; First year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: None
Course outline:
This course introduces students to architectural history and theory as understood through cultural studies. The course follows a chronology of World Architecture until the beginning of the 19th Century. This chronology is occasionally interrupted and reframed by thematic content based on contemporary theoretical issues and architecture.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1005F   HISTORY & THEORY OF ARCHITECTURE II
12 NQF credits at NQF level 5; First year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: None
Course outline:
The course follows the chronology of major administrative and stylistic architectural shifts at the Cape until the early 20th Century and introduces theoretical readings pertinent to particular buildings, precincts and epochs. Students visit, analyse and then present their findings of their assigned local case studies to the class. These case studies form the basis of research for the final essay.
Lecture times: Refer to departmental timetable

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1005S   HISTORY & THEORY OF ARCHITECTURE II
12 NQF credits at NQF level 5; First year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: None
Course outline:
The course follows the chronology of major administrative and stylistic architectural shifts at the Cape until the early 20th Century and introduces theoretical readings pertinent to particular buildings, precincts and epochs. Students visit, analyse and then present their findings of their assigned local case studies to the class. These case studies form the basis of research for the final essay.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1016H   GEOMATICS I
18 NQF credits at NQF level 5; First year undergraduate.
Convener: Dr S Hull
Course entry requirements: None
Co-requisites: CSC1015F or CSC1017F
Course outline:
This course aims to introduce students to geomatics, principles of measurement science, geometry of spatial measurement, spatial data, reference systems and datums, coordinate systems, projections, spatial computations on the plane, surveying principles and instrumentation, representation of spatial data in two dimensions, interpretation of maps and plans in three dimensions, and spreadsheets.
Lecture times: 3rd period Monday, Wednesday and Friday. Assignments on alternate Mondays 14h00-17h00.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1017F   ACADEMIC DEVELOPMENT CLASS I
0 NQF credits at NQF level 5; First semester, DP course. First year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: APG1003W, APG1020W.
Course outline:
A seminar based practical class to support the development of visual and verbal literacy, for students in need of academic support as a result of prior education inequities.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1018S   ACADEMIC DEVELOPMENT CLASS II
0 NQF credits at NQF level 5; June vacation, DP course. First year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: APG1003W, APG1020W or APG2039W, APG2021W.
Course outline:
A tutorial based practical class in which individual learning difficulties evident in mid-year review are clarified and which provides academic support.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1020W   DESIGN & THEORY STUDIO I
72 NQF credits at NQF level 5; First year undergraduate.
Convener: Ms B Mathole
Course entry requirements: None
Co-requisites: APG1003W
Course outline:
As a basic course for architecture, urban design and landscape architecture, its focus is on initiating the development of transferable design ability through the medium of architecture. Its primary objective is to introduce students to essential concepts, three dimensional spatialisation and inhabitation and to develop skills and techniques. Particular emphasis is paid to the development of productive working methods in design. The format of the course consists of short experimental exercises, longer projects and *en loge* tests.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1021W   REPRESENTATION I
24 NQF credits at NQF level 5; First year undergraduate.
Convener: Dr P Tumubweinee
Course entry requirements: None
Co-requisites: APG1003W, APG1020W
Course outline:
This is a hands-on course, divided between freehand, geometric drawing and digital drawing. While the aim is to introduce techniques and disciplines, once understood these are intended to enhance creativity rather than conformity. The freehand drawing tutorials will address drawing elements such as line, tone, mass, texture, measure and proportion, in wet and dry media. The geometric drawing tutorials will address the elements of planar geometry as well as the projections and conventions useful to designers. The digital drawing, while introducing digital 2 & 3D visualisation in terms of view studies, material studies and lighting studies, will reiterate the visual and graphic understanding built up in the course.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG1022X   PRACTICAL TRAINING IN GEOMATICS

0 NQF credits at NQF level 5
Convener: Professor J Whittal
Course outline:
This course aims to to consolidate knowledge and skills of field surveying and data processing learnt in the course APG1016W. Allied outcomes are to equip the student with skills relating to the workplace, which may include: group work, professional communication skills, office procedures, timekeeping, logistical planning, organisational skills and administrative procedures. Outcomes: After completing this practical training module the student should have an appreciation of basic technical surveying operations in the field and the roles of the professional, technical, assistant staff; the student should have an appreciation of office operations and data processing. The student should have a developing understanding of the following: the importance of timekeeping, communication norms and procedures within the survey team, care of equipment before, during and after fieldwork operations. The course includes practical work of not less than 2 weeks (10 working days) duration related to surveying. The student is required to submit a daily work diary, signed daily by both students and employer. Copies of observations and calculations are to be submitted. A signed letter from each employer on company letterhead must accompany the diary. The letter should confirm the practical training duration and the range of tasks undertaken. For students in the surveying stream, this is a prerequisite for third year courses.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2000F   HISTORY & THEORY OF ARCHITECTURE III

8 NQF credits at NQF level 6; Second year undergraduate.
Convener: Ms S Papanicolaou
Course entry requirements: None
Co-requisites: None
Course outline:
This course focuses on architectural modernism and urbanism. The intention is to give students an insight into the culture, tradition, programmes and movements of early modern architecture, as a global as well as local practice. The aim is to develop a critical understanding of the historical period.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2003S   HISTORY & THEORY OF ARCHITECTURE IV

8 NQF credits at NQF level 6; Second year undergraduate.
Convener: Ms B Mathole
Course entry requirements: None
Co-requisites: None
Course outline:
This course is an introduction into postmodern architectural theory and practice. It examines the various responses to modernism after WWII and starts a debate with critical contemporary architectural concerns. It aims to offer students a meaningful framework to assess contemporary architectural issues.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2009F   THEORY OF STRUCTURES III
6 NQF credits at NQF level 6; Second year undergraduate.
Convener: TBA
Course entry requirements: None
Co-requisites: None
Course outline:
Understanding the concepts of load, equilibrium, bending, shear, compression, tension and torsional forces and stresses. Understand and be able to produce various structural concepts of horizontal spanning elements and vertical elements pertaining to buildings at and beyond residential scale. The concepts will show how the structure carries the loads (in all three directions), how it connects to the vertical structure and introduction to structural materials. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements include roofs, suspended floors and beams and their various evolutions. Fixed and pinned connections are introduced. Arches are developed into vaults and domes.
Lecture times: Refer to departmental timetable.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2011S   THEORY OF STRUCTURES IV
6 NQF credits at NQF level 6; Second year undergraduate.
Convener: TBA
Course entry requirements: APG2009F
Co-requisites: None
Course outline:
This course enables students to understand and produce various structural concepts to buildings at and beyond the residential scale. The concepts will show how the structure (with appropriate material choices) connects to earth. Here vector and other relevant force diagrams are used to argue the form and material and the founding conditions. Structural elements include load bearing walls, retaining walls, foundations, basements and large span tension structures.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2014S   GEOMATICS II
24 NQF credits at NQF level 6; Second year undergraduate.
Convener: Associate Professor P Odera
Course entry requirements: CSC1015F or CSC1017F, APG1016F/H
Co-requisites: APG2040F, MAM2084F/S, STA1000S
Course outline:
This course builds further upon the introduction to co-ordinate systems provided in Geomatics I, and extends it to cover co-ordinate transformations, 3-D co-ordinate systems and time variations. The student is also introduced to the method of least squares as a means of solving over-determined systems of equations, with applications in co-ordinate transformations. Course Content: Introduction to error theory and error propagation; method of least squares - parametric case; two-dimensional co-ordinate systems; motions of the Earth; time; satellite orbits; three-dimensional co-ordinate systems and spherical trigonometry.

Lecture times: 4th period Monday-Friday. Practicals: one per week, Monday 14h00- 17h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2015F GEOGRAPHIC INFORMATION SYSTEMS I

24 NQF credits at NQF level 6; Second year undergraduate.
Convener: Dr S Hull
Course entry requirements: BSc Geomatics students: CSC1015F or CSC1017F, APG1016F/H
Co-requisites: None
Course outline:
This course aims to provide knowledge and skills in the fundamental concepts of geographic information systems and remote sensing. Course Content: GIS concepts, Cartographic concepts and GIS map production, Map Projections and their application in GIS, GIS data structures and their analysis, Spatial databases, GIS data input with special emphasis on Remote Sensing, GIS analysis and its application.
Lecture times: 4th period Monday to Friday. Practicals: one per week, Friday 14h00-17h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2019X PRACTICAL TRAINING I

0 NQF credits at NQF level 6
Convener: Professor J Whittal
Course entry requirements: None
Co-requisites: APG2040F
Course outline:
This course aims to consolidate knowledge and skills learnt in the course APG2040F, to equip the student with skills relating to the workplace, which may include: group work, professional communication skills, office procedures, timekeeping, logistical planning, organisational skills and administrative procedures. The course includes practical work of not less than 2 weeks (10 working days) duration related to surveying. Specified compulsory tasks are communicated via the Vula course site and could include control observations and calculations using specified equipment such as total stations and GNSS.The student is required to submit a daily work diary, signed daily by both students and employer. Copies of observations and calculations are to be submitted. A signed letter from each employer on a company letterhead must accompany the diary. The letter should confirm the practical training duration and the range of tasks undertaken. For students in the surveying stream, this is a prerequisite for APG3027Z.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2021W TECHNOLOGY II

APG2021F/S versions are available for Semester Abroad students only.
24 NQF credits at NQF level 6; Site visits, tutorials. Second year undergraduate.
Convener: TBA
Course entry requirements: APG1003W
Co-requisites: APG2038W, APG2039W

Course outline:
Understanding materials, components, assembly systems, and generic details applicable to composite construction systems and small framed structures in reinforced concrete and steel. Development of an awareness of materials and construction as an informant of design at the scale of 2 - 4 storey buildings with basements, and of the link between design development and detail resolution both in precedent of architectural merit and in the students own design development work based on Studiowork projects. Understanding of 2d and 3d graphic representation of building assembly.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2026F   CONSTRUCTION SURVEYING

16 NQF credits at NQF level 6
Convener: Mr K Singh
Course entry requirements: Civil Engineering students: MAM1020F/S or MAM1023F/S. Construction Studies students: MAM1010F/S.
Co-requisites: None
Course outline:
This course aims to provide an understanding of graphical and spatial concepts and skills of plane surveying for students of the built environment, who are not intending to study higher courses in surveying. The course develops problem solving skills in relation to practical surveying problems and group work and technical report writing skills. The course includes the South African co-ordinate system; introduction to reduction of observations to a reference surface and projection to a mapping surface. Joins, polars, understanding error, traversing, theodolite and level instruments and their calibration, height determination by levelling and trigonometric heighting, distance measurement, tachaeometry and map creation and interpretation, GIS as a tool for representation and analysis of spatial data, construction surveying: setting out of horizontal works and vertical alignment, calculation of volumes from plan, introduction to GPS as a data collection tool.
Lecture times: 4th period Tuesday to Friday. Practicals: one per week Monday 08h00-12h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2026S   CONSTRUCTION SURVEYING

16 NQF credits at NQF level 6
Convener: Mr K Singh
Course entry requirements: Civil Engineering students: MAM1020F/S or MAM1023F/S. Construction Studies students: MAM1010F/S.
Co-requisites: None
Course outline:
This course aims to provide an understanding of graphical and spatial concepts and skills of plane surveying for students of the built environment, who are not intending to study higher courses in surveying. The course develops problem solving skills in relation to practical surveying problems and group work and technical report writing skills. The course includes the South African co-ordinate system; introduction to reduction of observations to a reference surface and projection to a mapping surface. Joins, polars, understanding error, traversing, theodolite and level instruments and their calibration, height determination by levelling and trigonometric heighting, distance measurement, tachaeometry and map creation and interpretation, GIS as a tool for representation and analysis of spatial data, construction surveying: setting out of horizontal works and vertical alignment, calculation of volumes from plan, introduction to GPS as a data collection tool.

Lecture times: 4th period Tuesday to Friday. Practicals: one per week Monday 08h00-12h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2027X   WORK EXPERIENCE

0 NQF credits at NQF level 6; Second year undergraduate. DP course.
Convener: TBA
Course entry requirements: None
Co-requisites: APG2021W, APG2039W
Course outline:

Students find their own employment for a three week period of work experience during the second year mid-year break, to consolidate learning and gain exposure to career directions, requiring the submission of a logbook. Approved work experience can be undertaken in a variety of contexts, including design offices, government departments, NGOs, community-based projects, building sites, etc.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2038W   ENVIRONMENT & SERVICES II

APG2038F/S versions are available for Semester Abroad students only.
18 NQF credits at NQF level 6; Second year undergraduate.
Convener: Dr T Sanya
Course entry requirements: None
Co-requisites: APG2021W, APG2039W
Course outline:

This course covers conventional and sustainable strategies for thermal comfort and servicing of small and medium scale buildings. The course facilities students to utilise literature, building science principles, experiments and simulations to analyse and apply sustainable building solutions. The subject matter in the first semester includes (i) sustainable low energy design methods for indoor space heating, cooling, ventilation and lighting (ii) small-scale embedded clean energy generation (iii) sustainable smart solutions for water and sanitation. Students explore these sustainable design approaches through analysis and documentation of existing building case studies. In the second semester, students focus on integration of the sustainable principles and solutions in a building design project. This is extended into demonstration of fulfilment of the building regulations for energy efficiency and the applicable regulations for water and sanitation. Technical documentation is undertaken using architectural drawing conventions. Students must also make a business case for their sustainable design proposals.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2039W   DESIGN & THEORY STUDIO II

APG2039F/S versions are available for Semester Abroad students only.
74 NQF credits at NQF level 6; 240 hours studio. Second year undergraduate.
Convener: TBA
Course entry requirements: APG1020W
Co-requisites: APG2021W, APG2038W
Course outline:
The course reiterates in more sophisticated form the issues explored in first year studio in order to gain familiarity with them. They are addressed within the exploration of the architecture of place making, conceived as having four cornerstones: it is ordered by experience, has tectonic quality, is eminently habitable and contributes to its urban context. An undercurrent is the study of design method and digital design techniques are introduced. Design exercises are linked to theoretical concerns related to the contemporary South African city in global context. The format of the course consists of experimental exercises, longer projects and en loge tests.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2040F   SURVEYING 1

18 NQF credits at NQF level 6; Second year undergraduate.
Convener: Dr S Hull
Course entry requirements: MAM1021F/S or (MAM1004F and STA1000S); APG1016F/H
Co-requisites: None.
Course outline:
This course aims to provide students of Geomatics with an understanding of graphical and geospatial concepts and skills of plane surveying measuring and calculation. The course aims to develop problem solving skills in relation to practical surveying problems and to equip students with group work and technical report writing skills.
Collection of geospatial information for land management and development purposes: planning a detail survey, fieldwork methods and techniques, use of basic surveying instrumentation including theodolites, levels, electronic distance measurement; reduction of survey data to the mapping plane, plane spatial calculations, coordinate systems; reduction of heighting data and calculation of height differences; representation of geospatial data including contouring, surface fitting; spatial data modelling and cartography; horizontal curve theory and setting out for engineering works, are covered.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG2041S   APPLIED SURVEYING AND GISC

14 NQF credits at NQF level 6; Second year undergraduate.
Convener: Dr S Hull
Course entry requirements: DP for APG2040F and APG2015F
Co-requisites: None.
Course outline:
This course aims to consolidate and extend understanding of graphical and geospatial concepts. The course aims to further develop problem solving skills in relation to practical surveying problems, to equip students with group work skills and engender tolerance of diversity, and to further develop technical report writing skills. The course builds individual competency in the solution of integrated survey calculations. It consolidates basic surveying fieldwork, instrumentation and processing skills

and knowledge from the 1-week camp in the mid-semester vacation. This camp is project-based and relies on groupwork and outcomes. The course further teaches problem solving skills in relation to practical spatial data management challenges in Geoinformation Science (GISc) through a simulated office project design to consolidate skills and knowledge. The content includes GISc project planning, needs analysis, user requirements, project layout, multi-source data acquisition and conversions, data fusion, data manipulation, data models and modelling, database modelling, design and implementation (including DBMS), GISc analysis, cartographic principles and application, system implementation and system maintenance.

Lecture times: Friday afternoons from 14h00 – 17h00 and one week-long camp during the mid-semester break.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3000F   HISTORY & THEORY OF ARCHITECTURE V

8 NQF credits at NQF level 7; Third year undergraduate.

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3001S   HISTORY & THEORY OF ARCHITECTURE VI

8 NQF credits at NQF level 7; Third year undergraduate.

Convener: TBA

Course entry requirements: None

Co-requisites: None

Course outline:

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

Lecture times: Refer to departmental timetable.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3012S   GEOMATICS III

24 NQF credits at NQF level 7; Third year undergraduate.

Convener: Associate Professor J Smit

Course entry requirements: MAM1000W or MAM1021F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F; APG2016W or APG2040F.

Co-requisites: APG2041S

Course outline:
This course develops an understanding of the nature and concept of satellite and airborne remote sensing: the nature of remote sensing, optical radiation models, sensor models, data models spectral transforms, spatial transforms, thematic image classifications and remote sensing for decision support. This course also introduces airborne laser scanning (ALS), application and sensor systems for ALS, photogrammetry, geometry of images, image measurement and co-ordinate refinement, stereo restitution, camera calibration and photogrammetric applications.
Lecture times: 3rd period Mon to Fri. Practicals: one per week, Tues 14h00-17h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3013F   NUMERICAL METHODS IN GEOMATICS

16 NQF credits at NQF level 7; Third year undergraduate.
Convener: Dr M Shoko
Course entry requirements: MAM2084F/S, APG2014S, APG2016W or APG2040F.
Co-requisites: APG2041S
Course outline:
Course Aims: To consolidate the knowledge the student acquired in the introductory course on adjustment, and provide skills and knowledge required to solve all standard adjustment problems. Course Content: Advanced least squares modelling using the parametric adjustment case, condition equation adjustment, survey statistics, network design, elimination of nuisance parameters, combined and general case, quasi-parametric case, parametric adjustment with condition equations for the unknowns, generalised inverses, free net adjustment and S-transformation. Programming of least squares applications.
Lecture times: 3rd period Mon-Fri. Practicals: one per week, Mon 14h00-17h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3015X   PRACTICAL TRAINING II

This course is being phased out and will not be completed by students who have DP in both APG1022X and APG2019X
0 NQF credits at NQF level 7; Third year undergraduate.
Convener: Professor J Whittal
Course entry requirements: APG2019X, APG2016W or (APG2040F and APG2041S).
Co-requisites: None
Course outline:
The course aims to consolidate knowledge and skills learnt in geomatics courses, to equip the student with skills relating to the workplace, which may include: group work, professional communication skills, office procedures, timekeeping, logistical planning, organisational skills and administrative procedures. The course includes practical work of not less than 2 weeks (10 working days) duration related to any area of geomatics. The student is required to submit a daily work diary, signed daily by both students and employer. Copies of observations and calculations are to be submitted. The specific tasks and submissions required for this course are specified on the Vula course site. A signed letter from each employer on a company letterhead must accompany the diary. The letter should confirm the practical training duration and the range of tasks undertaken.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3016C   SURVEYING II

12 NQF credits at NQF level 7; Third year undergraduate.

Convener: Professor J Whittal

Course entry requirements: APG1016F/H; for BSc Geomatics students APG2016W or (APG2040F and APG2041S) is also a prerequisite.

Co-requisites: None

Course outline:

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

Lecture times: Third or fourth quarter. 4th period Mon-Fri. Assignments: one per week, Wed 14h00-17h00

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3017D   SURVEYING III

12 NQF credits at NQF level 7; Third year undergraduate.

Convener: Professor J Whittal

Course entry requirements: APG2016W or (APG2040F and APG2041S), APG2019X, MAM1021S

Co-requisites: APG3016C.

Course outline:

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

Lecture times: Third or fourth quarter. 4th period Mon-Fri. Assignments: one per week, Wed 14h00-17h00

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3023W   TECHNOLOGY III

24 NQF credits at NQF level 7; Site visits and tutorials. Third year undergraduate.

Convener: TBA

Course entry requirements: APG2021W

Co-requisites: APG3034W, APG3037W

Course outline:

To integrate students' understanding of materials/construction with their design process, to critically and strategically work with those who will appropriately reinforce their individual designs. To extend knowledge and understanding of more advanced construction and more specialised materials and services to encompass larger and more complex buildings. To raise awareness of the importance

of specialist information, and where and when to find this. Presentation of case studies of international buildings that are milestones in innovative construction principles/processes and/or materials, including issues of environmental sustainability. Revisiting basic materials and investigating more advanced techniques that extend their use to larger more complex structures. Introduction to more recent materials and technology, where and how they have been appropriately used. Students' own Studio designs are used as assignments to develop construction details and material decisions, to emphasise integration into the design process.

Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3027Z   CADASTRAL SURVEYING AND REGISTRATION PROJECTS
24 NQF credits at NQF level 7; Assignments, and 1-week camp-project.
Convener: Professor J Whittal
Course entry requirements: APG2016W or (APG2040F and APG2041S), APG2019X.
Co-requisites: CON2027F, APG3033W
Course outline:
Course Aims: To enhance theoretical knowledge from course work with practical skills and understanding of cadastral surveying, land registration and spatial analysis. Course Content: Urban and rural cadastral farm surveys, including design, fieldwork, calculations, analysis, and plan preparation. This course includes 2 major projects, tutorials and a one-week camp project, which takes place during a vacation, away from the UCT campus.
Lecture times: Thursdays, 6th to 8th period mid-semester vacation, second semester
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3028X   INDEPENDENT RESEARCH
0 NQF credits at NQF level 7; Third year undergraduate.
Convener: TBA
Co-requisites: APG3037W
Course outline:
Development of independent research initiative in the quantitative and qualitative analysis of architectural and urban programmatic requirements during a three week period in the mid-year break, resulting in the development of a brief for the major design project in studio.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3030F   DESIGN & THEORY STUDIO III
40 NQF credits at NQF level 7; For study abroad students.
Convener: TBA
Co-requisites: None
Course outline:
This course focuses on the integration of design proposals and theoretical issues in coherent responses which cross urban, landscape and architectural scales, and which are well developed in detail. The use of digital media is emphasised in terms of conceptualisation, design development and presentation. The format of the course consists of short experimental exercises, longer projects and

en-loge tests. The third quarter is spent on a major project, which provides scope for individual direction within the constraints of the course objectives.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3033W   LAND AND CADASTRAL SURVEY LAW
16 NQF credits at NQF level 7; Third year undergraduate.
Convener: Professor J Whittal
Co-requisites: CON2027F.
Course outline:
Fundamentals of Roman Dutch law, acquisition of rights in land, registration and recording of rights, cadastral systems and practical aspects of cadastral survey law. Statute and case law relating to cadastral survey, registration, planning, property holding, mineral and petroleum resources development rights, communal and informal rights, and land information management in South Africa. International law and law of the sea. Delimitation and delineation of offshore rights. Post-apartheid land policies and legislation. Land reform and land delivery in the developing world.
Lecture times: First semester. Tues 09h00 to 10h00. Assignments and seminars: First semester, Wed 14h00-17h00. Second semester Fri 12:00 – 12:45. Assignments and seminars: 14h00 – 16h00.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3034W   ENVIRONMENT & SERVICES III
6 NQF credits at NQF level 7; Third year undergraduate.
Convener: Dr T Sanya
Course entry requirements: APG2038W.
Co-requisites: APG3023W, APG3037W.
Course outline:
This course introduces sophisticated architectural strategies for passive and hybrid environmental control systems and services for medium and large scale buildings. Building energy simulation is emphasised. Students undertake analysis of best practice case studies. Students also independently apply sustainable design solutions to own design work.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3035F   THEORY OF STRUCTURES V
6 NQF credits at NQF level 7; Third year undergraduate.
Convener: TBA
Course entry requirements: APG2009F and APG2011S.
Co-requisites: None
Course outline:
Understand and be able to produce various structural concepts of all vertical and horizontal spanning elements pertaining to buildings beyond the residential scale. The concepts must show how the structure carries the load (in all three directions), and the most appropriate material choice. Here vector and other relevant force diagrams are used to argue the form and material. Structural elements

include bridges, large span building structures and tall buildings, etc. planar space frames, shells, girders, etc. are explored in this section.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3036F   MANAGEMENT PRACTICE LAW III
12 NQF credits at NQF level 7; Third year undergraduate.
Convener: TBA
Course outline:
The course provides a broad understanding of social and organizational principles which influence the production of the built environment as well as business principles of practice management related to architectural design and practice. Economic and legal principles are introduced in global and national contexts, giving emphasis to the following two themes: production of the built environment (incl. financial, sectoral, professional and ethical issues) and regulation of the built environment (providing an overview of multiple legislative frameworks and responsibilities, documentation methods).
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3037W   DESIGN & THEORY STUDIO III
80 NQF credits at NQF level 7; 1 theory and studio, 10 hours per week. \third year undergraduate.
Convener: TBA
Course entry requirements: APG2039W.
Co-requisites: APG3023W, APG3034W.
Course outline:
The course focuses on the integration of design proposals and theoretical issues in coherent responses which cross urban, landscape and architectural scales, and which are well developed in detail. The use of digital media is emphasised in terms of conceptualisation, design development and presentation. The format of the course consists of short experimental exercises, longer projects and *en-loge* tests. The third quarter is spent on a major project, which provides scope for individual direction within the constraints of the course objectives.
Lecture times: Refer to departmental timetable
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3038F   PROFESSIONAL COMMUNICATION STUDIES
12 NQF credits at NQF level 7
Convener: Mrs A Gwynne-Evans
Course entry requirements: None
Co-requisites: None
Course outline:
This course aims to develop an understanding of effective reporting and of academic style and referencing. Students learn the requirements for written and oral reports in terms of planning, organisation and selection of information, as well as in terms of linguistic style and final presentation. Students will have to demonstrate proficiency in both formats.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3039B   SPATIAL DATA INFRASTRUCTURES

12 NQF credits at NQF level 7

Convener: Associate Professor J Smit

Course entry requirements: MAM1021F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F

Co-requisites: None

Course outline:

This course aims to introduce students to spatial information systems analysis and design, spatial data infrastructures and metadata, distributed Geographical Information Systems, GIS project management, digital cartography, copyright and privacy issues, and SDI legislation.

Lecture times: 3rd period Monday to Friday. Practicals: one per week, Monday 14h00-17h00

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG3040C   ADVANCED SPATIAL DATA ANALYSIS

12 NQF credits at NQF level 7

Convener: Associate Professor J Smit

Course entry requirements: MAM1021F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F

Co-requisites: None

Course outline:

This course aims to introduce students to geostatistics, trend surface analysis, spatial interpolation, geostatistical models and generalised least squares, Kriging, and regression analysis.

Lecture times: 1st period Monday to Friday. Practicals: one per week, Monday 14h00-17h00

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4001S   GEODESY

24 NQF credits at NQF level 8

Convener: Associate Professor P Odera

Course entry requirements: APG3013F, APG3016C, APG3017D, MAM2084S, STA1000S, PHY1031F, PHY1032S.

Course outline:

Course Aims: This course describes the objectives, concepts and methods of modern geodesy. On completion of this course the student will have a good understanding of the use of satellite positioning techniques in geodesy and will be able to design and carry out high precision GPS surveys. The student will also be able to design, adjust and analyse modern three-dimensional networks and transform data from one datum to another. The student will have a good understanding of the influence of the Earth's gravity field on geodetic methods and will know how to compute geoid models from gravity and satellite data. Course Content: Introduction to geodesy; satellite positioning in geodesy; geodetic networks; datum transformations; Earth gravity field.

Lecture times: 2nd period Mon to Fri. Practicals: one per week, Wed 6th to 8th period

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4002Z   LAND USE PLANNING & TOWNSHIP DESIGN
16 NQF credits at NQF level 8
Convener: Associate Professor J Smit
Course entry requirements: APG3016C
Course outline:
Course Aims: This course provides students with both a theoretical and a practical background in land use planning and the design of townships in the Southern African context. Course Content: Historical and theoretical bases of land use planning, hierarchy of land use plans, land use control and management. Sub-division and township layouts; site analysis. Social considerations; financial and economic considerations, institutional framework. Property development; current development issues.
Lecture times: Monday, 13h00- 17h00
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4003Z   GEOMATICS PROJECT
40 NQF credits at NQF level 8
Convener: Associate Professor P Odera
Course entry requirements: The candidate must be able to graduate in the year in which the course is taken.
Course outline:
This project will provide an opportunity to demonstrate ability to design, execute and report on a Geomatics-related problem. Students will start a Geomatics 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 of their work in the second semester.
Lecture times: None. Students are encouraged to meet with their supervisors at least fortnightly to discuss progress, especially in the beginning stages of the project. Additional support is provided through CHED in consultation with students, and students are encouraged to make use of these sessions.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4005F   ENGINEERING SURVEYING & ADJUSTMENT
18 NQF credits at NQF level 8
Convener: Dr M Shoko
Course entry requirements: APG3013F, APG3017D.
Course outline:
Course Aims: To provide knowledge on the design and optimisation of two- and three- dimensional engineering network, precision survey techniques and deformation analysis methods. To equip the student with problem solving skills for practical applications in precise engineering surveying and general project management. Course Content: Statistical analysis, deformation and subsidence surveys. Instrumentation and methods of precise engineering surveying, Kalman filters, engineering and industrial metrology, deformation analysis methods, case studies.
Lecture times: 2nd period Mon to Fri. Practicals: one per week, Wed 14h00-17h00.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4010X GEOINFORMATICS CAMP
4 NQF credits at NQF level 8
Convener: Associate Professor J Smit
Course entry requirements: APG3012S.
Course outline:
This camp aims to consolidate knowledge and skills learnt in the course APG3012S. To further teach practical problem solving and production tasks in photogrammetry and remote sensing. In addition to perform 3D data modelling of results achieved and present the output by means of suitable visualisation methods. The practical work will be conducted in groups and the outcomes should be reported as a critical evaluation of the processes and methods used.
Lecture times: One week during a vacation.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4011F GEOMATICS IV
24 NQF credits at NQF level 8
Convener: Dr M Shoko
Course entry requirements: APG3012S, MAM2084F/S.
Course outline:
The nature and concept of satellite and airborne remote sensing: advanced spectral and spatial image transforms, advanced thematic image classification methods, and an introduction to data fusion and hyperspectral image analysis concepts. Processing of ALS data, including: data filtering, segmentation, object classification and 3D modelling. Photogrammetric production concepts including: aerial triangulation, DTM and ortho image production, pictometry, 3D reconstruction and visualisation.
Lecture times: 1st period Monday - Fridays. Practicals: Tuesdays 14h00 - 17h00.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

APG4012S GEOMATICS MANAGEMENT AND PROFESSIONALISM
24 NQF credits at NQF level 8
Convener: Mr K Singh
Course entry requirements: It is intended that this course is taken by students in the final year of their degree programme. Students on ASPECT may take the course in their programme year of study where timetabling permits.
Course outline:
This course aims to prepare students for professional practice in the private and public sector and to provide an understanding of the interaction between business practices, land policies and the Geomatics profession. Topics will include: management functions (planning, controlling, organising, decision-making), human resource management, labour legislation, financial management and management accounting, taxation, capital financing, estimating, depreciation, risk management, project planning, costing, resource allocation, project control and reporting, business communication, report writing, contract law, marketing and client relations, health and safety, professionalism, professional ethics, South African Geomatics Council (including legislation and

rules), different types of professional practices, partnerships and partnership law, structuring a practice, civil service in South Africa, government structures, and parastatals, The Access to Information Act, copyright, SDI, ISO, role of international associations/societies in Geomatics and social responsibility will also be covered.

Lecture times: Thursday, meridian to 9th period

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHEMICAL ENGINEERING

The Department offers the following degree programme:

BSc(Eng) in Chemical Engineering

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

Website: www.chemeng.uct.ac.za

Staff

Professor and Head of Department
A Mainza, BMinSC *UNZA* PhD *Cape Town*

Professors
M Claeys, Dipl Ing(Eng) Chem 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 FIChemE
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 AFIChemE
HB von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *UNISA* MSc (Eng) *Cape Town* Dr- Ing. *Aachen*

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.(Eng) Chem *Karlsruhe* PhD *Cape Town*
A Isafiade*, BSc(Hons) Ilorin* MSc *Ife* PhD *Cape Town* AMIChemE
BJ McFadzean, BSc(Hons) MSc *Port Elizabeth* PhD *NMMU*

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 *Stellenbosch* FSAIMM FSAIChE FSAAE FRSSAf

Honorary Professors
JE Burgess, BSc (Hons) *University of Wales, Swansea* MRes PhD *Cranfield University* MIWA SFWISA MRSSAf
JM Case, BSc(Hons) *Stellenbosch* HDE MSc *Cape Town* MEd *Leeds* PhD *Monash* MASSAf
PW Cleary BSc(Hons) *Monash* PhD *Monash*
I Govender, BSc *UDW* BSc(Hons)Physics PhD *Cape Town* HDE *UNISA*
C Hebling Dipl.(Phys) PhD (Phys) *Konstanz*
GJ Hutchings BSc(Eng) Chem PhD *UCL* DSC (Heterogeneous Catalysis) *London* FIChemE FRS CBE

MJ Nicol, BSc(Hons), PhD *Witwatersrand*
JW Niemantsverdriet, BSc (Phys+Math) MSc *Amsterdam* PhD *Delft* (TechSciences)
JG Petrie, BSc (Chem Eng), *UCT,* MSc *Houston,* PhD *UCT,* C. Eng FIChemE
ND Plint BSc(Hon), *MDP*, MBA (distinction), PhD, *GAICD*
MS Powell, BSc(hons) *Natal* PhD *Cape Town* FSAIMM FAusIMM

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

Adjunct Professors
B J Chicksen, MBChB *Harare* FCP (SA) *Durban* MBA *Johannesburg*
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*
DW Wright BSc(Eng) *Natal* PrEng FSAAE FIChemE MSAIChE M.Inst.D

Adjunct Associate Professor
TBA

Senior Lecturers
L Bbosa, BSc(Eng)Elec-Mech MSc PhD *Cape Town* MSAIMM
MA Fagan-Endres, BSc(Eng)Chem *Cape Town* PhD *Cantab* (Director of Undergraduate Studies)
E Govender-Opitz, BSc(Eng) Chem PhD *Cape Town*
HR Heydenrych, BSc(Eng)Chem MSc *Cape Town*
TP Mokone BSc (Hons) Chem *UFS* MSc *UFS* PhD(Chem Eng) *Cape Town*
MS Manono, BSc(Eng)Chem MSc Cape Town PGDip Business Management *Regenesys* PhD *Cape Town*
T Rampai, BSc(Hons) MSc *Cape Town*

Contract Lecturers
S Bremner, BSc (Physics) *Cape Town*, BSc(Hons) NASSP *Cape Town*, MSc (Physics) *KwaZulu-Natal* PhD (Physics) *Cape Town*
CJ Edwards, BSc(Eng)Chem *Cape Town*
R Manenzhe BSc(Eng)Chem MSc *Cape Town*
D Mogashana, BSc(Eng)Chem *Cape Town*, MPhil (Engineering Education) *Cape Town*, PhD (Engineering Education) *Cape Town*
L Motsepe, BSc(Microbiology and Biochemistry) Wits, BSc(Eng)Chem *Johannesburg*, MSc (Eng) Chem *Cape Town*
L October, BSc(Eng) Chem *Cape Town*
T van Heerden, BSc(Eng)Chem MSc *Cape Town*

Honorary Research Associates
M Johnstone Robertson, BSc(Eng)Chem PhD *Cape Town*
SM Jones, BSc(Biochemistry) BSc(Hons) Biotechnology MSc(Biochemistry) Rhodes PhD Bioprocess Engineering Cape Town
MA Petersen, BSc(Physics) MSc *Cape Town* PhD *Cantab*

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

Senior Research Officers
AG Hughes, BIng *Stellenbosch*, MSc(Eng) *Cape Town*
A Kotsiopoulos, BSc(Eng) MSc PhD *Cape Town*

A Marquard, BA *Cape Town*, MA *Rhodes*, PhD *Cape Town*
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R Mohamed, BSc(Hons) (Chemistry) MSc *NMMU* PhD(Chem Eng) *Cape Town*
M Smart, BSc(Hons) MSc *Stellenbosch* PhD *Cape Town*
APP van der Westhuizen, BEng *Stellenbosch* MSc *Cape Town*

Research Officers
F Ahjum, BSc(Hons) *Perth*, MSc(Eng) *Cape Town*
PA Bepswa, BSc(Eng)Metallurgical *Zimbabwe* PhD *Cape Town*
M Fadlalla, BSc(Chem) MSc PhD *Durban-University of KwaZulu-Natal*
AS Geldenhuys, BEng (Chem) *Stellenbosch*, MSc (Chem Eng) *UCT*
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B McCall, BSc(Hons), MScEng *Cape Town*
T Moyo, BEng(Hnrs) (Eng) *NUST Zimbabwe*, PhD, (Eng) *Cape Town*
MC Richter,BSc(Physics) *Cape Town*, BSc (Hons) *Cape Town*, MSC(Physics) *Cape Town*, PhD(Physics) *Cape Town*
M Smart, BSc(Hons) MSc *Stellenbosch* PhD *Cape Town*
J Waters, BTech(Chem Eng) *Cape Technikon* MSc *Cape Town*

Principal Technical Officer
TBA

Chief Technical Officers
MA Jakoet, BSc(Eng) Mechatronics *Cape Town*
P Johnston, BSc *Cape Town*
T Samkanga*, NITC NTC NH(Eng)Elec Harare Polytechnic MBA Rhodes*

Senior Technical Officers
RB Cupido, NDip(Analytical Chemistry) BTech(Chemistry) MTech(Chem) *CPUT*
WP Koorts BTech(Chem Eng) MTech *CPUT*
CA Le Roux, NDip *CPUT* BTech(Chem) *UNISA*

Technical Officers
DJ Bramble
GV Groenmeyer

Principal Scientific Officer
S Govender, ND Analytical Chemistry *Peninsula Technikon* BTech Chemistry *CPUT* MPhil Env Mngmnt *Stell Univ*

Chief Scientific Officer
J Chivavava, B(Eng) *NUST* MSc(Eng) *Cape Town*
K Pillay, BSc (Hons) *UKZN* MSc *Cape Town* Pr. Sci. Nat.

Department Laboratory Manager
A Mentoor, BSc(Hons) MSc *Stellenbosch*

Analytical Laboratory Manager
S Govender, BSc(AppChem) Hons(Chem) MSc *UKZN*

Technical Assistant-Analytical Lab
R Geland

Laboratory Assistant - Analytical Lab
S Klink

Department Manager
SI Pillay

Building Supervisor
E Matthews

Workshop Assistant-Electronic Workshop
CF Nomdoe

Administrative Staff
B Cloete (Undergraduate Administrator)
B Davids (Postgraduate Administrator)
N Dili (Receptionist)
D Lesch (Finance Assistant)
K Mfundisi (Administrative Assistant)
F Silwana (Purchaser)

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

Course Outlines

CHE1001Z   INTRODUCTION TO CHEMICAL ENGINEERING
22 NQF credits at NQF level 5
Convener: Dr E Govender-Opitz
Course entry requirements: None
Course outline:
This course introduces the field of chemical engineering, unit conversions, material and energy balances, process analysis and design, natural foundations, graphical analysis, engineering drawing, modelling using spreadsheets and COCO and professional development.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE1005W   CHEMICAL ENGINEERING I
44 NQF credits at NQF level 5
Convener: Dr E Govender-Opitz
Course outline:
This course introduces the field of chemical engineering, unit conversions, material and energy balances, process analysis and design, natural foundations, graphical analysis, engineering drawing, modelling using spreadsheets and COCO and professional development.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE2000X   FIELD TRIP
4 NQF credits at NQF level 6
Convener: Ms N Abbas
Co-requisites: CHE2005W
Course outline:
The aim of the field trip is to expose the student engineer to industrial scale equipment and processes, as well as opportunities for application of material studied in class to real systems. It also provides experience of industrial safety requirements and opportunities to engage with practising engineers and other plant personnel.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE2005W   CHEMICAL ENGINEERING II
72 NQF credits at NQF level 6
Convener: Ms T van Heerden
Course entry requirements: CEM1000W, CHE1005W, MAM1020F/S, MAM1021S/F, PHY1012F/S, STA1008S
Co-requisites: CHE2000X
Course outline:
This course aims to further develop the understanding of chemical engineering theory and practice. The theory is taught in integrated blocks and is reinforced and contextualised by: theory-related tools (e.g. heuristics, flowsheeting, charts, tables); engineering practice-related tools and skills (e.g.

sustainability, environment & economics, safety & health, communication, teamwork, drawing and computing); practicals; and project work. Detailed theory topics are:

Energy Balances and Thermodynamic Properties of Substances: ideal gas; phase diagrams; energy balance elements and influence of T and p; Bernouilli equation; simultaneous mass and energy balances; Mollier diagrams; cyclic systems; entropy.

Reaction Systems: heats of formation/reaction/combustion; mass and energy balances with reaction; chemical equilibrium; reactor mole balances; CSTR, PFR and multiple reactors; chemical kinetics; recycle effects; design using data; reactor profiles.

Interface Systems: binary systems; equilibrium diagrams; equilibrium constants; volatility; flash calculations; counter-current cascade systems; multistage vapour-liquid equilibrium; column internals; multicomponent distillation.

Heat Systems: heat transfer mechanisms; resistances in series; heat exchanger networks.

Fluid Systems: forces on submerged surfaces; fluids under constant acceleration; linear momentum and forces on bends; viscosity; laminar and turbulent flow; Hagen-Poiseuille law; friction; drag coefficients; pump characteristics.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE2006S   INTRODUCTION TO BIOTECHNOLOGY
24 NQF credits at NQF level 6
Convener: Dr M Smart
Course entry requirements: BIO1000F, CHE1005W
Course outline:

The course aims to introduce engineers to the fundamentals of biotechnology, pertinent to bioprocess engineering. This is achieved by building an understanding of the key concepts and elements of biotechnology, including molecular components, information transfer and metabolism; the basic concepts of applied microbiology, including microbial cell structure, microbial classification, cell division and nutritional requirements; and the basic concepts of molecular biology and genetic engineering, especially recombinant DNA technology. Using these, a working knowledge of microbial growth kinetics, enzymology and bioenergetics is built. Further, a working knowledge of mixed microbial culture dynamics is established. Skills are developed to enable quantitative descriptions of microbial transformations. Further a practical working knowledge of enzymology, microbial growth, kinetic studies and aseptic transfer are developed.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3000X   WORKPLACE EXPERIENCE
0 NQF credits at NQF level 7
Convener: Ms N Abbas
Course outline:

Chemical Engineering students shall complete a minimum of four weeks of workplace experience (before registering for the 4th year of their studies, if possible). The work can be project-based (i.e. involve the application of knowledge and skills from the 2nd or 3rd year curriculum) and/or involve experiencing typical aspects of a (engineering) work environment (e.g. working in a team, data retrieval, industrial safety practices and standards, how meetings are run, typical day of an engineer, company/business driving-forces, management-structure of a company). The work can be completed in a formal company, NGO, local community or similar. Evidence of the work needs to be collected in a log book and signed off by a practicing engineer/supervisor/community leader. The log book as well as a report to the satisfaction of the course convener (or a letter of confirmation that a

satisfactory report has been written, if the work is confidential) shall be submitted immediately on return to campus (i.e. day of registration or first day of second semester).

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3006F   FUNDAMENTALS OF CHEMICAL ENGINEERING III

54 NQF credits at NQF level 7

Convener: Dr T Rampai

Course entry requirements: CHE2005W, MAM2084F/S

Course outline:

This course aims to develop the understanding of chemical engineering theory and practice. The theory is covered in blocks and is reinforced and contextualised by theory-related tools (heuristics, flowsheeting, charts, tables), engineering practice-related tools/skills (sustainability, environment & economics, safety & health, communication, drawing and computing), practicals and project work. Detailed theory topics include: (1 – Solid-Fluid Systems) particle characterisation, motion of a particle in a fluid, sedimentation, thickening hydrocyclones and centrifugation, mixing and agitation, rheology, flow through packed beds, fluidisation, filtration; (2 – Interface Systems) Fick's law, film mass transfer, film theory, mass transfer coefficients, correlations, overall mass transfer concept, packed bed design, mass transfer with reaction, solid-fluid reactions; (3 – Reaction Systems) residence time distribution and non-ideal reactors, non-isothermal reactor design, multiple reactions; (4 – Thermodynamic Systems) equations of state, departure functions and excess properties, fugacity, phase equilibrium, vapour-liquid equilibrium, partial molar properties, activity coefficients, azeotropes, flash calculations, liquid-liquid-equilibrium, chemical equilibrium.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3007S   NON-IDEAL SYSTEMS IN CHEMICAL ENGINEERING

22 NQF credits at NQF level 7

Convener: Associate Professor N Isafiade

Course entry requirements: CHE2005W, MAM2083F/S, MAM2084F/S

Course outline:

This course aims to extend the concepts and understanding build in the first 2.5 years of the curriculum into real world systems and equip students with tools to analyse, design and control these systems.

Dynamic systems and control: Unsteady state balances on heat, fluids, mass transfer systems, analysis of system dynamics, analytically and numerically, Process controllers, systems dynamic response and controller dynamics, controller and system stability, controller tuning, open/closed loop responses, dynamic simulations, controller design and analysis.

Process systems and process industries: Systems analysis and efficiency, 2nd law analysis, exergy, Overview of world industries, commodity chemicals, speciality chemicals, international drivers in chemical engineering, design of various equipment, project management, process sensitivity, site layout.

Non-Ideal and Non-Standard Systems - the study of the influence of coupling multiple phenomena (phase condensation) or non-ideal properties (azeotropes) in the performance of reaction and separation systems and the development of design criteria for such systems.

Integrated laboratory experience : design an experimental program, to perform the experiments and to analyse the subsequent data relevant to process control. The focus is on comparing theoretical descriptions and empirical data with experimentally observed phenomena.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3008S   CHEMICAL ENGINEERING PROJECT MANAGEMENT AND UNIT OPERATION DESIGN
16 NQF credits at NQF level 7
Convener: Professor K Moller
Course entry requirements: CHE3006F, MAM2083F/S
Co-requisites: CHE3007S
Course outline:
This course aims to develop the basic concepts of project management and then requires application in a dedicated design project around a chemical process unit. Special focus is on the design of reactor and separation units and how they integrate within a process unit. The project entails 4 stages: (1) conceptual design, flowsheet development, mass and energy balances, (2) reactor design, (3) separator design, (4) process integration, optimisation and economics.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3009Z   CHEMICAL ENGINEERING UNIT OPERATION DESIGN
16 NQF credits at NQF level 7
Convener: Professor K Moller
Course entry requirements: DP obtained in CHE3008S
Course outline:
This course aims to develop the basic concepts of projects management and then requires application in a dedicated design project around a chemical process unit. Special focus is on the design of reactor and separation units and how they integrate within a process unit. The project entails 4 stages: (1) conceptual design, flowsheet development, mass and energy balances, (2) reactor design, (3) separator design, (4) process integration, optimisation and economics.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3067S   DESIGN AND OPERATION OF CATALYTIC REACTORS
16 NQF credits at NQF level 7
Convener: Professor E van Steen
Course entry requirements: CHE2005W
Course outline:
The course focuses on the fundamental aspects of heterogeneously catalysed reactions with the aim to design reactors for catalytic reactors. The course will introduce Langmuir-Hinshelwood kinetics together with internal and external mass transport limitations to describe the rate of the process, from which catalytic reactors will be designed. The consequences of catalyst deactivation on the operation of catalytic reactors will be discussed with catalyst regeneration being modelled using classical solid-fluid models such as the shrinking core model.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3068S   BIOPROCESS ENGINEERING
16 NQF credits at NQF level 7
Convener: Dr E Govender-Opitz
Course entry requirements: CHE2005W, CHE2006S
Course outline:
The course aims to develop an advanced understanding of the fundamental engineering science of bioprocess engineering. The course will build on an adequate understanding of life sciences to address the process requirements of microbial and enzymatic processes. The fundamentals of biokinetics and bioreactor systems will be addressed. Sterilisation, aseptic operation and clean room technology will be covered, as will downstream processing for product recovery. Study of important bioprocesses will be included, with examples drawn from those of significance to South Africa. The course includes selected case studies and visits to local bioprocess industries.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3069S   MINERAL AND METALLURGICAL PROCESSING
16 NQF credits at NQF level 7
Convener: Miss L October
Course entry requirements: CHE2005W
Co-requisites: GEO2006S
Course outline:
This course aims to develop an understanding of the processes involved in the beneficiation of minerals and extraction of metals. The course begins with a multimedia-based introduction to the field of mineral and metallurgical processing, from the mining operation to environmental rehabilitation. This is followed by 5 dedicated 10-lecture sessions to introduce the principles behind comminution and classification, flotation, hydrometallurgy, pyrometallurgy, crystallisation and precipitation. In the course of each session students will be required to perform experiments and/or analyse data in the context of pilot or bench scale operations in the respective fields and report findings through dedicated assignments.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE3070S   NUMERICAL SIMULATION FOR CHEMICAL ENGINEERS
16 NQF credits at NQF level 7
Convener: Professor K Möller
Course entry requirements: CHE2005W
Course outline:
This course aims to develop an advanced understanding of computer arithmetic, application of similarity transforms to reaction-diffusion and rate based mass transfer; data fitting by linear leasts squares regression; application of non-linear equations techniques in mass and energy balances (VLE); application of ODE solvers, BVP solvers and the method of lines in reaction and mass transfer systems described by ODEs and PDEs; stiffness ratio; non-linear leasts squares estimation of model parameters with variance; formulate objective functions and minimisation/maximisation of process operating models; and embedded systems.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4036Z   CHEMICAL ENGINEERING DESIGN
This course is not eligible for additional assessment
36 NQF credits at NQF level 8
Convener: Mr H Heydenrych
Course entry requirements: All core third year courses, CHE4048F, CHE4049F.
Course outline:
This course brings together many of the elements previously covered in the chemical engineering degree and is intended to be the culmination of the previous years' study. The course is structured around an open ended design problem and includes: process evaluation, comparison and selection; material and energy balancing; hazard analysis and operability; economic evaluation; unit operation design; plant equipment selection and specification, materials selection and plant layout; and project evaluation. The work will be presented in the form of an individual feasibility report and oral examination, followed by a group-based design in 5 or 6 member teams.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4045Z   CHEMICAL ENGINEERING RESEARCH
This course is not eligible for additional assessment
36 NQF credits at NQF level 8
Convener: Professor J Petersen
Course entry requirements: All core third year courses.
Course outline:
This course is an assigned experimental or theoretical investigation involving limited staff supervision. The assessment of performance is based on engineering ability and initiative displayed in the formulation of objectives, execution of the project and presentation of the results. There are limited lectures in the scientific method, survey of the literature, design of experiments, relevant analytical equipment and techniques, safety in the laboratory, the handling of wastes, introduction to statistics, analysis and interpretation of data, report writing, presentation of research findings.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4048F   BUSINESS, SOCIETY AND ENVIRONMENT
20 NQF credits at NQF level 8
Convener: Professor H von Blottnitz
Course entry requirements: All core third year courses.
Co-requisites: CHE4049F
Course outline:
The course aims to provide a foundation for students to engage with their future roles as practising professionals or entrepreneurs relative to the expectations of society, and of employers. The course covers: benefit indicators, physical risk in the process industries, environmental sustainability, social impacts and license, innovation and entrepreneurship, business planning, capital and operating cost estimation, profitability assessment and engineering ethics.
DP requirements: Exit level outcomes attained for the ethics assignment and the multi-disciplinary work assignment; satisfactory participation in the group work for the risk management and new business venture planning projects.
Assessment: Class test; projects; June examination 3 hours. Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4049F   PROCESS SYNTHESIS AND EQUIPMENT DESIGN

20 NQF credits at NQF level 8
Convener: Dr M Manono
Course entry requirements: All core third year courses.
Co-requisites: CHE4048F
Course outline:

The course aims to familiarise students with the design of entire chemical processes, building on but going beyond the detailed sizing of major equipment as learned in third year and minor equipment, pipe work and heat exchangers as learned in second year. It covers: process flowsheeting conventions; process flowsheet development using process synthesis theory and heuristics; chemical engineering process simulation using Aspen Plus; equipment design heuristics; process control philosophy; health, safety and environmental (HSE) reviews and plant layout.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4057F   INDUSTRIAL ECOLOGY FOR CHEMICAL ENGINEERS

8 NQF credits at NQF level 8
Convener: Professor H von Blottnitz
Course entry requirements: CHE3006F, CHE3007S, CHE3008S
Co-requisites: None
Course outline:

This elective course aims to introduce 4th year chemical engineering students to the field of industrial ecology, its main topics of enquiry, the associated analysis tools, as well as the emerging practise resulting from it. Topics covered start from the biological metaphor and the systems dimension of biomimicry: interplays of producers, consumers, degraders; metabolism; symbiosis; young vs. mature eco-systems; signalling in nature. Applications covered include industrial symbiosis, material flow analysis, the circular economy, resource efficiency. Assessment is by means of one term-time assignment (40%), applying learnings to a current topic, and by a final written examination (60%).

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4058Z   LIFE CYCLE ASSESSMENT

8 NQF credits at NQF level 8
Convener: Professor H von Blottnitz
Course entry requirements: 3 years of engineering or science studies at university level
Co-requisites: None
Course outline:

This course aims to familiarise students with the environmental assessment tool known as Life Cycle Assessment, the history of its development, its diverse uses, the ISO norms, the science behind some of its key impact categories (beyond carbon and water), its use to support decision-making in product systems, process systems or in policy-making. Furthermore, to develop skills and insights in the important steps of goal and scope definition, inventory modelling, data quality assessment, choice of impact assessment categories, interpretation and uncertainty propagation, partly by working with LCA software and databases. Assessment is by project 50% and written final examination 50%.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4067F   HETEROGENEOUS CATALYSIS
16 NQF credits at NQF level 8
Convener: Professor P Kooyman
Course entry requirements: CHE2005W or CEM2005W
Course outline:
This course aims to introduce advanced students to basic principles in heterogeneous catalysis: diffusion and adsorption; catalyst performance evaluation (reactions, product analysis); catalyst preparation (metal-based catalysts; metal-oxide based catalysts; supported catalysts); catalyst characterisation; catalysed reactions: acid catalysed reactions, metal catalysed reactions, bi-functional catalysis, oxidation catalysis; important industrial chemical processes based on heterogeneous catalysis.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4068F   BIOPROCESS ENGINEERING DESIGN
16 NQF credits at NQF level 8
Convener: Ms C Edward
Course entry requirements: CHE3068S
Course outline:
This course aims to give advanced students an opportunity to apply all of their acquired knowledge of the fundamentals of bioprocess engineering and biotechnology to the integrated design of a complete bio-manufacturing plant
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4069F   MINERAL AND METALLURGICAL PROCESSING II
16 NQF credits at NQF level 8
Convener: Professor J Petersen
Course entry requirements: CHE3006F, CHE3007S, CHE3008S, CHE3069S, GEO2006S
Course outline:
This course aims to equip students with the knowledge required to model and simulate mineral beneficiation and extractive metallurgical processes. The course will be run in 5 dedicated sessions of lectures and tutorial, covering the principles of geo-metallurgy and modelling comminution & classification, flotation, hydrometallurgy, crystallisation and precipitation processes. Simulators commonly applied to designing and optimising mineral processing circuits will be used. The modelling of hydrometallurgical flowsheets with its various unit operations is covered. Crystallisation and precipitation includes modelling concepts of supersaturation; basic mechanisms of nucleation, growth, aggregation, breakage and dissolution for crystallisation and precipitation systems as applied in metallurgical flowsheets.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CHE4070F   NUMERICAL OPTIMISATION FOR CHEMICAL ENGINEERS
16 NQF credits at NQF level 8
Convener: Professor K Möller
Course entry requirements: CHE3006F, CHE3007S, CHE3008S
Course outline:
This course aims to develop students' knowledge of rigorous optimisation techniques and tools with application to chemical engineering problems and processes. The course content consists of : convex, concave, quadratic function interpretation, objective functions, single variable optimisation: bracketing, newtons and secant methods, quadratic interpolation, multivariable optimisation: simplex, conjugate gradient concepts, indirect methods of first and second order, conjugate gradient method, newtons methods, quasi-newton, secant methods, BFGS,secant updates, non-linear programming: lagrange multipliers, conditions for a minimum(max), quadratic programming (QP), generalised reduced gradient (GRG), penalty functions, sequential quadratic programming (SQP), linear programming (LP), integer constraints (MINLP), formulating objective functions of processes with constraints, linearisation of models, and optimal control.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIVIL ENGINEERING

The Department offers the following undergraduate degree programme:

BSc (Eng) in Civil Engineering

The Department of Civil Engineering is housed in the New Engineering Building, situated on the top terrace of the Upper Campus. This 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
NP Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *CapeTown* PhD *Stell* FSAAE FSAICE FWISA FSAIMunE Fellow IWA Mem IAHR Mem IAHS
R Behrens, Pr Pln BA MCRP PhD *Cape Town*
H Beushausen, Dipl-Ing HAW Hamburg MSc(Eng) PhD *Cape Town*
S Skatulla, Dipl-Ing *Karlsruhe* PhD *Adelaide*
M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* FSAICE MITSSA
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
KJ Carden, BSc MSc(Appl Sci) PhD *Cape Town*
DS Ikumi, PhD *Cape Town*
D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*
DG Randall, PrEng BSc(Eng)Chem PhD *Cape Town* MSAIChE MWISA MIMWA

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

Emeritus Associate Professors
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

Senior Lecturers
K Mudenda, PrEng BEng *Zambia* MSc(Eng) *Cape Town*
J Okedi, BSc(Eng) *Makerere* MSc(Eng) Leuven PhD *Cape Town* AMSAICE MWISA MIWA

Academic Development Senior Lecturers
S Motala, PrLS BSc(Land Surveying) *UKZN* MSc(Eng) *UCT* HDHET *CPUT* PhD (Education) *UWC*
NS Wolmarans, BSc(Eng) MSc(Eng) PhD *Cape Town*

Lecturers
FC Chebet, BSc(Eng) *Makerere* MSc(Eng) *Manchester*
T Harding BTech (Chem Eng) *CPUT* BSc Hons (Environ Eng) *Pretoria* MSc (Eng) PhD *Cape Town*
GV Maswime BSc (Eng) BSocSc Hons (Public Policy) *UZKN* MPA *Pretoria*
T Mofokeng, PrEng BSc (Eng) MSc (Eng) *Cape Town*
L Nolutshungu, MSc(Eng) *Cape Town*

Honorary Professor
S Hess, BSc *Manchester* MPhil *Cambridge* PhD *London*

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 Tchetgnia Ngassam, PhD *Paris-Est*

Principal Technical Officer
TBA

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 Officers
A Rule
TBA

Departmental Manager
AB Dalwai, BSocSc *Cape Town*

Administrative Officer - Postgraduate
R Geswindt

Administrative Officer – Undergraduate
TBA

Research Administrative Staff
G Verster

Finance Assistant
A Courie

PA to HOD
B Adams

Receptionist
Z Mcoteli

Laboratory Technical Staff
L Adams
C Ceasar
H Mafungwa
C May
E Witbooi

Workshop Assistant
M Swayiza

Course Outlines

CIV1005W   INTRODUCTION TO ENGINEERING
24 NQF credits at NQF level 5
Convener: Dr N Wolmarans
Course entry requirements: None
Course outline:
This course aims at forming the platform for the development of personal, academic and professional skills needed for successful study and practice of civil engineering. Skills are developed through hands-on participation in projects set in the context of civil engineering practice. A basic level of computer literacy is established. The course is designed to motivate and engage the student in the civil engineering degree and its practice. Aspects of civil engineering are introduced by means of practical sessions involving problem solving, personal, academic and professional skills, numerical and computational methods, laboratory experiments and project work, group work, fieldwork, the use of measurement techniques, and elementary aspects of planning. The course includes a module which will address the development of academic skills needed for studying in a university environment, and a module to ensure productive use of Information Technology.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV1006S   BUILDING SCIENCE I
16 NQF credits at NQF level 5
Convener: Professor H Beushausen
Course entry requirements: None
Course outline:
The course aims to introduce students to the nature and the properties of construction materials, to provide an understanding on relevant physical, chemical and mechanical properties of common construction materials, and to highlight proper selection and application of materials in practice. The course illustrates problems that might arise through injudicious choice of materials and the reasons behind the selection of materials for particular applications. The course contents include: a general overview on relevant material properties for structural and non-structural construction materials (strength, toughness, elastic deformations, density, time-dependent deformations, durability, etc.); the nature, properties, and application of common construction materials (cement and concrete, timber, metals (iron and steel, aluminium), glass, polymers, bitumen and asphalts, bricks and blocks); corrosion of metals; thermal, acoustic and fire properties of building components.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV1007S   ENGINEERING MECHANICS

16 NQF credits at NQF level 5
Convener: Associate Professor S Skatulla
Course entry requirements: PHY1012F/S (DP), MAM1020F/S (DP)
Co-requisites: None
Course outline:
The course aims to introduce students to concepts of engineering mechanics, which are the foundations of structural engineering, hydraulic engineering and geotechnical engineering. It develops the concept of equilibrium, which is foundational for solving engineering problems in many civil engineering disciplines. It introduces external and internal forces as vectors. External forces include point loads in the same and different directions; uniformly and non-uniformly distributed loads; externally applied moments and pressure. Internal forces include axial, shear, bending and torsional forces. The course is restricted to the reactions of simple statically determinate systems, and simple applications to structures and fluids.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2011F   MECHANICS OF MATERIALS

16 NQF credits at NQF level 6
Convener: Associate Professor S Skatulla
Course entry requirements: CIV1007S (DP)
Course outline:
This course aims to develop an understanding of the concepts of stress and strain; elasticity versus plasticity; effects of known actions on various cross-sections; determination of the magnitude of stresses and strains caused by prescribed actions (axial forces, bending moments, shear forces, twisting moments); fundamentals of the 2-dimensional theory of elasticity and simplifications for bars, beams and shafts.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2020X   PRACTICAL EXPERIENCE

0 NQF credits at NQF level 6; 6 weeks.
Convener: Professor M Vanderschuren
Course outline:
This course requires Civil Engineering students to gain at least 6 weeks of practical experience and insight into the practice of civil engineering by working during vacations. Students are encouraged to engage in a wide variety of civil engineering work, but must ensure that adequate experience in both site work and design office practice (a minimum of three weeks in each) is achieved. This course provides the framework for gaining practical experience to supplement academic study.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2039S   GEOTECHNICAL ENGINEERING I
16 NQF credits at NQF level 6
Convener: Ms F C Chebet
Course entry requirements: CIV2011F (DP), GEO1008F (DP).
Course outline:
This course aims to provide an understanding of the engineering principles –applied in the analysis of soil materials for civil engineering purposes. The main topics include: nature and physical characteristics of soils as engineering materials; soil structure, grain size distribution and common soil classification systems; principle of effective stress, significance of the presence of water in soil and the effects of its movement in the ground on the engineering properties of soil, permeability of soil, seepage and flow nets; distribution of applied stresses, consolidation and settlement, analysis of soil response to loading; soil strength, stress-strain response of soils, and other theories relevant to engineering soil behaviour.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2040S   FLUID MECHANICS
8 NQF credits at NQF level 6
Convener: Ms T Mofokeng
Course entry requirements: None.
Course outline:
This course aims to develop an understanding of fluids and fluid properties; fluid statics; pressure and pressure forces; basics of fluid flow; conservation of mass: conservation of energy; conservation of momentum; and similitude.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2041S   STRUCTURAL ANALYSIS I
16 NQF credits at NQF level 6
Convener: Professor A Zingoni
Course entry requirements: CIV2011F (DP)
Course outline:
This course aims to develop an understanding of various structural systems; conditions of equilibrium and external and internal structural indeterminacies. Topics include analysis of statically determinate structures: determination of actions in trusses, beams and frames; axial force, shearing force and bending moment diagrams; calculation of displacements by the method of successive integration; virtual work method; buckling of struts and geometric instability; thermal stresses. Computer based methods for analyses of statically determinate structures are introduced.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV2042F   CONSTRUCTION MATERIALS
16 NQF credits at NQF level 6
Convener: Professor H Beushausen
Course entry requirements: None.
Co-requisites: None.

Course outline:
This course aims to introduce the science and application of construction materials. Topics include: engineering material properties such as strength, elastic and plastic deformations, viscoelastic and time-dependent behaviour, toughness, fracture, deterioration, durability, sustainability, heat and sound insulation, thermal conductivity; Analytical modelling and prediction of material properties; experimental investigations and interpretation of data; application of statistical principles to experimental analysis; manufacturing processes; selection of materials; elements of steel corrosion science; common construction materials such as concrete, cements, lime, clay, clay bricks, rocks, steel, cast iron, aluminium, timber, bitumen, rubber, sealants, plastics, dry-building materials.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3042F   GEOTECHNICAL ENGINEERING II
16 NQF credits at NQF level 7
Convener: Associate Professor D Kalumba
Course entry requirements: CIV2039S
Course outline:
This course provides the basic concepts and mechanics necessary for geotechnical design. It aims to provide an understanding of the factors influencing soil strength, and to give practice in the application of this understanding by exploring the stability of slopes, retaining walls, and foundations. Geotechnical investigations are also covered.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3043F   HYDRAULIC ENGINEERING
16 NQF credits at NQF level 7
Convener: Professor NP Armitage
Course entry requirements: CIV2040S (DP)
Course outline:
This course aims to develop an understanding of flow in pipelines: laminar and turbulent flow – Reynolds; head losses in pipelines and fittings; the design of pipe systems. Pump selection. Open channel flow: the steady flow equations; Froude; uniform, gradually and rapidly varied flow; hydraulic structures, e.g. flumes, weirs, spillways and control gates.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3044F   ENGINEERING HYDROLOGY
8 NQF credits at NQF level 7
Convener: Dr J Okedi
Course entry requirements: STA1008F/S (DP)
Course outline:
This course aims to develop an understanding of engineering hydrology. Topics include: factors affecting runoff; flow measurements; selected flood prediction methods; flood routing; and reservoir sizing:
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3045S   TRANSPORTATION PLANNING
16 NQF credits at NQF level 7
Convener: Professor M Vanderschuren
Course entry requirements: None.
Co-requisites: None.
Course outline:
This course aims to develop an understanding of the causes and motivations of personal travel, the means by which movement takes place, as well as the impact personal travel, freight and transport infrastructure have on the environment, economy and society. This is done by providing a grounding in techniques for modelling, analysing and assessing (multi-modal) transport systems and their impacts. Transport policy and appraisal and fundamentals of data collection, as well as professional communication (presentation skills) are included.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3046S   WATER TREATMENT
12 NQF credits at NQF level 7
Convener: Dr T Harding
Course entry requirements: CEM1008F
Course outline:
This course aims to develop an understanding of potable water quality criteria. Topics include Water treatment: objectives, processes and systems. Surface water characterization: aqueous equilibria, alkalinity, acidity, pH, buffer capacity and titration curves, log-species pH diagrams of the inorganic carbon system; pH control. Aqueous-gas phase equilibrium, conversion between concentration units, aqueous-solid phase interactions, calcium carbonate saturation, using the Modified Caldwell Lawrence Diagram for 2 and 3 phase equilibrium, changes of state with dosing and water stabilization.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3047S   URBAN WATER SERVICES
16 NQF credits at NQF level 7
Convener: Dr J Okedi
Course entry requirements: APG2026S; CIV3043F (DP) and CIV3044F (DP).
Course outline:
This course aims to develop an understanding of the design and operation of water services in urban areas (formal and informal), including: water supply and distribution; sanitation and urban drainage.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3048F   STRUCTURAL ANALYSIS II

16 NQF credits at NQF level 7
Convener: Professor A Zingoni
Course entry requirements: CIV2041S
Co-requisites: n/a
Course outline:
This course aims to develop an understanding of flexibility versus stiffness methods in structural analysis. Analysis of statically indeterminate structures by the force method and displacement method (trusses, beams and frames); the principles of loading (types of loading, code provisions, safety factors). The course introduces computer based structural analysis of statically indeterminate structures.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV3049S   STRUCTURAL DESIGN I

16 NQF credits at NQF level 7
Convener: Mr K Mudenda
Course entry requirements: CIV3048F
Co-requisites: n/a
Course outline:
This course aims to develop an understanding of behaviour, analysis and limit state design of reinforced and prestressed concrete members and steel structures. Topics include: properties of structural concrete; properties of reinforcing and prestressing steel; properties of structural steel, elastic and plastic behaviour of reinforced concrete structures and steel structures; serviceability limit-state design and ultimate limit-state design of reinforced concrete elements (beams and slabs) and steel structures.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4035C   DESIGN PROJECT

24 NQF credits at NQF level 8; 5 weeks full time duration.
Convener: Ms L Nolutshungu
Course entry requirements: All core Civil Engineering design (CIV) courses, including successful completion of their respective pre-requisites, as well as MAM2083F, MAM2084S, CIV2042F, EGS1005F and CIV4041F.
Course outline:
This course aims to develop the competence of students to perform civil engineering planning and design of a major civil engineering project and to provide a reasonable response to the problem posed in both content and communication. This is a capstone course, which requires integration and application of a wide range of knowledge and skills developed in the programme. A key requirement is that the project posed must be a complex problem, made complex by a combination of conceptual and contextual considerations (i.e. of engineering knowledge, as well as the context in which it is applied).
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4041F   PROFESSIONAL PRACTICE
12 NQF credits at NQF level 8
Convener: Ms F Chebet
Course entry requirements: Students must be potential qualifiers (i.e. anticipated final year of study).
Course outline:
This course aims to prepare student engineers for the world of civil engineering through exposure to key professional issues including: the structure of the profession; engineering economics; project prioritization, the project life cycle; engineering contracts; contract management options; tender and contract documents; project planning; universal access; engineering risk management; contract administration; Health & Safety; professional ethics; and sustainability in engineering.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4042F   WASTEWATER TREATMENT
12 NQF credits at NQF level 8
Convener: Dr D Ikumi
Course entry requirements: CEM1008F
Course outline:
This course aims to develop an advanced understanding of the objectives of wastewater treatment; wastewater test methods for organic, nitrogen and phosphorus content; physical characterization of wastewater, settleable, non-settleable and dissolved constituents; unit operations in wastewater treatment, primary sedimentation; biodegradable and unbiodegradable organics, biological growth and death behaviour; reactor kinetics; biological process kinetic equations; the steady state activated sludge model; oxygen demand, sludge production, nutrient requirements; sewage sludge stability and disposal, and selection of sludge age.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4044F/S   RESEARCH PROJECT
48 NQF credits at NQF level 8
Convener: Professor R Behrens
Course entry requirements: No simultaneous registration of more than one additional course (besides CIV4035C). Students will not be permitted to undertake a research topic in a field for which they have not successfully completed the relevant core courses.
Course outline:
This course is an individual investigation into an assigned problem in civil engineering culminating in a formal written project report and a poster.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4045F   STRUCTURAL DESIGN II
18 NQF credits at NQF level 8
Convener: Professor P Moyo
Course entry requirements: CIV3048F and CIV3049S (DP)
Co-requisites: n/a

Course outline:
This advanced course introduces the full structural design process including conceptualisation, development of alternative schemes, sizing and detailing of structural elements. The course also aims to develop an understanding of the design of prestressed concrete elements and plastic design of steel elements. Topics include: introduction to conceptual design of structures including stability and robustness, design of pre-stressed beams, plastic analysis of steel beams and frames. The course includes a major design project.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CIV4046F   TRANSPORTATION ENGINEERING

18 NQF credits at NQF level 8
Convener: Professor M Zuidgeest
Course entry requirements: None
Course outline:
This course aims to provide students with an understanding of the fundamentals of road engineering and traffic analysis by providing a grounding in techniques for: (1) the geometric design of roads, freeways and intersections, including road drainage; (2) the design of pavements; (3) traffic engineering design (3) (multi-modal) capacity analysis of traffic facilities, including for public transport and Non-Motorized Transportation (NMT); and (4) management and control of traffic flows (both urban roads, rural roads and highways), including road pricing.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following undergraduate degree programmes:

BSc in Construction Studies
BSc in Property Studies

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
MM Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*

Professors
KS Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA
A Windapo, BSc(Building) *IfE* MSc(Construction Management) PhD *Lagos* FNIOB PrCPM

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

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 FCIOB PrCM PrCPM PrValuer
AJ Stevens, MSc(Building) *Cape Town* PhD *UPE*

Senior Lecturers
F Ametefe, BSc (Admin) *Ghana*, M Phil (Finance) *Ghana* PhD (Real Estate and Finance) *Reading*
E Edwardes, BSc BSc(QS) MSc(Project Management) *Pret* PrQS PMAQS
K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS
MW Massyn, BSc(Building) *UPE* FCIOB
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*
L van Schalkwyk, LLB LLM,PhD *Cape Town* Researcher at the SARChI Research Chair: Mineral Law in Africa, *Cape Town*

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*
M Lefoka, BSc (CS), *Cape Town*, BSc (Hons) (CM) *Cape Town*

Academic Development Senior Lecturer
K Ontong BEd (SS) cum laude BEd.Hons (LS) cum laude MEd (Sustainability Education) *cum laude* PhD (Curriculum Studies) *Stellenbosch* SACE

Contract Lecturer
A Ellmann, BAS *Cape Town*

Honorary Research Associate
C Kariuki, BA (Land Economics) MA (Housing Administration) *Nairobi*

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

Course Outlines

CON1004W   CONSTRUCTION TECHNOLOGY I
32 NQF credits at NQF level 5
Convener: Ms E Edwardes/Ms AM Ellmann
Course outline:
This course aims to develop an understanding of the building as a System; the site including site/soil investigation, setting-out of a building etc.; Construction Technology appropriate for assembly of a double-storey house, including: manufacture and performance of materials and components used; construction of such dwelling; and preparation of a report concerning the temporary facilities, plant and equipment used, specialists used, sequence of building and comparison of the requirements of good practice; and the National Building Regulations and the Occupational Health and Safety Act.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1007X   PRACTICAL TRAINING
0 NQF credits at NQF level 5
Convener: Ms K Le Jeune
Course outline:
Practical training takes the form of 120 hours (3 weeks) of approved employment experience in any of the built environment disciplines (construction; engineering; housing; property development and management; quantity surveying; relevant local authority, provincial and national government departments) and 40 hours (1 week) on a community build organised by the Department.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1010S   CONSTRUCTION INFORMATION SYSTEMS
8 NQF credits at NQF level 5
Convener: TBA
Course outline:
This course aims to provide an introduction to computers, networks, data storage, manipulation/analysis and reporting using spreadsheets and relational databases. Solving problems using spreadsheets and databases is also covered.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1019F/S   PROFESSIONAL COMMUNICATION
16 NQF credits at NQF level 5
Convener: Ms G Nudelman
Course outline:
This course aims to equip students with practical skills to enable them to: prepare and write professional texts, including reports; plan and present oral presentations; develop academic arguments and reference correctly.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1021F   PROPERTY AND PLANNING I
16 NQF credits at NQF level 5
Convener: TBA
Course outline:
This course aims to introduce basic property types, urban spatial structure, the reasons cities develop and the history of city development, growth drivers of cities, role that cities play in society, relationship between property development and city building, informality, key issues facing cities in developing countries today, history of modern town planning, and different types of modern town planning.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1022F   BUILDING CONSTRUCTION I
16 NQF credits at NQF level 5
Convener: TBA
Course outline:
This course aims to introduce the built environment and sets the urban scale and environmental influences which house the micro-level buildings, including the role players involved in creating the built environment, an overview of what they do and how this influences and is in turn influenced by technology and socio-economic factors. The course will look at the built environment from the viewpoint of the construction of the micro-level building and will set the scene for an understanding of the need for strategic decision making in the development of buildings on a micro scale. The building as a product will introduce students to the AutoCAD and Revit software and use this 3D aid to look at the component parts of a simple building.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1023S   BUILDING CONSTRUCTION II
16 NQF credits at NQF level 5
Convener: TBA
Course outline:
This course aims to introduce the building as a product. and draws on knowledge from Building Construction I and essentially looks at the built product and the details of building construction from the backdrop of the built environment and its influences. This course also introduces an understanding of building as a process and covers such issues as the organisation, materials, human resources, technology and processes that produce the building (within its contextual environment).
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1024S   PROPERTY ECONOMICS I
16 NQF credits at NQF level 5
Convener: Associate Professor F Viruly
Course outline:
This course aims to introduce the characteristics and functions of property markets, informal property markets, 'township' property markets, land in the history of economic thought, the pricing of land and land resources, relationship between the user; financial and development markets, patterns of urban land use and land values, property markets and the competitiveness of cities, application of macro and micro economic concepts to the property sector, technology and property markets, role of property in the South African economy, researching the property market and Highest and Best use analysis.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON1025S   PROPERTY AND TECHNOLOGY
16 NQF credits at NQF level 5
Convener: TBA
Course outline:
This course introduces intelligent buildings (sustainability and energy use), building information modelling (BIM), smart cities (data and technological solutions for urban management), the sharing economy (shared workspaces, short-term housing rental, transport), property fintech (research and information platforms, sales and leasing platforms, crowdfunding and equity raising platforms, debt and mortgage platforms), blockchain and artificial intelligence, virtual property markets, the digital divide, and technological innovations in Africa.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2006W   CONSTRUCTION TECHNOLOGY II
32 NQF credits at NQF level 6
Convener: TBA
Course entry requirements: CON1004W
Course outline:
This course aims to develop an understanding of construction technology appropriate for assembly of light weight long span structures and multi-storey buildings, including: assembly and performance, reinforced concrete, steel and timber, materials, components, plant and equipment required: such as formwork, concrete, steel including reinforcing, roofing systems (including flat roof waterproofing); cladding systems; windows and doors, ceilings and partitions, access flooring, finishes; services requirements and services spaces; and fire and other regulations.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2013X   PRACTICAL TRAINING
0 NQF credits at NQF level 6
Convener: Ms K Le Jeune
Course entry requirements: CON1007X
Course outline:
This practical training takes the form of 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, and provincial and national government departments).
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2020S   CONSTRUCTION MANAGEMENT I
16 NQF credits at NQF level 6
Convener: Professor A Windapo/Ms A Mtya
Course entry requirements: BUS1036F/S and CON1004W
Course outline:
This course aims to develop an understanding of the principles of management and includes: the main schools of management and their history and developments; scientific management; human relations school; systems thinking; contingency theory and operations research/theory. The construction enterprise and its environment: customer profile; patterns of demand; types of service or product provided; common organisational structures; the construction firm as a complex system. The construction project and its environment; construction management processes and practices applicable to small projects. Project processes to include: the project delivery process; the production process and the traditional procurement process. Construction management practice to include site layout and management, plant management, materials management, health and safety regulation, waste management, financial management and risk management.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2022W   MEASUREMENT & DESIGN APPRAISAL I
16 NQF credits at NQF level 6
Convener: Ms E Edwardes
Course entry requirements: CON1004W, MEC1002W
Course outline:
This course aims to develop and understanding of the principles of measurement and the documentation thereof; and a detailed analysis of the clauses contained in the Standard System of Measuring Building Work. The practical component of the course entails the measurement, abstraction and billing of the following elements: foundations, superstructure brickwork, roofs; eaves and rainwater goods, internal and external finishes, ceilings, floors; and doors, windows and opening adjustments.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2032S   PROPERTY INVESTMENT AND FINANCE I
16 NQF credits at NQF level 6
Convener: Mr S Nurick
Course outline:
This course aims to develop an understanding of determinants of interest rates; Reserve Bank and inflation targeting; term structure of interest rates (segmentation theory, expectations theory, liquidity preference theory); simple/compound interest; annuities; discounting; sinking funds; amortisations; initial return, minimum accepted rate of return (MARR), payback period; net present value (NPV); internal rate of return (IRR); the mortgage loan process; private sources of property finance, and government sources of property finance.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2033F   REAL PROPERTY LAW I
16 NQF credits at NQF level 6
Convener: Dr L van Schalkwyk
Course outline:
This course aims to develop an understanding of the Classification of property; accession; real rights; land rights and the Deeds Registry; Ownership (definition and nature, legal effects, limitations (common law and statutory), derivative acquisition (from sale, inheritance, donation), original acquisition (prescription, expropriation)); co-ownership and subdivision; servitudes; land tenure and indigenous law, traditional courts; sectional title; homeowners associations, gated villages, share block schemes; introduction to lease; and the principles of real security.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2034S   PROFESSIONALISM IN THE BUILT ENVIRONMENT
12 NQF credits at NQF level 6
Convener: Dr K Ontong
Course outline:
This course aims to develop an understanding of being a professional; ethics; ethos of Property Studies at UCT; academic writing/ plagiarism; professional communication; professional practice in the Built Environment, including the responsibilities of the Built Environment Professionals and the

professional bodies and their codes of conduct; ethical concerns in the workplace and society (corruption, racism, sexism, sexuality, environmental management and sustainable development, social inequality, poverty, unemployment); and case studies.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2035S   PROPERTY AND PLANNING II
16 NQF credits at NQF level 6
Convener: TBA
Course outline:
This course aims to develop an understanding of the role of land economics in understanding and intervening in the key issues facing cities (including housing, informality, inner-city decay, gentrification, urban sprawl; transport, environment, education); an overview and critique of key town planning concepts and instruments (including: Spatial Development Frameworks, Densification, Transit-Orientated Development, Land-Use Management); overview of key legislation and policies; overview of key processes (including Land-Use Management, Environmental Impact Assessments; and Heritage Impact Assessments.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON2036F   PROPERTY VALUATION I
16 NQF credits at NQF level 6
Convener: TBA
Course outline:
This course aims to develop an understanding of basic concepts in valuation theory; evolution of value theory, value and valuation in African customary/indigenous /pre-capitalist societies; determinants of property value, the valuation process; market research and analysis (sources of information, online platforms, data problems in Africa); overview of valuation approaches and methods; the market approach to valuation (sales comparison method applied to residential property, hedonic models, artificial neural networks, fuzzy logic); valuation report writing (including digital interactive reports), technology in property valuation (including automated valuation models, artificial intelligence, virtual reality); Legislative framework; International Valuation Standards

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3012W   CONSTRUCTION TECHNOLOGY III
32 NQF credits at NQF level 7
Convener: Mr M Lefoka
Course entry requirements: CON2006W
Course outline:
This course aims to develop the understanding of Construction Technology and services appropriate to the assembly of light weight long span structures and multi-storey buildings, including: plumbing and drainage of water supply (hot and cold); drainage; waste disposal; electrical installation; air-conditioning systems; communication systems; lifts, hoists and escalators. Basements, soil stabilization, rock-anchoring and retaining structures. Piling and special foundations. Civil engineering construction. Sustainable technology. Theory of structures.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3023X   PRACTICAL TRAINING
0 NQF credits at NQF level 7
Convener: Ms K Le Jeune
Course outline:
This practical training takes the form of 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: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3030S   CONSTRUCTION COSTING
16 NQF credits at NQF level 7
Convener: Professor K Cattell
Course entry requirements: CON1010F or CON1015F, CON1004W or CON1018W, CON2022W or CON2029S
Co-requisites: CON3043W
Course outline:
This course aims to develop an understanding of construction costing and includes: computation of labour costs; synthesis of labour; material and plant costs for Bills of Quantities item rates; pricing approximate quantities of elemental estimates; pricing subcontracts; and pricing preliminaries.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3031W   MEASUREMENT & DESIGN APPRAISAL II
32 NQF credits at NQF level 7
Convener: Ms E Edwardes
Course entry requirements: CON2006W and CON2022W
Co-requisites: CON3012W, CON3030S and CON3043W
Course outline:
This course aims to develop the understanding of measurement and design appraisal. The theoretical aspects of the course are covered in lectures and includes detailed studies on: principles of measurement and documentation used in measurement and descriptive clauses in the Standard System of Measuring Building Work (6th ed.) The practical component of the syllabus is a progression from Measurement and Design Appraisal 1. The principles of measurement are applied to advanced projects with particular emphasis on simple framed and load-bearing multi-storey buildings by means of elemental quantification, covering: foundations; reinforced concrete structures; plumbing and drainage; architectural metalwork; structural steelwork; Specialist work; and external works. The practicals require complete computerised documentation with competence in the WinQS and/or QSPlus software package(s). Students measure all elements of a small commercial structure.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3032W   APPLIED CONTRACT LAW I
12 NQF credits at NQF level 7
Convener: TBA
Course entry requirements: CML1001F or CML1004S or CML1001P
Course outline:
This course aims to develop an understanding of the JBCC Principle Building Agreement; the Arbitration Act and includes case studies.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3033F   PROPERTY STUDIES I
16 NQF credits at NQF level 7
Convener: TBA
Course entry requirements: MAM1010F/S
Course outline:
This course aims to develop an understanding of Investment. Topics include: characteristics of property as an investment; financial mathematics for cost engineering and property development decisions and evaluation techniques for property development and investment decision.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3038W   CONSTRUCTION MANAGEMENT II
32 NQF credits at NQF level 7
Convener: Ms A Mtya
Course entry requirements: CON2020S or CON3039S
Course outline:
This course aims to develop an understanding of production management theory and practice by considering: typical business and project objectives; the need to achieve high productivity; the impact of method and layout on production; planning for production. Techniques such as: Gantt charts; critical path networks, precedence diagrams; computer applications; short term planning systems; progress recording; and work study. Construction procurement systems. Management accounting in construction. Industry structures and development. Health, and safety issues surrounding production management.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3043W   COST ENGINEERING UNDER UNCERTAINTY
16 NQF credits at NQF level 7
Convener: Professor K Cattell
Course entry requirements: CON2006W and CON2022W
Course outline:
This course aims to develop an understanding of cost engineering under uncertainty. Topics include: consideration of client/developer motivation and needs; the client briefing process; the theory of construction cost planning and cost control; design economics, elemental cost analyses of buildings;

and cost studies/cost comparisons. Consideration of cost and price indices. Techniques for cost planning and cost control, and the preparation of approximate estimates. Communication applied to the cost planning and control environment. Consideration of current research being conducted on the practice of cost planning and cost control in South Africa.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3046S   PROPERTY AND FACILITIES MANAGEMENT

16 NQF credits at NQF level 7

Convener: Associate Professor K Michell

Course outline:

This course aims to develop an understanding of the fundamentals of property/facilities management and the role of property/facilities managers; management and administration of the property portfolio; understanding leases; the leasing process, types of leases, lease management; landlord-manager-tenant relationships; maintenance and facilities management co-ordination (operational FM); budgetary and financial controls (cost control and reporting); technology and property management; and adapting to changing property markets.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3047F   PROPERTY INVESTMENT & FINANCE II

16 NQF credits at NQF level 7

Convener: Mr S Nurick

Course outline:

This course aims to develop an understanding of: Cost of capital (cost of equity, cost of debit); equity capital; financial leverage; mortgages (types, borrowers' decision-making, lenders' decision making); investment decision-making; taxation; construction and development financing; and creative property financing (presales, joint ventures, leasebacks etc).

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3048F   PROPERTY DEVELOPMENT I

16 NQF credits at NQF level 7

Convener: Associate Professor K Michell

Course outline:

This course aims to develop an understanding of: the consideration of client/developer motivation and needs; the client briefing process; the theory of construction cost planning and cost control as it relates to the client/developer; design economics; reliability of cost data; and communication during the design phase of a development.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3050F   PROPERTY AND CONTRACT LAW
16 NQF credits at NQF level 7
Convener: Dr L van Schalkwyk
Course outline:
This course aims to develop an understanding of:
  i.   Lease: Common law of lease; relevant statutory law; what a lease must cover; what a lease can cover; common ancillary terms in leases (deposits, escalations, warranties, indemnities, conditional clauses, options to renew, rights of pre-emption, obligations to maintain premises, allocation of risk, termination); the shape of a good lease; and how the drafting of a lease impacts the relationship of the parties to it.
  ii.   Construction Agreement: division of responsibilities; management of risk, locating delictual liability, management of permitted time, processes of completion; quality control and defect correction, system for payment; managed termination; dispute resolution; understanding agency and the relationship between the employer, the chief agent and the contractor

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3051F   PROPERTY VALUATION II
16 NQF credits at NQF level 7
Convener: Associate Professor M Mooya
Course outline:
This course aims to develop an understanding of: Income approach to valuation (direct capitalisation, discounted cashflow method, accounts method, valuation of leaseholds); cost approach to valuation (depreciated replacement cost method); residual method of valuation; valuation of shopping centres, valuation of commercial property (including offices, shops, mixed-use), valuation of industrial property (warehouses and light industrial), valuation of customary/indigenous property; and South African valuation case-law
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3052S   PROPERTY ECONOMICS II
16 NQF credits at NQF level 7
Convener: Dr F Ametefe
Course outline:
This course aims to develop an understanding of: macro-economic analysis of property markets; micro-economic analysis of property markets; technology and property markets (blockchain, artificial intelligence, virtual property markets, shared workspaces, short-term housing rental, autonomous vehicles, research and information platforms, sales and leasing platforms, crowdfunding and equity raising platforms debt and mortgage platforms); positive and negative externalities in property markets; property markets and the environment; location theory and gravity models; property market cycles; modelling and forecasting of property markets; the impact of the public sector (fiscal and monetary policy) on property markets; institutional economics/analysis and property markets; and the role of property as a catalyst for economic growth.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3053S   PROPERTY AND ENVIRONMENT
16 NQF credits at NQF level 7
Convener: Mr S Nurick
Course outline:
This course aims to develop and understanding of: main environmental issues in property (energy, water solid waste, biodiversity, pollution); policy and regulatory framework for environmental management; green rating tools for buildings; Environmental Impact Assessment for property projects; accounting for externalities and social cost of property projects.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3054S   PROPERTY DEVELOPMENT II
16 NQF credits at NQF level 7
Convener: TBA
Course outline:
This course aims to develop an understanding of: the role of property development in property markets, the property development process; theories of property development; the players in the property development process; feasibility and viability studies; property development and the environment; computer-based modelling of property development; researching markets for property developments; the development of residential units; the development of commercial units; marketing of property developments; and financing property developments
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

CON3055S   PROPERTY AND PLANNING III
16 NQF credits at NQF level 7
Convener: TBA
Course outline:
This course aims to develop an understanding of: public intervention in city building; an introduction to Pareto Optimality; an overview of the causes and outcomes of market failure (including market inefficiencies, public goods, externalities, principle/agent dilemma, capital accumulation); Socio-economic impact assessments; city governance; an introduction to public finance and the budgeting process; the theory and instruments of land-based finance and value-capture; incentives and other interventions (including Urban Development Zones, Special Economic Areas, Overlay Zones).
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

ELECTRICAL ENGINEERING

The Department offers the following undergraduate degree programmes:

Bachelor of Science in Engineering in:
Electrical Engineering
Electrical and Computer Engineering
Mechatronics

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
Telephone no.: 021 650 2811

Staff

Associate Professor and Head of Department
F Nicolls, MSc(Eng) PhD *Cape Town*

Professors
P Barendse, MSc(Eng) PhD *Cape Town* MIEEE
ES Boje, PrEng BSc(Eng) *Wits* MSc(Eng) PhD *Natal* FSAAE SMSAIMC MIEEE
KA Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ, SMSAIEE SMIEEE
MA Khan, MSc(Eng) PhD *Cape Town* SMIEEE
AK Mishra, BE *REC India* PhD *Edinburgh* SMIEEE

Emeritus Professors
A Baghai-Wadji, MSc(Eng) PhD DSc *Vienna* FEMA SMIEEE
M Braae, MSc(Eng) *Cape Town* PhD *UMIST* LMIEEE
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* FSAIEE
MR Inggs, 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 Professors
P Martinez, BScHons(Mat Eng) MSc PhD *Cape Town* IAA, IISL, FRAS, MSAIP
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 Patel, MSc(Eng) PhD *Cape Town* MIEEE
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
D O'Hagan, BEng (Hons) MSc *Ulster* PhD *UCL*

Adjunct Associate Professor
AA Lysko, MSc *Russia* PhD *Norway* FSAIEE SMIEEE

Senior Lecturers
KO Awodele, Reg Eng (COREN), BSc(Eng) *Ife* MSc(Eng) *Abu* PGDM MNSE MIEEE
MY Abdul Gaffar, PrEng BSc(Eng) MSc(Eng) *Natal* PhD *Cape Town*
JB Mwangama, MSc(Eng) PhD *Cape Town* MIEEE
DTO Oyedokun, BSc (Eng) MSc(Eng) PhD *Cape Town* SMIEEE SAIEE
D Ramotsoela BEng MEng PhD *Pretoria* MIEEE
RA Verrinder, MSc(Eng) *Cape Town* MIEEE
S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town* MIEEE

Academic Development Senior Lecturer
R Smit, BSc, HDE MSc(ScEd) *Witwatersrand* PhD *Cape Town*

Lecturers
P Amayo, BSc(Eng) MSc(Eng) *Cape Town* DPhil *Oxford* MIEEE
S Jayalath, BEng(Hons) *Sheffield* MSc(Eng) *Cape Town*
S Paine*, BSc(Eng), MSc(Eng), PhD *Cape Town*
WPF Schonken BEng MSc(Eng) PhD *Stellenbosch* SMIEEE
J Son, BSc(Eng) *Cape Town*
J Wyngaard, BSc(Eng) PhD *Cape Town*

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

Senior Research Officer
MFC Moorlach, MSc(Eng), *Eindhoven NL*

Research Officer
R Larmour, BSc(Eng) MSc(Eng), *Cape Town*

Principal Technical Officer
J Pead, BSc(Eng) MSc(Eng) *Cape Town*

Chief Technical Officers
D De Maar, BEd(Hons) *Cape Town*
M Soltanian, BSc(Eng) MSc(Eng) *Iran*

Senior Technical Officer
P Bizimana
B Daniels

Technical Officer
TBD

Departmental Manager
J Buxey

Finance Officer
C Koonin

Administrative Officer (Undergraduate)
V Langenhoven

Administrative Assistant (Postgraduate)
N Moodley

Administrative Assistants
R Harris (General)
S Sabodien (AMES Research Group)

Receptionist
TBC

The activities of the Department cover a wide field both at undergraduate and postgraduate level. The Department regards laboratory work as critically important and a range of dedicated laboratories exist. These are in the fields of: Control; Process Control and Instrumentation; Robotics; Data Communications; Telecommunications; Digital Systems and Computers; Digital and Analogue Electronics; Electrical Machines, Drives and Power Electronics; Power System Engineering; Image and Signal Processing; Microwave Engineering; Radar Systems.

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

Course Outlines

EEE1000X   PRACTICAL TRAINING
0 NQF credits at NQF level 5
Convener: Mr D de Maar
Course outline:
This opportunity for practical experience culminates in a certificate showing evidence of completion of suitable work in the basic workshop processes to the satisfaction of the Head of Department, during a period of at least six weeks in an approved workshop, either before registration or during the long vacation following the year of first registration in the faculty (due by 31 March of the following year). Alternatively, students may produce a certificate showing evidence of completion of an approved structured intensive practical training course of at least 3 weeks duration.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE1006F   INTRODUCTION TO ELECTRONIC ENGINEERING
12 NQF credits at NQF level 5
Convener: Dr P Amayo
Course outline:
This course aims to motivate and help students understand the nature and scope of electronic engineering by providing an introduction to the content, methods and modes of thinking. A further aim is to develop students' confidence in rational problem-solving approaches and to introduce students to the design process. Topics include: Current, Voltage and Power, Resistors, Kirchhoff's

Laws, Resistors used for Sensing, Capacitors, Capacitors as Sensors, Diodes, The Bipolar Junction Transistor (BJT) and BJT circuits, Digital Integrated Circuits and the NE555.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE1007S   INTRODUCTION TO ELECTRICAL ENGINEERING

12 NQF credits at NQF level 5
Convener: Associate Professor S Chowdhury
Course outline:
This course aims to motivate and help students understand the basic concepts of power generation, transmission, distribution, nuclear energy and renewable energy, power utilization in common electric appliances and basic principles of electric circuits and networks. A further aim is to develop students' confidence in rational problem-solving approaches, in performing laboratory exercises and to introduce students to the design process. Topics include power generation, transmission, distribution and utilization, DC networks, inductance and capacitance, circuit transients, fundamentals of AC and single-phase AC circuits.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2041F   INTRODUCTION TO ELECTRICAL ENGINEERING & POWER UTILISATION

For students in the Mechanical Engineering and Mechanical & Mechatronic Engineering programmes.
16 NQF credits at NQF level 6
Convener: Mr S Jayalath
Course entry requirements: PHY1013F/S, MAM1021S
Course outline:
The course aims to help students understand: (a) DC networks including DC circuits, series and parallel connection, Kirchhoff's laws, Mesh Analysis, DC network theorems , DC transients in R-L and R-C circuits; (b) Fundamentals of AC including generation, concepts of waveform, period, frequency, angular velocity, phase etc., average, peak and RMS values; (c) Single-phase AC circuit including AC through resistance (R), inductance (L) and capacitance (C), concept of reactance and impedance, phasors, single-phase AC series and parallel circuits, concept of active power, reactive power, apparent power and power factor; (d) Three-phase AC systems; (e) Magnetic circuits including definition of magnetic circuits, simple and composite magnetic circuits, magnetic circuit calculations, magnetic hysteresis, core loss, sinusoidal excitation of magnetic circuits and induced voltage (f) Single-phase transformers including core construction, principle of operation, e.m.f. equation and transformation ratio, no-load and on-load operation, phasor diagram under no-load and full-load operation with lagging and leading loads, exact and approximate equivalent circuits, open and short circuit tests, losses and efficiency, voltage regulation. (g) DC motors.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2042S   INTRODUCTION TO ANALOGUE AND DIGITAL ELECTRONICS

For students in the Mechanical Engineering and Mechanical & Mechatronic programmes.
8 NQF credits at NQF level 6
Convener: Dr S Paine
Course entry requirements: MAM1021F/S, PHY1013F/S, DP for EEE2041F.
Course outline:
The course aims to help students understand the following concepts: (a) Introduction to Semiconductor Physics and Diode basics. (b) Diode circuit model, applications and LEDs (c) Introduction to BJTs and basic models (d) BJT amplifier circuit (only focus on common-emitter) (e) Introduction to Op Amps, op-amp ideal and practical models (f) Opamp inverting and non-inverting applications (g) Introduction to FETs, FET analogue applications (h) Simple H-bridge circuits (i) Difference between analogue and digital applications, intro into digital electronics (j) Digital electronic continued (Boolean algebra, logic gates) (k) FET digital applications, introduction to Flip Flops (l) Basics of state machines and electronic instruments.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2044S   INTRODUCTION TO POWER ENGINEERING

16 NQF credits at NQF level 6
Convener: Professor P Barendse
Course entry requirements: (MAM1020F/S or MAM1023F/S) and, (PHY1013F/S or PHY1015F/S) and EEE1007S
Course outline:
This course aims to help students understand the basic concepts of (a) three-phase AC power generation, voltage, current and power calculations, concepts of balanced and unbalanced systems, measurement of active power by two-wattmeter method, (b) definitions and principles of simple and composite magnetic circuits, magnetic hysteresis, (c) basic principles of operation of electric machines, transformer material; (d) basic principles of operation, construction, operating characteristics, modelling and performance analysis of DC generators, DC motors and stepper motors, (e) single phase transformers. The course will prepare students to apply engineering and scientific knowledge in carrying out analysis, problem solving and design projects.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2045F   ANALOGUE ELECTRONICS

16 NQF credits at NQF level 6
Convener: Dr J Mwangama
Course entry requirements: EEE1006F
Course outline:
This course aims to give students a sound background in analogue electronics design which will help them to understand, analyse and design circuits involving analogue electronic components and parts. Topics include: Diodes: Basic Diode Concepts. Load-Line Analysis of Diode Circuits. Zener-Diode Voltage-Regulator Circuits. Ideal-Diode Model. Piecewise-Linear Diode Models. Rectifier Circuits. Wave-Shaping Circuits. Linear Small-Signal Equivalent Circuits Bipolar Junction Transistors: Current and Voltage Relationships (Ebers-Moll model). Common-Emitter Characteristics. Load-Line Analysis of a Common-Emitter Amplifier. pnp-Bipolar Junction Transistors. Large-Signal DC Circuit Models. Large-Signal DC Analysis of BJT Circuits. Small-Signal Equivalent Circuits. Common-Emitter Amplifiers. Emitter Followers Field-Effect Transistors: NMOS and PMOS Transistors. Load Line Analysis of a Simple NMOS Amplifier. Bias

Circuits. Small-Signal Equivalent Circuits. Common-Source Amplifiers. Source Followers. CMOS Logic Gates Amplifiers: Specifications and External Characteristics Basic Amplifier Concepts. Cascaded Amplifiers. Power Supplies and Efficiency. Operational Amplifiers: Ideal Operational Amplifiers. Inverting Amplifiers. Non-inverting Amplifiers. Design of Simple Amplifiers. Op-Amp Imperfections in the Linear Range of Operation. Nonlinear Limitations. DC Imperfections. Differential and Instrumentation Amplifiers. Integrators and Differentiators. Frequency Response & Active Filters RLC Circuits and their steady state analysis. Frequency response of single pole RLC circuits. Ideal filter frequency characteristics. Butterworth filter design. Filter design using OpAmps.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2046F   EMBEDDED SYSTEMS I
16 NQF credits at NQF level 6
Convener: RA Verrinder
Course entry requirements: (EEE1006F and CSC1015F) or (EEE2042S and CSC1019F)
Course outline:
This course aims to give students a strong foundation in embedded systems by introducing them to digital system fundamentals, including: information representation, Boolean algebra, logic gate behaviour, combinational and sequential digital circuits, digital building blocks and algorithmic state machines; C programming with a focus on microcontroller applications; basic microcontroller usage, including an introduction to computer architecture, general purpose input/outputs, analogue to digital convertors and basic timers.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2046S   EMBEDDED SYSTEMS I
16 NQF credits at NQF level 6
Convener: Dr MY Abdul Gaffar
Course entry requirements: (EEE1006F and CSC1015F) or (EEE2042S, CSC1019F)
Course outline:
This course aims to give students a strong foundation in embedded systems by introducing them to digital system fundamentals, including: information representation, Boolean algebra, logic gate behaviour, combinational and sequential digital circuits, digital building blocks and algorithmic state machines; C programming with a focus on microcontroller applications; basic microcontroller usage, including an introduction to computer architecture, general purpose input/outputs, analogue to digital convertors, interrupts and basic timers.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2047S   SIGNALS AND SYSTEMS I
16 NQF credits at NQF level 6
Convener: Associate Professor F Nicolls
Course entry requirements: MAM1021F/S or MAM1024S/F
Course outline:
This course provides students with the basic tools required for understanding linear systems, and the effect that such systems have on deterministic signals. Upon completion, students will be able to characterise and manipulate linear time-invariant systems in terms of input-output relationships,

using both time and frequency domain methods. The course includes concepts related to signal representation, linear convolution, Fourier analysis, sampling of continuous-time signals, and Laplace transforms.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course

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EEE2048F   PROFESSIONAL COMMUNICATION FOR ELECTRICAL ENGINEERING

8 NQF credits at NQF level 6
Convener: Dr G Nudelman
Course entry requirements: None
Course outline:

This course aims to develop an understanding of effective written communication for engineers. Students learn the requirements for written reports and correspondence in terms of planning, organisation and selection of information. There is a particular focus on professional style and tone. In addition, the students consider their identities as engineering professionals, including the development of CVs and management of social media. Finally, there is a focus on academic writing, including referencing and style.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2049W   INTRODUCTION TO ELECTRICAL AND ELECTRONIC ENGINEERING: SCIENCE STUDENTS

24 NQF credits at NQF level 6
Convener: Mr S Jayalath
Course entry requirements: PHY1013F/S, MAM1021F/S
Course outline:

The course aims to help students understand: (a) DC networks including DC circuits, series and parallel connection, Kirchhoff's laws, Mesh Analysis, DC network theorems, DC transients in R-L and R-C circuits; (b) Fundamentals of AC including generation, concepts of waveform, period, frequency, angular velocity, phase etc., average, peak and RMS values; (c) Single-phase AC circuit including AC through resistance (R), inductance (L) and capacitance (C), concept of reactance and impedance, phasors, single-phase AC series and parallel circuits, concept of active power, reactive power, apparent power and power factor; (d) Three-phase AC systems; (e) Magnetic circuits including definition of magnetic circuits, simple and composite magnetic circuits, magnetic circuit calculations, magnetic hysteresis, core loss, sinusoidal excitation of magnetic circuits and induced voltage; (f) Single-phase transformers including core construction, principle of operation, e.m.f. equation and transformation ratio, no-load and on-load operation, phasor diagram under no-load and full-load operation with lagging and leading loads, exact and approximate equivalent circuits, open and short circuit tests, losses and efficiency, voltage regulation. (g) DC motors.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2050F   EMBEDDED SYSTEMS I FOR SCIENCE STUDENTS
18 NQF credits at NQF level 6
Convener: RA Verrinder
Course entry requirements: EEE2049W and CSC1015F
Course outline:
This course aims to give Science students majoring in Computer Engineering a strong foundation in embedded systems by introducing them to digital system fundamentals, including: information representation, Boolean algebra, logic gate behaviour, combinational and sequential digital circuits, digital building blocks and algorithmic state machines; C programming with a focus on microcontroller applications; basic microcontroller usage, including an introduction to computer architecture, general purpose input/outputs, analogue to digital convertors and basic timers.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE2051L   PRACTICAL ELECTRONICS: COMPONENTS, MODULES AND DESIGN
Not offered in 2022
8 NQF credits at NQF level 6
Convener: Mr J Pead
Course entry requirements: EEE2045F
Course outline:
This elective course aims to augment theory with supplementary practical materials and technologies. Fundamental material is re-presented in a practical way, to reinforce the foundation in electronic components like passive devices, diodes, BJT and MOSFET transistors, operational amplifiers, CMOS discrete combinational and sequential logic, and microcontrollers. The course also aims to enable students to do fundamental design work, be familiar with how to read and interpret data sheets and how to think laterally, in order to come up with solutions to a design problem.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3000X   PRACTICAL TRAINING
0 NQF credits at NQF level 7
Convener: Mr D de Maar
Course outline:
This second opportunity for the student engineer to consolidate through practical experience, culminates in a technical report and certificate showing to the satisfaction of the head of department, evidence of completion of suitable work for a minimum period of six weeks in engineering employment at the end of the third year. The report and certificate is to be submitted by the end of the fourth week of the term immediately following the period of employment. Students who submit evidence of having obtained suitable practical experience prior to their registration may be exempted from EEE3000X. The employer must certify that the student completed the work.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3088F   ELECTRICAL ENGINEERING DESIGN PRINCIPLES
8 NQF credits at NQF level 7
Convener: Dr J Wyngaard
Course entry requirements: EEE2045F and EEE2047S
Course outline:
This course aims to equip students with the skills required to undertake efficient procedural engineering design. Various design methodologies and strategies, stages of design, and practical tools for design management, development, and evaluation are introduced via theory and use-case lectures. The use of simulation, modeling, measurement error analysis, tests, and optimisation processes are introduced as key tools for engineering design. The course assignments are structured around both skill-specific exercises and a design project of relevance to all EE streams. The project requires students to use the methodologies and tools presented to: (i) develop a standard adherent specification, (ii) develop simulation based subsystems, (iii) integrate these subsystems into a complete solution, and (iv) evaluate, qualify, and document the final implement solution.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3089F   ELECTROMAGNETIC ENGINEERING
16 NQF credits at NQF level 7
Convener: Dr W F Schonken
Course entry requirements: PHY2010S, MAM2083F/S
Course outline:
This course aims to introduce the electrical engineering student to the mechanism of electromagnetic radiation by antennas and the nature of fields produced by antennas. The propagation of plane waves in space and in lossy media is studied and applications are presented. One-dimensional models for TEM transmission lines are constructed. These models are often used as basic elements in design of antennas and other components. Simplification to very short lines such as power lines are discussed. A selection of conventional and modern waveguide structures are considered. Finally, an overview of computational methods for the solution of realistic electromagnetic problems are presented.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3090F   ELECTRONIC DEVICES & CIRCUITS
16 NQF credits at NQF level 7
Convener: Dr MY Abdul Gaffar
Course entry requirements: EEE2045F and EEE2047S
Course outline:
This course aims to do the recap of fundamental concepts – resistors, capacitors, inductors, diodes, bipolar transistors, op-amps, filters Active Filters – Second order and higher order filters, standard filter responses, design of low-pass, high-pass and band-pass filters, transfer function of Sallen and Key.Op-amps – Building blocks of internal circuitry, parameters and non-ideal effects, impact of DC non-ideal effects and compensation, effect of negative feedback on input impedance, output impedance and bandwidth of op-amps, identifying circuit parameters for various applications. Practical circuits – Difference and instrumentation amplifiers, practical integrators, practical differentiators. Voltage Regulation - line & load regulation. Linear Voltage Regulators – series regulators, standard circuits, overcurrent protection, overvoltage protection, selection of pass transistor elements, standard integrated circuits. Oscillators - Barkhausen criteria, Phase-shift oscillators, Wein-bridge oscillators, Relaxation oscillators, Hartley, Colpitts & Pierce oscillators. Current Sources - BJT and FET based, Basic two-transistor, Three-transistor, Cascode, Wilson and

Widlar configurations. Differential Amplifiers - Basic BJT differential pair, DC analysis, AC analysis, Common Mode Rejection Ratio, FET implementations. Linear Power Amplifiers - Class, A, B, AB, efficiency, power output constraints, heatsink design. Switched Mode Power Supplies - buck, boost, inverting, switched capacitor, gate driver circuits. Noise – Amplifier noise, noise measurements and noise sources. SPICE based simulations.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3091F   ENERGY CONVERSION

16 NQF credits at NQF level 7
Convener: Professor MA Khan
Course entry requirements: EEE2044S
Course outline:
This course aims to introduce students to the fundamentals of AC Electrical Machines and Power Electronics. Several machine types are studied, which include: induction, synchronous and other modern AC machines. The features, characteristics and performance of each machine type are studied. Uncontrolled and controlled rectifier circuits are introduced and analysed in detail. DC-DC converters are also be introduced. Topical industrial applications of AC machines and Power Electronics are also discussed.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3092F   SIGNALS & SYSTEMS II

16 NQF credits at NQF level 7
Convener: Associate Professor AJ Wilkinson
Course entry requirements: EEE2047S, MAM2083F/S
Course outline:
This course aims to develop the understanding of: Random signals and processes in continuous /discrete time, probability distribution/density functions, random signals calculus (mean, variance, moment generation function), transforms of random signals, Bayesian Theorem, covariance and correlation, Central Limit theorem, Gaussian processes, random signals spectrum and bandwidth, power spectral density (PSD), Wiener-Khinchine Theorem, entropy function, estimation/filtering of random signals. Additionally this course aims to develop the understanding of: Time and frequency domain signal processing for electronic systems (carrier-wave radio and instrumentation), continuous-time Fourier theory, sampled signals and use of the discrete Fourier transform, propagation of signals and noise through linear systems, complex analytic signal representation, power calculations using PSD functions, pulse detection using correlation and the matched filter, analog carrier-wave modulation/demodulation, amplitude modulation (double sideband and single sideband; suppressed carrier and large carrier), heterodyning, angle modulation (frequency and phase modulation), signal-to-noise ratio calculations.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3093S   COMMUNICATION AND NETWORK ENGINEERING
16 NQF credits at NQF level 7
Convener: Associate Professor O Falowo
Course entry requirements: EEE2046F
Course outline:
This course aims to develop the understanding of Computer Networks and the Internet: Internet, network edge, network core, network performance metrics, protocol layers and service models, LAN topology, Physical media, OSI reference model and TCP/IP reference model, network standardization, computer network attacks and prevention, history of computer networking and the Internet. Application and Transport Layers: Principle of network applications, socket programming, transport layer services, multiplexing/demultiplexing, connectionless transport, connection-oriented transport (TCP), TCP congestion control and performance issues. Network Layer: Network layer design issues, forwarding and routing, virtual circuit and datagram networks, router architecture, Internet protocol, routing algorithms, routing in the Internet, integrated and differentiated services. Data Link Layer: Data link design issues, error detection and correction, multiple access links and protocols, switched local area networks, IEEE 802 family, link virtualization, MPLS, data centre networking. Physical Layer: Baseband systems, formatting textual data, formatting analogue information, sources of corruption, pulse code modulation, quantization, baseband modulation and demodulation/detection, inter-symbol interference, equalization, bandpass modulation and demodulation/detection amplitude. Emerging Communication Networks: Fundamentals of mobile networks, fundamentals of smart grid communication networks.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3094S   CONTROL SYSTEMS ENGINEERING
16 NQF credits at NQF level 7
Convener: Professor E Boje
Course entry requirements: EEE2045F and EEE2047S and MAM2084F/S
Course outline:
This course aims to develop the understanding of open and closed loop configurations, block diagrams, dynamic system modelling, transient response, steady state error criterion. System stability: Routh Hurwitz criterion, Root Locus. Frequency responses. Nyquist plots, Bode diagrams, Nichols Charts. Compensation: Lead-lag circuits, minor loops, feedforward and three-term controllers. Sensitivity functions, minimum prototype response controllers, bilinear transformation, frequency response methods. State variables, state space models and design methods. Robustness, observability controllability, stability and performance.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3095S   EMBEDDED SYSTEMS II FOR SCIENCE STUDENTS
18 NQF credits at NQF level 7
Convener: Dr S Winberg
Course entry requirements: EEE2050F
Course outline:
This course focuses on embedded systems architectures, firmware and software tool stacks. This course builds on the Embedded Systems I course. Consideration for Internet of Things (IoT) is included in the form of design scenarios and project-based learning. The course is split into two parts. Part 1 (10 credits) covers: theory and practices of design and analysis through modeling and simulation of embedded systems; embedded operating systems, and methods for modelling and

simulation of computer systems are studied. An introduction to Linux command line and source code version control are also taught. Part 2 (6 credits) introduces Hardware Description Language (HDL) programming and computer architecture fundamentals; and tools for developing gateware and simulating HDL designs. Part 1 practicals concern using a single board computer, deploying and using an embedded operating system, building applications using a cross-compiler tool stacks, and hardware software interfaces – the practical work culminates in Miniproject A, which requires the use of taught tools to design, analyse and implement an IoT application. Part2 practicals involve implementing a combination logic design and developing a small HDL testbench to analyse its behavior. Those completing the course for 18 credits (Computer Science students) are required to complete a more demanding Miniproject B which adds software features to the Miniproject A baseline and requires additional performance and throughput testing.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3096S   EMBEDDED SYSTEMS II
16 NQF credits at NQF level 7
Convener: Dr S Winberg
Course entry requirements: EEE2046F
Course outline:
This course focuses on embedded systems architectures, firmware and software tool stacks. This course builds on the Embedded Systems I course. Consideration for Internet of Things (IoT) is included in the form of design scenarios and project-based learning. The course is split into two parts. Part 1 (10 credits) covers: theory and practices of design and analysis through modeling and simulation of embedded systems; embedded operating systems, and methods for modelling and simulation of computer systems are studied. An introduction to Linux command line and source code version control are also taught. Part 2 (6 credits) introduces Hardware Description Language (HDL) programming and computer architecture fundamentals techniques and tools for developing gateware and simulating designs. Part 1 practicals concern using a single board computer, deploying and using an embedded operating system, building applications using a cross-compiler tool stacks, and hardware software interfaces – the practical work culminates in Miniproject A, which requires the use of taught tools to design, analyse and implement an IoT application. Part2 practicals involve implementing a combination logic design and developing a small HDL testbench to analyse its behavior.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3097S   ENGINEERING DESIGN: ELECTRICAL AND COMPUTER ENGINEERING
8 NQF credits at NQF level 7
Convener: Professor A Mishra
Course entry requirements: EEE2045F and EEE2047S and EEE3088F
Course outline:
In this course students will be assigned a design problem relevant to the Electrical & Computer Engineering discipline within which they will need to design a system and development plan, implement a prototype of this design and evaluate the design through formal testing processes. This will provide insight to understand the intricacies of real-life complex sub system design. Students will be expected to solve it methodically using the skills they have gathered over the previous semesters of the curriculum, especially from the Design Principles course.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3098S   ENGINEERING DESIGN: ELECTRICAL ENGINEERING
8 NQF credits at NQF level 7
Convener: Professor K Folly
Course entry requirements: EEE2045F and EEE2047S and EEE3088F
Course outline:
This course aims to assign students to a design problem relevant to the Electrical Engineering discipline within which they will need to design a prototype and test a sub-system. This will provide insight to understand the intricacies of real-life complex sub system design. Students will be expected to solve a problem methodically using the skills they have gathered over the previous semesters of the curriculum, especially from the Design Principles course.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3099S   ENGINEERING DESIGN: MECHATRONICS
8 NQF credits at NQF level 7
Convener: Associate Professor A Patel
Course entry requirements: EEE2045F and EEE2047S and EEE3088F
Course outline:
This course aims to assign students to a design problem relevant to the Mechatronics discipline within which they will need to design a prototype and test a sub-system. This will provide insight to understand the intricacies of real-life complex sub system design. Students will be expected to solve a problem methodically using the skills they have gathered over the previous semesters of the curriculum, especially from the Design Principles course.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE3100S   POWER SYSTEMS ENGINEERING
16 NQF credits at NQF level 7
Convener: Mrs KO Awodele
Course entry requirements: EEE2044S
Course outline:
This course aims to develop further skills and knowledge in power systems engineering, power systems network models, per-unit, load flow and balanced fault calculations, transformers, protection principles, electrical loads and tariffs and electricity market.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4022F/S   RESEARCH PROJECT
This course is also available in the first semester as EEE4022F. This Course is not eligible for additional assessment
40 NQF credits at NQF level 8
Convener: TBC
Course entry requirements: EEE4114F or EEE4115F or EEE4117F or EEE4118F or EEE4121F

Course outline:
The final year research project is an important opportunity, at the end of the degree programme, to tackle a real engineering project that involves the creative application of scientific principles to the solution of problems in society. The student is expected to work on the project both individually and under the guidance of a supervisor. The project involves: a problem description or research hypothesis developed in consultation with a supervisor; reviewing the topic in detail and defining the boundaries (scope) carefully, to confirm an understanding of the requirements of the project; searching for, and critically engaging the relevant literature, selecting and justifying the most appropriate approaches to solving the problem or testing the hypothesis; analysis, simulation, designing, building, integrating and testing as appropriate, hardware and software; evaluating the project against the success criteria and design objectives; writing a report about the project, the findings, and any recommendations. An oral presentation and the preparation of an exhibit of the project is also required.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4105C   RF & MICROWAVE DEVICES & CIRCUITS
10 NQF credits at NQF level 8
Convener: TBC
Course entry requirements: EEE3089F
Course outline:
This course covers the revision of transmission line theory, microstrip coaxial and waveguide circuits, Gunn diode oscillators, IMPATT oscillators and GaAs MESFET oscillators, low noise and power GaAs MESFET amplifiers, PIN diode switches and limiters, and microwave receivers and mixers.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4113F   ENGINEERING SYSTEM DESIGN
16 NQF credits at NQF level 8
Convener: Dr S Paine
Course entry requirements: EEE3097S or EEE3098S or EEE3099S
Course outline:
This course aims to consolidate prior material in the context of professional project and design work. Students working individually as well as in groups will tackle a design assignment, leading to submission of a technical report. Topics include: Various models for the stages of formal design methodologies, divergent and convergent thinking, South African industrial design case studies, context analysis (STEEPLE), idea generation, creative methods to organize thinking and planning, user requirements and specifications, project clarification and scope, design standards and codes, systems engineering approach, detail aspects and checklists related to concept, embodiment and final designs, redundancy in systems, worst-case design, sensitivity analysis and cost and project life-time estimation as well as design-thinking applied to final-year projects.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4114F   DIGITAL SIGNAL PROCESSING
16 NQF credits at NQF level 8
Convener: Associate Professor F Nicolls
Course entry requirements: EEE3092F or EEE3094S
Course outline:
This course aims to develop an advanced understanding of digital signal processing. Topics include: discrete time signals and systems; the discrete Fourier transform properties and fast algorithms; the z-transform; frequency response from z-plane; FIR and IIR filter design and structures for digital filters. The course includes a specialist component in an applied or advanced signal processing application area.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4115F   POWER DISTRIBUTION AND TRANSMISSION NETWORKS
16 NQF credits at NQF level 8
Convener: TBC
Course entry requirements: EEE3091F and EEE3100S
Course outline:
This course aims to develop an advanced understanding of power distribution and transmission networks. Topics include: transmission and distribution, electrical loads and load forecasting, overhead lines and cables, substations, renewable energy generation, distributed generation, smart grids, power system protection, high voltage engineering, and power system reliability and power quality, electrification, delivery process and pricing.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4116F   POWER SYSTEMS ANALYSIS, OPERATION & CONTROL
16 NQF credits at NQF level 8
Convener: Dr D Oyedokun
Course entry requirements: EEE3091F and EEE3100S
Course outline:
This course aims to develop an advanced understanding of various topics in the analysis, operation and control of electric power systems, and their practical applications. Topics include: Graph theory, admittance and impedance matrices, power flow studies, symmetrical components, fault calculation, power system security states, optimisation of power system operations, power system stability and control, dynamic security analysis, grid operations, control centres, HVDC systems and geomagnetic induced currents (GIC).
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4117F   ELECTRICAL MACHINES AND POWER ELECTRONICS
16 NQF credits at NQF level 8
Convener: Professor MA Khan
Course entry requirements: EEE3091F
Course outline:
This course aims to develop an advanced understanding of speed control of electrical machines and power electronic circuits. In particular, the analytical models of DC and AC machines are

manipulated to achieve speed control of these machines. Furthermore, circuit topologies, switching patterns and waveforms of DC-DC converters and DC-AC inverters are studied.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4118F   PROCESS CONTROL AND INSTRUMENTATION
16 NQF credits at NQF level 8
Convener: Professor E Boje
Course entry requirements: EEE3094S
Course outline:
This course aims to present a unified and holistic view of industrial control, automation and instrumentation. It covers topics on industrial automation, measurements and instrumentation, and introduces advanced control methods. Specific topics are: the industrial automation hierarchy; automation drawings – P&ID diagrams; Programmable Logic Controllers; Supervisory Control and Data Acquisition; Distributed Control Systems; Sensing and Measurement Techniques; Batch Processes; Automation Networks; Safety Systems; and a selection of Advanced Control topics such as Nonlinear, Quantitative Feedback Theory, H-infinity and Model Predictive Control. The course aims to develop knowledge, skills and values through a balanced integration of lecturers, tutorials, laboratory and project work.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4119F   MECHATRONICS
16 NQF credits at NQF level 8
Convener: Associate Professor A Patel
Course entry requirements: MEC2047F and MEC2045S and EEE3094S
Course outline:
The course aims to provide a unified and holistic view of automation of mechanical systems. Specific topics are: Multibody Kinematics (2D&3D), Inverse Kinematics, Euler-Lagrange Mechanics, Numerical Simulation, Friction modelling and a selection of nonlinear control topics from: Feedback Linearisation, Lyapunov Stability, Sliding Control, Gain Scheduling, Manipulator control and Trajectory Optimisation. Applications of techniques will be tailored towards terrestrial, sea, air as well as industrial robotic systems. The course aims to develop knowledge, skills and values through a balanced integration of lectures, laboratory and project work.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4120F   HIGH PERFORMANCE DIGITAL EMBEDDED SYSTEMS
16 NQF credits at NQF level 8
Convener: Dr S Winberg
Course entry requirements: EEE3096S
Course outline:
This course aims to consolidate an understanding of Parallel computing, with a focus on design for parallel systems. This includes theory of parallel algorithm development, developing golden measures, performance analysis, benchmarking essentials, implementing parallel code. Topics include fundamental theories, design practices, and techniques related to the design of digital high performance embedded systems. The lectures include a number of case studies related to real

systems that were developed. Additionally, the course aims to consolidate an understanding of Reconfigurable computing and the design and development of hardware description language (HDL) code for use with Field Programmable Gate Arrays (FPGAs) platforms. The latter part of the course has an emphasis on the use of FPGAs and HDL programming in relation to design and application development for ReConfigurable (RC) hardware platforms.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4121F   MOBILE AND WIRELESS NETWORKS
16 NQF credits at NQF level 8
Convener: Associate Professor O Falowo
Course entry requirements: EEE3093S
Course outline:
This course aims to develop an understanding of mobile and fixed networks. Topics include: Wireless Network Fundamentals, Wireless and Wireline Access Technologies, Radio Resource Management, Mobility Management, Traffic and Congestion Control, QOS in Packet Network, IP Traffic Engineering, Network Convergence, Network Services and Applications Requirements, Data Plane and Control Plane Technologies, and Performance modelling and simulation.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4122C   COMMUNICATION ENGINEERING
8 NQF credits at NQF level 8
Convener: Dr D Ramotsoela
Course entry requirements: EEE3092F
Course outline:
This course aims to present the fundamentals of digital communication engineering. Topics include: Probability and Random Signals, Band-Limited Channels, Elements of Information Theory, Channel Capacity, Channel Reliability Function, Source Coding, Channel Coding, Error-Control Coding and Baseband Signalling, Bandpass Modulation and Demodulation in Noise, Data Detection and Cryptography
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4123C   ELECTRICAL MACHINES AND DRIVES
8 NQF credits at NQF level 8
Convener: Professor P Barendse
Course entry requirements: EEE3091F
Course outline:
This course provides an introduction to reference frame theory; dq-machine modelling; field orientated control of a permanent magnet synchronous motor and induction motor; and an introduction to single-phase induction motors.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4124C   IMPACT OF ENGINEERING ON THE NATURAL AND SOCIAL ENVIRONMENT
8 NQF credits at NQF level 8
Convener: Ms M Moorlach
Course entry requirements: EEE3088F
Course outline:
This course aims to expose students to the two complex environments in which graduate engineers will be working, namely the natural environment and the social environment. Employing systems thinking, taking cognisance of environmental sustainability, resource efficiency and life-cycle analysis of engineering projects and activities is a central focus of the course. Students will be challenged to grasp the broader impact of engineering activities and industry through case studies. Interacting with non-engineering guest professionals from industry will provide students with opportunities to critically engage with the impact of engineering activities from a multidisciplinary perspective. Topics covered will include energy and resource efficiency, waste management, identification of industrial symbiosis opportunities between different industries, and the application of this to an engineering project.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

EEE4125C   NEW VENTURES: PLANNING, PRACTICE AND PROFESSIONALISM
16 NQF credits at NQF level 8
Convener: Mr R Lamour
Course outline:
This course introduces students to a range of practical and technical tools related to the planning and managing of entrepreneurial ventures. This includes the skills and knowledge to communicate professionally and ethically, manage a new business and to work in diverse teams. The business aspects of the course include feasibility studies; product conception and description; market assessment; industrial analysis; regulatory aspects; marketing plans; operations, development plans and management; staffing and labour issues; financial projections; and intellectual property. The communication aspect develops professional identity alongside ethical responsibility and exposes students to a variety of persuasive professional communication formats including business proposals, posters and eportfolios culminating in a group presentation to industry professionals.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MECHANICAL ENGINEERING

The Department offers the following undergraduate degree programmes:

Bachelor of Science in Engineering in:
Mechanical and Mechatronic Engineering
Mechanical Engineering

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

Deputy Heads of Department
Research: Associate Professor MN Ngoepe, BSc(Eng) *Cape Town*, DPhil *Oxon*
Teaching: Associate Professor CJ von Klemperer, BSc (Eng) MSc (Eng) PhD *Natal*

Professors
Professor T Bello-Ochende, PrEng BEng MEng *Ilorin* PhD *Duk*e MASME
Professor PG Rousseau, PrEng BEng (Mech) MEng (Mech) PhD *Pretoria* OPM *HBS*

Emeritus Professors
GN Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE
BD Reddy, OMB, BSc(Eng) *Cape Town* PhD *Cantab,*DSc(hc) *Stellenbosch* FSAAE,MASSAf

Emeritus Associate Professor
HD Mouton, BSc Eng Pret BSc Unisa BEng Hons MEng Pretoria PhD Eng NWU

Honorary Professors
Professor GS Langdon, BEng, PhD *Liverpool* MIMechE, CEng, MASSAf
Professor JM Nordstrom, MSc(Aeronautics) KTH, the Royal Institute of Technology, PhD Uppsala University

SARChI South African Research Chair in Industrial CFD
Professor AG Malan, PrEng BEng(Mech) MEng(Mech) *Pretoria* PhD *Swansea*

Associate Professors
T Becker BSc(Eng) PhD Cape Town
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

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)
S Parker, BSc(Eng) MSc(Eng) *Cape Town*
CB Shaw, BSc(Eng) MSc(Eng) HDE MPhil(EngMan) DPhil(EngMan) PhD *Cape Town*

Lecturers
J Hepworth, BSc(Eng), MSc(Eng) *Cape Town*
LC Raw, BSc(Eng) MSc(Eng) *Cape Town*
SC Mashau, BSc (Aeronautical Eng) MSc (Eng) *Wits*
CF du Sart,PrEng BCom(Hons) BSc(Eng) MSc(Eng) *Cape Town*
A Pretorius, BSc(Eng) *Cape Town*
P Gosai, BSc(Eng) GradDip Wits MSc(Eng) Cape Town

Principal Technical Officers
P Smith
W Swart, BIng MScIng, *Stellenbosch*

Chief Technical Officer
D Jacobs

Senior Technical Officer
TBC

Technical Officer
TBC

Technical Assistant
TT Mobo

Departmental Manager
CMC Jonker, BCom(Hon) *UWC*

Administrative Officer (Undergraduate)
R Maree

Administrative Assistant (Postgraduate)
DJ Botha, BPrimEd *Witwatersrand*

Administrative Officer (Finance)
B Glass

Senior Secretary
S van Sensie-Fisher

Department Assistant
G Doolings

The activities of the Department cover a wide field at both undergraduate and postgraduate level. The undergraduate programme has an annual intake of approximately 120 students who are among the best of the South African and international school leavers. Graduates are highly regarded and join a variety of industrial and commercial enterprises. Students who obtain satisfactory results at undergraduate level are encouraged to continue studies at the postgraduate level. The postgraduate qualifications are focussed on a wide range of Departmental research activities, such as aeronautical engineering, bio-medical engineering, blast response of structures, composites, computational mechanics, energy, engineering education, fracture and fatigue, fuels, impact, management,

manufacturing, materials, non-destructive testing and evaluation, refrigeration engineering, robotics and control systems.

The undergraduate Bachelor of Science in Engineering degree programmes in Mechanical and Mechatronic Engineering and Mechanical Engineering have the first two years' curricula in common.

Course Outlines

MEC1000X   PRACTICAL TRAINING I
0 NQF credits at NQF level 5
Convener: Associate Professor S Chung Kim Yuen
Course entry requirements: None
Co-requisites: None
Course outline:
This opportunity for practical experience for Electro-Mechanical and Mechanical Engineering students culminates in a certificate showing evidence of completion of suitable work in basic workshop processes during a period of at least four weeks in an approved industrial workshop. The practical experience should be gained in the mid-year or end of year vacation following the year of first registration in the Faculty. The evidence of completion must be submitted by 31 March of the following year. Alternatively, students may produce a certificate showing evidence of completion of an approved structured intensive two-week practical training course (e.g. at a University of Technology). Students are required to cover at least the following: welding, turning, and basic fitting.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1002W   ENGINEERING DRAWING
16 NQF credits at NQF level 5; First year course.
Convener: Associate Professor R Kuppuswamy
Course entry requirements: None
Co-requisites: None
Course outline:
This course aims to introduce students with no prior drawing experience to basic drawing principles and to provide the knowledge required to continue with the Construction Economics and Management degree. Drawing equipment will be used to convey the principles of descriptive geometry and pictorial projection. Drawing standards will be introduced. Free hand sketching will be introduced as a skill used to create layouts, elevations, floor plans, and basic designs. 2D CAD skills will be taught and applied during the course.
Lecture times: 1 Lecture and 1 Tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1003F   ENGINEERING DRAWING
8 NQF credits at NQF level 5; First year course.
Convener: Associate Professor R Kuppuswamy
Course entry requirements: None
Co-requisites: None

Course outline:
This course aims to provide an overview of the knowledge and skills required for basic engineering drawing.

The course is offered in 3 parts: Part 1 introduces the principles of orthographic and pictorial projections. These are demonstrated by using free hand sketching as well as drawing instruments. Part 2 introduces the basics of CAD 3D Modelling. Part 3 introduces the basics of PCB Design.

Lecture times: 1 Lecture and 1 Tutorial per week.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1005W   INTRODUCTION TO MECHANICAL ENGINEERING
24 NQF credits at NQF level 5; First year course.
Convener: Professor B Collier-Reed
Course entry requirements: None
Co-requisites: None
Course outline:
This course provides students with a broad introduction to mechanical engineering through a variety of activities culminating in a competitive group design challenge. Throughout the course, students will engage with classical mechanical engineering concepts, participate in experiential activities, and locate what they are learning through the use of case studies. Topics covered include what it means to be an engineer; how to use effective oral, written, and technical communication; the interrelationship between technology and society; professional ethics; the need for sustainable engineering activities; the engineering design process; forces in structures and machines; thermal and energy systems; motion and power transmission; fluids engineering; basic electrical theory and materials and stresses.

Lecture times: 3 Lectures per week; 1 afternoon session every two weeks.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1007F   INTRODUCTION TO ENGINEERING DRAWING
8 NQF credits at NQF level 5
Convener: Mr C du Sart
Course entry requirements: None
Co-requisites: None
Course outline:
This course aims to introduce students with no prior drawing experience to basic drawing principles and to provide the knowledge required to continue with the design stream of the mechanical and electro-mechanical engineering degrees. Drawing equipment to convey the principles of descriptive geometry and drawing standards will be used, as well as free hand sketching to interpret orthographic and pictorial projections and basic design principles. 3D CAD software will be used to address the following topics: solid modelling applications with design intent; fits and tolerances; detailing for manufacturing; interpretation of drawings; and assembly design for manufacturing.

Lecture times: 1 lecture and 1 tutorial per week

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1008S   INTRODUCTION TO MECHANICAL DESIGN
8 NQF credits at NQF level 5
Convener: Mrs C Findeis
Course entry requirements: DP Requirement for Introduction to Engineering Drawing (MEC1007F).
Co-requisites: None
Course outline:
This course aims to form a foundation of drawing and design using 3D Computer Aided Drawing software. The software will be a used as a tool to generate and interpret drawings for a manufacturing environment. Basic fundamentals of mechanical engineering design will be applied using free hand sketching skills and 3D CAD. Topics include: Solid modelling applications with design intent; fits and tolerances; detailing for manufacturing; interpretation of drawings; and assembly design for manufacturing.
Lecture times: 1 lecture and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1009F   INTRODUCTION TO ENGINEERING MECHANICS
16 NQF credits at NQF level 5
Convener: Mr T Cloete
Course outline:
This course aims to introduce students to the concepts of engineering mechanics. It develops the concept of equilibrium of particles and rigid bodies which is a required basis for solving engineering problems in mechanical engineering and cognate disciplines. The course reviews the use of vectors for displacement, position and force. Students will learn how to represent engineering problems using free body diagrams and graphical methods. Forces considered are applied as point loads, moments and distributed loads. Internal resultant forces that occur due to axial loading, bending and torsion will be considered. Applications include statically determinate systems only: basic trusses, beams, frames and machines. Concepts of centroids, second moment of area, parallel axis theorem and mass moment of inertia are covered. Elementary solid mechanics ideas such as stress, strain and simple mechanical properties of materials are also introduced.
Lecture times: 4 lectures and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC1009S   INTRODUCTION TO ENGINEERING MECHANICS
16 NQF credits at NQF level 5
Convener: Dr S Parker
Course outline:
This course aims to introduce students to the concepts of engineering mechanics. It develops the concept of equilibrium of particles and rigid bodies which is a required basis for solving engineering problems in mechanical engineering and cognate disciplines. The course reviews the use of vectors for displacement, position and force. Students will learn how to represent engineering problems using free body diagrams and graphical methods. Forces considered are applied as point loads, moments and distributed loads. Internal resultant forces that occur due to axial loading, bending and torsion will be considered. Applications include statically determinate systems only: basic trusses, beams, frames and machines. Concepts of centroids, second moment of area, parallel axis theorem and mass moment of inertia are covered. Elementary solid mechanics ideas such as stress, strain and simple mechanical properties of materials are also introduced.

Lecture times: 4 lectures and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2000X PRACTICAL TRAINING II

0 NQF credits at NQF level 7
Convener: Dr S Parker
Course entry requirements: None
Co-requisites: None
Course outline:
This second opportunity for practical experience for Electro-Mechanical and Mechanical Engineering students, culminates in a certified employers report showing regular timekeeping and evidence of completion of suitable work in mechanical, or electro-mechanical engineering practice. It and must involve work in a registered company where a student will be exposed to "engineering activities" for a minimum period of six weeks at the end of the second year. The six weeks does not have to be continuous, however no single block may be less than three weeks. The student engineer is expected to be involved with operation and maintenance of plant, and / or to work on a design project, and to apply the knowledge gained in academic study, to the project under supervision.
Lecture times: None
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2045S APPLIED ENGINEERING MECHANICS

16 NQF credits at NQF level 6
Convener: Associate Professor S Chung Kim Yuen
Course entry requirements: MEC1009F/S and MEC2023F/S or MEC2047F/S
Course outline:
This course provides an introduction to basic materials, basic stress and strain analyses, beam deflections and stress analysis, gears and gear forces, rotating unbalance, vibrations and gyroscopic motion. Students will learn how to perform kinematic analysis of gear trains, energy storage calculations in flywheels and analyse single-degree-of-freedom models in simple free and forced vibrating systems. Students will learn to analyse rotating machinery, flywheels and gyroscopes. They will also be able to perform basic deflection and stress calculations for statically determinate beams, and understand different classes of materials and their uses in structures.
Lecture times: 4 Lectures and 1 Tutorial per week
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2046F MATERIALS SCIENCE IN MECHANICAL ENGINEERING

12 NQF credits at NQF level 6
Convener: Associate Professor T Becker
Course entry requirements: None
Co-requisites: CEM1008F
Course outline:
This course includes an overview of the classification and structure-property relationships of metallic, ceramic, polymeric and composite engineering materials. Specific topics include: elastic behaviour; plastic and work-hardening behaviour of ductile materials; recovery and recrystallisation

of deformed metals; microstructure, heat treatment and properties of steels; optimisation and limitations of ceramic materials; processing and manufacture of polymeric and composite materials; influence of environmental effects on the deterioration of materials. The course is concluded by applying the knowledge of material classification, structure-process-property relationships, availability, sustainability and cost, to optimum selection of materials in engineering design.
Lecture times: 3 Lectures and 1 Tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2047F   ENGINEERING DYNAMICS
16 NQF credits at NQF level 6
Convener: Associate Professor M Ngoepe
Course entry requirements: MAM1021F/S, PHY1012F/S and MEC1009F/S
Course outline:
This course aims to extend the fundamental principles and formulations of Newtonian mechanics by examining the motion of particles and rigid bodies. This is achieved by considering kinematics (motion without reference to forces) and kinetics (motion with reference to forces). Topics include rectilinear motion, curvilinear motion, relative motion, constrained motion, absolute motion, Newton's laws, work and energy, impulse and momentum, impact.
Lecture times: 4 Lectures and 1 Tutorial per week.
DP requirements: Attendance at Class and Tutorial tests.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2047S   ENGINEERING DYNAMICS
16 NQF credits at NQF level 6
Convener: Dr B Kloot
Course entry requirements: MAM1021F/S, PHY1012F/S and MEC1009F/S
Course outline:
This course aims to extend the fundamental principles and formulations of Newtonian mechanics by examining the motion of particles and rigid bodies. This is achieved by considering kinematics (motion without reference to forces) and kinetics (motion with reference to forces). Topics include rectilinear motion, curvilinear motion, relative motion, constrained motion, absolute motion, Newton's laws, work and energy, impulse and momentum, impact.
Lecture times: 4 Lectures and 1 Tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Weekly tutorial tests: 10% (30 minutes each), Class tests: 30%, Class test 1: 10% (1.5 hours), Class test 2: 10% (1.5 hours), Class test 3: 10% (2 hours), Final examination: 60% (3 hours).

MEC2048S   MECHANICAL ENGINEERING DESIGN
16 NQF credits at NQF level 6
Convener: Dr R Govender
Course entry requirements: MEC1008S, MEC1005W, MEC2025F or MEC2049F, MEC2042F) or MEC2046F
Course outline:
This course aims to provide the foundations for graduate level mechanical engineering design. Specific knowledge areas developed are selection of simple machine elements, machine assembly design and basic manufacturing technology. Skills are developed in the use of Computer Aided Design (CAD) software, to produce 3D models of parts, compose these into assemblies with

appropriate constraints and produce orthographic drawings of assemblies and parts to accepted standards, suitable for manufacture. Basic product dissection skills are developed.
Lecture times: 3 Lectures and 1 Tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2049F   SOLID MECHANICS 1
16 NQF credits at NQF level 6
Convener: Dr S Parker
Course entry requirements: MEC1009F/S, MAM1020F/S (or equivalent)
Course outline:
This course aims to analyse the deformation of structures loaded axially, in torsion and in bending. Combinations of these loading types will be explored with regard to stress and stress transformations. Deformation will be calculated in statically determinate and indeterminate situations. The method of solving statically indeterminate problems will include using the geometry of deformation in conjunction with static equilibrium and superposition. Strain energy, using Conservation of Energy and the Principle of Virtual Work, will be used to calculate deformation. The buckling of columns will also be examined.
Lecture times: 4 Lectures and 1 Tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC2050S   THERMOFLUIDS 1
16 NQF credits at NQF level 6
Convener: Mr D Findeis
Course entry requirements: CEM1008F and MAM1020F and PHY1012F
Course outline:
This course aims to introduce students to the fundamentals of thermodynamic and fluid mechanic sciences in an integrated manner. In particular students will be introduced to fundamental concepts and definitions, as well as fluid properties and their relationships. Students will furthermore be given insight into the fundamental heat transfer mechanisms and become familiar with the four fundamental balance equations. By applying these to selected continuity problems, closed system problems, entropy problems as well as fluid statics and momentum problems, students will become familiar with the presented concepts and further their problem-solving skills.
Lecture times: 4 Lectures and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3074F   MEASUREMENTS AND ACTUATORS
8 NQF credits at NQF level 7
Convener: Mrs L Raw
Course entry requirements: EEE2041F, EEE2042S
Co-requisites: None
Course outline:
This course provides an introduction to the measurement of various physical phenomena, and an introduction to the use of different types of actuators in control operations. Content will include selected topics from: measurement parameters and their associated considerations; electrical

measurement techniques; signal conditioning; digital sampling; common transducers covering measurement of force, inertial motion, temperature, rotation, non-contact sensing; rotational actuators including, brushed and brushless DC motors, AC motors, servo motors and stepper motors; linear actuators including solenoids, hydraulic systems, and pneumatic systems.
Lecture times: 2 Lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3075F   COMPUTER METHODS FOR MECHANICAL ENGINEERING
12 NQF credits at NQF level 7
Convener: Mr J Hepworth
Course entry requirements: CSC1019F
Co-requisites: MAM2084F
Course outline:
This course aims to teach students how to design and use computational techniques for the analysis of problems in Mechanical Engineering. The course covers design of spreadsheets, creation of automation scripts in Python, how to select an appropriate numerical method, implementation of basic numerical methods, using numerical methods libraries (NumPy), and testing and debugging of computer code. These broad topics are investigated through application to specific engineering science   problems   from   across   Mechanical   Engineering.
 Topics include: basic computer architecture, number systems and computation, propagation of numerical error, text file manipulation, Newton's method for single and multivariate problems, LU factorisation and iterative solution of linear algebra systems, numerical differentiation, numerical integration using the trapezoidal rule and Gauss quadrature, solution of linear ordinary differential equations (Euler, Central Difference, Newmark methods).
Lecture times: 3 Lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3076F   STRESS ANALYSIS AND MATERIALS
16 NQF credits at NQF level 7
Convener: Associate Professor S Chung Kim Yuen
Course entry requirements: MEC2046F or MEC2042F, MEC2025F or MEC2049F, MAM2083F/S (DP), MAM2084F/S (DP)
Co-requisites: None
Course outline:
In this course the students will be exposed to failure analysis, gaining understanding of how components are abstracted and simplified to be solved using simplified principles.
Students will learn about basic material properties and material selection coupled with stress analysis. The students will develop an understanding of the different stresses a body experiences under various loading conditions with a view to assess and prevent failures in structures. Topics will demonstrate how forces, stresses and strains are used to size components for different applications and different materials. The course content will include topics such as theories of failure due to different loading conditions and material processes, stresses in structural elements (cylinders) and strain beyond elastic limit.
Lecture times: 4 lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3077F   THERMOFLUIDS II

16 NQF credits at NQF level 7
Convener: Professor P Rousseau
Course entry requirements: MEC2022S or MEC2050S
Course outline:
The aim of this course is to introduce students to the fundamentals of fluid control volumes and thermodynamic cycles, and its application in the analysis of various thermofluid components and systems. It covers: The balance equations of mass, energy (1st law), entropy (2nd law) and momentum and its application to pipes and ducts, mixing chambers, heat exchangers, pumps, compressors, turbines etc.; The heat transfer and work terms that are required as inputs to the balance equations, including specific methods for analysing heat exchangers and turbomachinery and the concepts of reversible and irreversible work; Simplifications for one-dimensional flow, such as the Bernoulli equation; The application of the 1st and 2nd laws in the analysis of various power and refrigeration cycles.
Lecture times: 4 Lectures and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3078S   MECHANICS OF MACHINES

8 NQF credits at NQF level 7
Convener: Associate Professor T Becker
Course entry requirements: MEC2048S (DP), MEC2047F/S
Course outline:
This course aims to teach students to analyse and understand the mechanics of rotating machine elements. It introduces mechanics of machines, with a particular focus on rotating elements. This includes the kinematic analysis of gear trains, energy storage in flywheels, rotating unbalance and gyroscopes. Students will learn to analyse the dynamic behaviour of common engineering components, for example gear trains, rotating machinery, flywheels and gyroscopes.
Lecture times: 2 lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3079S   CONTROL SYSTEMS

12 NQF credits at NQF level 8
Convener: Mr A Pretorius
Course entry requirements: MAM2083F/S or MAM2085F/S and MAM2084F/S
Course outline:
This course provides an introduction to basic techniques for control system engineering and design. Topics include mathematical modelling of elementary systems; converting governing linear differential equations by means of Laplace transforms; transfer functions and block diagram algebra; the root-locus technique for stability analysis; frequency response of systems; proportional and integral control; Bode plot design; compensators; noise and filtering; z-transforms for digital control; difference equations; sampling and quantization; mixed analogue and digital control systems.
Lecture times: 3 lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3080S   THERMOFLUIDS III

16 NQF credits at NQF level 7
Convener: Professor P Rousseau
Course entry requirements: MEC3077F (Thermofluids II) (DP)
Course outline:
The aim of this course is to introduce students to differential analysis of fluid control volumes, similitude and dimensional analysis, and the analysis of steady state incompressible and compressible internal flows and its application to pipe and duct flows as well as flow measuring devices. It covers: The differential forms of the fundamental conservation laws of mass, energy and momentum and its application to laminar flows and vortices; Similitude and dimensional analysis and its application to the velocity and thermal boundary layers, as well as pump and fan, scaling laws; Analysis of incompressible internal flows including the effects of frictional losses and convective heat transfer in pipes, ducts and pipe networks; The application of obstruction flow measuring devices and uncertainty propagation in flow measurement; Analysis of compressible internal flows including the effect of area change, choking, shocks, and flows with friction and heat transfer in pipes and ducts.
Lecture times: 4 Lectures and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3081S   MANUFACTURING SCIENCES

12 NQF credits at NQF level 7
Convener: Associate Professor R Kuppuswamy
Course entry requirements: MEC3076F Stress Analysis and Materials
Course outline:
This course presents a range of manufacturing processes used in the manufacturing environment making use of thermal, mechanical and hybrid techniques. The manufacturing processes introduced and covered are; casting, forming, material removal, abrasive assisted, polishing, hybrid, joining and rapid prototyping. The course educates students in a variety of manufacturing processes and sciences, including their typical use, limitations, capabilities and optimization. At the end of the course the students would be able to select a suitable manufacturing process to process an engineering features from a range of available processes taking into account: the complexity, reliability and lot size.
Lecture times: 3 lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3082S   MECHANICAL ENGINEERING MACHINE ELEMENT DESIGN

16 NQF credits at NQF level 7
Convener: Associate Professor C von Klemperer
Course entry requirements: MEC2048S Introduction to Design, MEC2049F Solid Mechanics 1
Course outline:
Aims: To facilitate the development of knowledge and skills that will allow the student to address complex design problems with both creativity and rigour. This will be by performing detail design analyses of machine components and assemblies. These analyses include strength and life calculations while still ensuring the designs will perform in accordance with appropriately specified development requirements. Issues such as manufacturability and maintenance will also be considered. The communication of the engineering designs by means of design calculations, brief technical reports, and the creation of suitable engineering models and drawings for parts and

assemblies.

Course outline: This course aims to further develop an advanced understanding of design in the mechanical and electro-mechanical domain. Topics include: Machine component design and basic machine system design, Compilation of a basic design report with calculations, CAD models and drawings. Specific knowledge areas are the application of fatigue failure theories; standard machine design for; power screws, threaded fasteners, springs, clutches, brakes, spur, helical and bevel gears, and shafts.

Lecture times: 3 lectures per week and a weekly afternoon tutorial.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC3083W   ENGINEER IN SOCIETY

16 NQF credits at NQF level 8

Convener: Dr C Shaw

Course entry requirements: None

Co-requisites: AYOS 3 but can use MEC3077F and MEC3082S as proxy

Course outline:

This course frames engineering as a socio-technical endeavour and deals with the broader context in which engineering activity takes place. This includes the economic systems in which engineering organisations are embedded; the socio-economic status of communities that might feel the impact from engineering activity; explores, through site visits, the notion of 'community' in post-apartheid South Africa; and deals with the political systems in which engineering operations occur, including issues of labour relations.

Lecture times: 2 lectures per week.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4047F   MECHANICAL VIBRATIONS

12 NQF credits at NQF level 8

Convener: Dr R Govender

Course entry requirements: MEC3078S or MEC3031S and MEC3075F or equivalent

Course outline:

This course introduces modelling of dynamical systems for vibration analysis, analytical and computational solution techniques, interpretation of these solutions, and vibration in real-world scenarios and machines. The course considers the development of equations of motion for continuous, single, and multi-degree of freedom systems with Newtonian and Energy methods. Analytical solution of equations of motion is considered using time-domain and Laplace techniques and modal analysis. Topics include viscous and Coulomb damping, harmonic and general forced vibration, base excitation, rotating unbalance, vibration measurement and condition monitoring, vibration isolation and absorption, and one-dimensional vibration of continuous systems.

Lecture times: 3 lectures and 1 tutorial/computer session per week.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4108S   SYSTEM DESIGN

12 NQF credits at NQF level 8; 75 hours assignments.
Convener: Associate Professor W Fuls
Course entry requirements: None
Co-requisites: MEC4124W or MEC4103F
Course outline:
This course aims to enable students to structure and plan a high level system design and to generate system and subsystem development specifications; structuring of the development process according to the life cycle model portrayed by the V-diagram; do functional decomposition and allocation to hardware; determination of the system and subsystem requirements by means of system modelling and simulation; and creation of a system verification matrix.
Lecture times: 1 lecture and 1 tutorial per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4123F   ENGINEER IN BUSINESS

16 NQF credits at NQF level 8
Convener: Dr C Shaw
Course entry requirements: MEC3083W
Co-requisites: None
Course outline:
Engineer in Business is an interdisciplinary course that aims to provide the basis for an understanding of how technology, economics and management intersect. It consists of three key modules: Operations management, Project Management and Engineering Economics (including New Venture Planning). The fourth module consists of a set of case studies to provide an opportunity for engagement with the principles covered in the previous modules. The course is intended to follow a typical trajectory of an engineering graduate's career. The first module deals with the engineer's role in the daily operations of an organisation such a manufacturing plant. The second module considers the role that the engineer plays in the management of projects. The third module highlights the importance of economic and financial concepts in relation to engineering decision-making and the role this plays in launching a new business venture. This includes consideration of aspects of a business plan and the fundamentals of a techno-economic analysis for a new product or service. To conclude the course, case studies demonstrate the principles covered in the previous modules.
Lecture times: 4th period, Mon, Tues, Thurs, Fri
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4124W   ENGINEERING PRODUCT DESIGN

22 NQF credits at NQF level 8
Convener: Associate Professor W Fuls
Course entry requirements: MEC3072F and MEC3073S or MEC3050W or MEC3082S
Co-requisites: None
Course outline:
This course aims to teach the structured engineering product design process from concept, basic, detail design and into manufacturing, integration and testing. The course spans a full year, where students work on a given design brief individually, as well as in groups and eventually build and test the designed product. Students are assessed through the submission of individual design reports, as well as outputs in group format related to the final built product.

Lecture times: 2 lectures per week first semester and 1 per week second semester
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4125F   THERMOFLUIDS IV

20 NQF credits at NQF level 8
Convener: Mr P Gosai
Course entry requirements: Thermofluids III (MEC3080S) (DP)
Co-requisites: None
Course outline:
The aim of this course is to introduce students to the analysis of steady-state incompressible external flows, the analysis of turbomachines with deviations from ideal theory, the properties and behaviour of gas mixtures, the fundamental principles of combustion and reacting flows, the fundamentals of psychrometrics and air-conditioning processes, and to provide an understanding of the various energy systems and its role in the national energy landscape. It covers: Forced and free convection over flat plates and other geometries; Application of the Euler equation and velocity triangles to turbomachines with slip factor and losses, similarity rules and performance curves of turbomachines; Behaviour of gas mixtures for temperature, concentration and pressure and the calculation of gas mixture properties; Theoretical and actual combustion processes, enthalpy of formation, first law analysis of reacting systems and adiabatic flame temperature; The concentration boundary layer, analogy between mass and heat transfer, properties of moist air and pshychrometrics applied to air-conditioning processes; Analyses of different energy systems, both thermal and non-thermal, and scenario planning in the global energy landscape.
Lecture times: 5 Lectures per week
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4126F   INTEGRATING EMBEDDED SYSTEMS

16 NQF credits at NQF level 8
Convener: Mr J Hepworth
Course entry requirements: EEE2046S, MEC3074F
Co-requisites: None
Course outline:
This course aims to bring together elements of engineering previously covered in electrical and mechanical courses, and to ensure that each student is equipped with the necessary skills to deal with the complexity that this integration brings. Skills to be developed include: Further knowledge of analogue circuitry including transistors (BJT and FET types) and H-bridges; operational amplifiers and their use in comparators, compensators, filters and level-adjusters; power sources design; PCB layout and simulation; version control; further training in C programming for microcontrollers including algorithms, libraries, coding standards and conventions, state machines, abstraction, and embedded control. Students on this course will gain the knowledge to program a microcontroller to make use of its main peripherals, use this microcontroller to interface with electronic circuits designed to facilitate obtaining and monitoring information from various sensors and to use this information to perform measurement and control tasks.
Lecture times: 4 Lectures per week
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4127F   MECHATRONIC SYSTEMS

16 NQF credits at NQF level 8
Convener: Mr A Pretorius
Course entry requirements: MEC3074F, MEC3079S, EEE2046S
Co-requisites: MEC4126F
Course outline:
The aim of this course is to provide both theoretical and practical exposure to the interdisciplinary field of mechatronic systems, building on previously covered mechatronics-related courses and concepts. Specific topics covered include: industrial control practices, systems, and networks; programmable logic controllers and associated programming languages; industrial diagrams and automation drawings; industrial safety systems; mechatronics design philosophies and architectures; project specifications; and testing and simulation of mechatronic systems. The course will additionally cover a subset of the following topics: system identification methods; forward and inverse kinematics of robotic platforms; path planning and trajectory generation; nonlinear control techniques; constrained optimisation; computer vision; state estimation; and introduction to robotic middleware and interfacing.
Lecture times: 4 Lectures per week.
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

MEC4128S   FINAL-YEAR ENGINEERING PROJECT

20 NQF credits at NQF level 8
Convener: Mr E Ismail
Course entry requirements: AYOS 4
Co-requisites: None
Course outline:
The final-year engineering project requires students to investigate a topic related to engineering beyond that explicitly taught in the curriculum. They are required to undertake an analysis of that topic, drawing on literature and/or data as appropriate, to address the engineering problem/question(s) posed. The outcome of the project will be a deeper understanding of that topic.
Lecture times: 1 Lecture per week
DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.
Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

OTHER COURSES IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

Course Outlines

END1000F/S   ELECTIVE PLACEHOLDER 18 CREDITS

18 NQF credits at NQF level 5

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

END1019L   SOCIAL INFRASTRUCTURES: ENGAGING WITH COMMUNITY FOR CHANGE

Located in Professional Communications Studies (PCS) and delivered by CHED.

18 NQF credits at NQF level 5

Convener: Dr. B Moolman

Course entry requirements: None. Enrolment is limited to 100 full-time students (90 from the Faculty of Engineering & the Built Environment and 10 from other faculties) on a first come first served basis.

Course outline:

This elective is open to students from all departments and faculties, and contributes to the Complementary Studies B requirement of engineering students. The course provides a space to explore the nexus of 'university studies and knowledge' on the one hand, and 'community issues and knowledge' on the other. Central to this exploration is the concept of 'social infrastructures'. Social infrastructures recognises that 'development' is a socio-technical process, giving rise to particular relationships between households and communities, shaped by the institutional and political context. It is also used to understand the complex set of relationships or forms of social capital developed within under-resourced communities and used to leverage social change. Through a combination of on- and off-campus classes, we utilise a process of 'horizontal learning' to explore learning and engagement with a range of community partners in the greater Cape Town area. We look particularly at how we, as students and emerging professionals, might engage with and learn from communities in the context of development and social justice.

Lecture times: Winter term

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

END1019P   SOCIAL INFRASTRUCTURES: ENGAGING WITH COMMUNITY FOR CHANGE

18 NQF credits at NQF level 5

Convener: Dr. B Moolman

Course outline:

This elective is open to students from all departments and faculties, and contributes to the Complementary Studies B requirement of engineering students. The course provides a space to explore the nexus of 'university studies and knowledge' on the one hand, and 'community issues and knowledge' on the other. Central to this exploration is the concept of 'social infrastructures'. Social infrastructures recognises that 'development' is a socio-technical process, giving rise to particular relationships between households and communities, shaped by the institutional and political context. It is also used to understand the complex set of relationships or forms of social

capital developed within under-resourced communities and used to leverage social change. Through a combination of on- and off-campus classes, we utilise a process of 'horizontal learning' to explore learning and engagement with a range of community partners in the greater Cape Town area. We look particularly at how we, as students and emerging professionals, might engage with and learn from communities in the context of development and social justice.

Lecture times: Summer term

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

END1023S   CITIZEN PROFESSIONALS IN ENGINEERING AND THE BUILT ENVIRONMENT

18 NQF credits at NQF level 5

Convener: TBC

Course entry requirements: None

Course outline:

This course through a process of learning, active listening, critical thinking and engagement, will challenge students to ask questions, reflect and develop views on topics around global concerns, social justice, inequality and citizenship. This will give students a sense of the broader social context into which they will apply their technical skills as professionals in engineering and the built environment. Topics include Global Debates, Local Voices; Service Citizenship and Social Justice and Active Citizenship through Dialogue and Deliberation.

Lecture times: Monday's 6th-9th periods plus 12 hours community/activation.

DP requirements: Please refer to the official course handout document for detailed information regarding the DP requirements for this course.

Assessment: Please refer to the official course handout document regarding the assessment criteria for this course.

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)

ACC1006F/S   FINANCIAL ACCOUNTING
18 NQF credits at NQF level 5
Convener: M Gajewski / N Daniels
Course entry requirements: Admission to degree. NSC level 5 in Mathematics and level 4 in English HL (or level 5 in English FAL).
Course outline:
Financial Accounting is predominantly an applied discipline that is based on broad conceptual principles. It starts with an understanding of the business cycle and various decisions taken in a business. Particular emphasis is placed on recording financial transactions in accounting records and interpreting financial transactions through the application of definitions and recognition criteria as set out in accounting framework. Students will also be required to prepare and present basic financial statements.
Lecture times: ACC1006F Tues, Wed, Thurs, Fri 13:00 – 14:00; 14:00 – 15:00; ACC1006S Tues, Wed, Thurs, Fri 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) AND an average of 40% for assignments.
Assessment: Coursework: 35% Exam: 65%

ACC1012S   BUSINESS ACCOUNTING
This course is a terminating course and does not lead to a 2000 level Accounting course.
18 NQF credits at NQF level 5
Convener: J Kew
Course entry requirements: A minimum 40% final mark for ACC1006.
Course outline:
This course builds on the foundation developed in Financial Accounting and is geared towards students who will not continue with financial reporting after first year. The course is designed to focus on analysing and interpreting financial statements as well as expose students to the remaining accounting disciplines namely taxation, management accounting and corporate governance.
Lecture times: Mon, Tues, Wed, Thurs, Fri 14:00 – 15:00
DP requirements: 75% course participation (details will be provided in course documentation) and a weighted average of 38% for class tests.
Assessment: Coursework: 35%-50% Exam: 50%-65% (final weightings will be provided in the course documentation, and will be determined by the modes of delivery and assessment permissible in terms of the public health restrictions in place)

ACC2022H   MANAGEMENT ACCOUNTING I
18 NQF credits at NQF level 6
Convener: J Dean
Course entry requirements: ACC1006
Course outline:
An introduction to the discipline of Management Accounting; the analysis of cost systems, cost classification, and cost behaviour; product costing including job costing and process costing; the allocation of costs from service departments; absorption and variable costing; activity based costing; cost-volume-profit relationships, relevant costing and cost benefit analyses; budgeting systems; standard costing and flexible budgeting; financial performance measurement in business segments.
Lecture times: TBA
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% Exam 60%.

INFORMATION SYSTEMS

Associate Professor and Head of Department:
ITJ Brown, BScEng(Hons)(Electrical) *Zimbabwe* GradDipBusComp MInfSys *Curtin* PhD *Cape Town*

INF2009F   SYSTEMS ANALYSIS
18 NQF credits at NQF level 6
Convener: E Scott / A Pekane
Course entry requirements: INF1003F or equivalent or INF1003F as co-requisite.
Course outline:
This course explores the role of the Systems Analyst in business, different approaches used in the development of information systems, and the various tools and techniques used in the specification of system requirements.
This course is intended to provide students with an in-depth knowledge of the systems development process, with particular emphasis on the analysis stage of the life cycle. There is a strong practical component to the course, where students will be taught to understand and use the common tools of object-oriented systems analysis. These tools and techniques include scoping, risk analysis, feasibility assessment, prototyping, JAD and techniques commonly used in object oriented systems. The course will also strongly focus on the design of UML models including package, activity, use case, class, interaction and state machine diagrams. INF2009F is closely linked with INF2011S and students will implement an information system in the second semester based on these user requirements and in doing so will have completed the whole systems development life cycle (SDLC).
Lectures & Practical Workshops: Lecture material with relevant exercises, quizzes and workshop will be released every Monday morning. All exercises, quizzes and workshops of the previous week must be submitted before the new material is released. Online Help (Vula Q & A) and/or Low Density interactions will be scheduled every Thursday during periods 3rd, 4th, 5th & 8th for the Practical Workshops.
Lecture times: Monday to Wednesday, 4th period, Practical workshops: Thursday 3rd & 4th periods OR 4th & 5th OR 8th & 9th
DP requirements: 80% attendance at workshops, completion of all deliverables, sub-minimum of 45% for course year mark. Submitted at least 80% of the coursework.
Assessment: The final grade is derived from results of the Coursework (Formative Assessment: 35% + Summative Assessment 25%) and the Final Examination (40%). Sub-minimum of 40% for the final examination.

FINANCE AND TAX

Associate Professor and Head of Department:
R Kruger, BBusSc MBusSc PhD *Cape Town*

FTX1005F/S   MANAGERIAL FINANCE

18 NQF credits at NQF level 7
Convener: FTX1005F C Abdulla/ FTX1005S N Jwara
Course entry requirements: Matriculation mathematics or registration for the Post graduate diploma in Management in Entrepreneurship, Marketing Sport Management Tourism and Business Communication.
Objective: This course is designed to provide a general introduction to the study of the financial function in business, particularly in a South African environment. The course has two primary objectives: Firstly, to expose students with little or no commercial or financial background to the fundamentals of the financial aspects of business and the environment in which businesses operate. The second objective is to afford the students with the opportunity of gaining as much practical experience as possible in key areas of Finance, Management Accounting and Accounting.
Course outline:
This course is designed to introduce students with little or no commercial or financial background to the fundamentals of managerial finance. Having completed the course students should have a basic understanding of accounting concepts, be able to read financial statements and perform basic (ratio) analysis of key performance areas of the business, understand the concept of time value of money, employ basic steps toward efficient working capital management and have a basic understanding of capital budgeting and valuations. The course covers the following key topics: Introduction to basic accounting concepts, understanding annual financial statements, source of finance, basic financial ratio analysis, investments, risk & return, working capital management, cost volume profit analysis, budgeting, time value of money, basic valuations, cost of capital, discounted cash flow, and capital budgeting.
Lecture times: Monday, Wednesday, Thursday & Friday: 12h00 -12h45
DP requirements: Writing all class tests. Attendance and submission of 80% of tutorials. Satisfactory completion of all projects and assignments. 40% average year mark.
Assessment: Class tests, 1-10%; 2-10%; objective tests (10%); 2 group projects20% (2 x 10%); final examination (50%).

FTX2000S   PERSONAL FINANCIAL MANAGEMENT

18 NQF credits at NQF level 7
Convener: C Abdulla
Course entry requirements: Students must be in at least their 2nd year of study to register for the course. 3rd and 4th year students may also register for the course
Course outline:
The course introduces students to the fundamental principles of sound financial management at the individual level and equips them with the tools to ensure that they are better able to manage their personal finances. Topics covered include basic financial planning, time value of money, credit management, real estate, the basics of investing, personal income tax, medical schemes and insurance and estate and retirement planning. While the course provides a sound theoretical grounding in these topics, the focus is on practical application and real-world relevance.
Lecture times: Monday, Tuesday & Wednesday: 15h00 -15h45
DP requirements: Completion and submission of at least 80% of tutorial assignments and attendance at 80% of tutorial sessions, and 40% average year mark.
Assessment: Assessment Weighting: Students will be required to complete weekly tutorial assignments and a Group Investment project (10%) will be prepared and submitted for grading. In addition to the project 10%, the balance of the marks are made up as follows: weekly objective tests 10% (best of 5 counts); two class tests 20% (2 x 10%) and final exam 60% will be written.

FTX2020F   BUSINESS FINANCE

NOTE: This course is NOT for students intending to major in Finance in a Commerce degree and is not a substitute for FTX2024F/S as a course entry requirement for further studies in Finance.
18 NQF credits at NQF level 6
Convener: E. Swanepoel
Course entry requirements: A DP in MAM1010 or equivalent, or a DP in STA1001F/S or equivalent
Co-requisites: ACC1006F
Objective: The course is designed to provide an overview of activities, decisions, and techniques used to fund and manage businesses efficiently. The course also provides an introduction to investment and financial markets.
Course outline:
Business Finance serves as an introduction to the concepts of corporate finance. It covers the principles of corporate finance, commencing with mastery of the tools and techniques essential for financial management and proceeding to the principles underlying investment and financing decisions made by large corporations listed on a securities exchange. The course also aims to provide an entrepreneurial focus, equipping the prospective entrepreneurs with some of the quantitative decision making tools required for a successful business venture.
Lecture times: Tuesday, Wednesday, Thursday, and Friday: 15h00 -15h45.
DP requirements: 40% for coursework, completion of all required submissions and tests, attendance of 80% of the tutorials.
Assessment: Students will be required to write two tests, each with a weight of 20% and a final exam of 60%.

SCHOOL OF ECONOMICS

Director of the School:
L Edwards, BA *Cape Town* BA(Hons) *Rhodes* MA MSc LSE PhD *Cape Town*

ECO1007S   ECONOMICS FOR ENGINEERS

This course is open to all students not specializing in economics but seeking an introduction to the discipline. It is aimed at providing a broad perspective on the subject covering topics from both the core microeconomics and macroeconomics syllabus. The course concentrates more on an understanding of economic concepts and their applications rather than rigorous proofs and analysis. NB: As all Commerce students are required to register for ECO1010 and ECO1011, this course is not available to Commerce students.
18 NQF credits at NQF level 5
Convener: C Van Walbeek
Course entry requirements: None
Course outline:
ECO1007S is a one semester course that introduces students to the core concepts in both micro- and macroeconomics. The focus is on the understanding of theoretical concepts and applications, rather than on rigorous proofs. Microeconomics focuses on the decisions of individual consumers, producers, and households, and in this section we look at standard economic models including the production possibility frontier, demand and supply analysis, and elasticity. We also explore the idea of comparative advantage as it applies to specialisation and trade. Macroeconomics focuses on the economy as a whole and in this section of the course we unravel the meaning, application, and limitations of such everyday concepts as money, inflation, exchange rates, unemployment, and GDP.
Lecture times: 12h00 - 13h00 Tuesday, Wednesday, Thursday & Friday
DP requirements: All class tests to be completed. Only students who have obtained DP certificates may write the final examination.

Assessment: Coursework: 50%; Exam: 50%. The course outline will provide more detail on the breakdown for submission weightings and variation for exemptions and absences.

ECO1010F/S   MICROECONOMICS
18 NQF credits at NQF level 5
Convener: N Narker
Course entry requirements: Admission to degree. National Senior Certificate: a pass (5) in Mathematics.
Co-requisites: There is no co-requisite, but students are strongly advised to do a formal mathematics course (MAM1010 or equivalent). Not having done such a course will preclude entry to second year Economics.
Course outline:
This is an introductory course in microeconomics, which aims to expose students to a wide variety of microeconomic concepts and theories as well as certain practical applications of these concepts. The course begins with a discussion of economic history and the characteristics of different economic systems, as well as factors influencing economic development following the Industrial Revolution. Hereafter, students are introduced to topics within the standard utility-maximisation theory of consumption, including optimal-bundle and indifference curve analysis. Students are then exposed to game theoretical frameworks to model social interactions amongst economic agents, before applying this framework to wage-setting relationships in the labour market. Applications of experimental economic methods are also briefly explored. Finally, students are introduced to the standard neo-classical theories of supply and demand as well as firms' pricing decisions under differing levels of market competition.
Lecture times: ECO1010F 09h00 – 10h00 Tuesday, Wednesday, Thursday & Friday10h00 – 11h00 Tuesday, Wednesday, Thursday & Friday11h00 – 12h00 Tuesday, Wednesday, Thursday & Friday12h00 – 13h00 Tuesday, Wednesday, Thursday & Friday **ECO1010S** 12h00 – 13h00 Tuesday, Wednesday, Thursday & Friday
DP requirements: You are required to attend the assigned tutorials. If you do not attend 70% of these you will be refused a DP, i.e., you will not be entitled to write the examination. Your year mark contributes a half of your final total for the course. If your year mark is below 30% you will not be permitted to write the final examination. If you choose not to submit your essay or not to write a test you will be given a mark of zero for that component of the course, but will be allowed to write the examination provided your year mark is above 30%.
Assessment: Coursework 50%; Exam 50%. The course outline will detail the breakdown for submission weightings and variation for exemptions and absences. *Note: The ECO1010F supplementary/deferred exam will be scheduled during the last week of the mid-year vacation. If students do not write this exam they will be marked as AB and will have to retake the course. The ECO1010S supplementary/deferred exam will be scheduled during January of the following year. If students do not write this exam, they will be marked as AB and will have to retake the course.*

ECO1011F/S   MACROECONOMICS
18 NQF credits at NQF level 5
Convener: L Mateane – ECO1011F & L Neethling – ECO1011S
Course entry requirements: A minimum mark of 50% for ECO1010F/S or ECO1110F/S. ECO1010F/S may be taken concurrently with ECO1011F/S if ECO1010F/S has been previously attempted.
Course outline:
This course is an introductory level course in macroeconomic theory and policy. Macroeconomics studies the aggregate behaviour of the economy. The list of topics covered include gross domestic product, economic growth, unemployment, inflation, exchange rates, balance of payments, business cycles, fiscal and monetary policy tools and objectives. The course will build on macroeconomic relationships to develop basic models explaining various interactions within the economy, providing students with a framework for understanding and interrogating the workings of the economy. The

course emphasizes relevant and current issues in the context of South African economic history. We also explore South Africa's relationship with the rest of the world.

Lecture times: ECO1011F 15h00 – 16h00 Monday, Tuesday, Wednesday & Thursday **ECO1011S** 09h00 – 10h00 Tuesday, Wednesday, Thursday & Friday10h00 – 11h00 Tuesday, Wednesday, Thursday & Friday11h00 – 12h00 Tuesday, Wednesday, Thursday & Friday12h00 – 13h00 Tuesday, Wednesday, Thursday & Friday

DP requirements: You are required to attend the assigned tutorials. If you do not attend and submit 70% of these you will be refused a DP, i.e., you will not be entitled to write the examination. Your year mark contributes one half of your final total for the course. If your year mark is below 30% you will not be permitted to write the final examination. If you choose not to submit your essay or not to write a test you will be given a mark of zero for that component of the course, but will be allowed to write the examination provided your year mark is above 30%.

Assessment: Coursework: 50%; Exam: 50%. The course outline will detail the breakdown for submission weightings and variation for exemptions and absences. *Note: The ECO1011F supplementary/deferred exam will be scheduled during the last week of the mid-year vacation. If students do not write this exam they will be marked as AB and will have to retake the course.*

ECO2003F   MICROECONOMICS II

18 NQF credits at NQF level 6

Convener: L Edwards

Course entry requirements: ECO1010 and MAM1010 (or an equivalent). Students will be allowed to register for ECO2003 if they obtained at least 40% for MAM1000W. No concessions will be granted to students who obtained less than 40% for MAM1000W.

Course outline:

The course formalises consumer and producer optimisation, and explores markets under perfect and imperfect competition. The course introduces the concept of uncertainty and how different agents respond to uncertainty. The course also considers industrial organisation, looking at models that relax the critical assumptions of perfect competition. All sections of the course incorporate applications.

Lecture times: 09h00 – 10h00 Monday, Tuesday, Wednesday, Thursday, Friday,12h00 – 13h00 Monday, Tuesday, Wednesday, Thursday, Friday,13h00 – 14h00 Monday, Tuesday, Wednesday, Thursday, Friday

DP requirements: All class tests and essays/projects to be completed, and a weighted average mark of 30% for the tests, essays/projects and tutorials homework must be achieved. Only students who have obtained DP certificates may write the final examination.

Assessment: Coursework: 50%; Exam: 50%. The course outline will detail the breakdown for submission weightings and variation for exemptions and absences. *Note: The ECO2003F supplementary/deferred exam will be scheduled during the last week of the mid-year vacation. If students do not write this exam they will be marked as AB and will have to retake the course.*

ECO2004S   MACROECONOMICS II

18 NQF credits at NQF level 6

Convener: R Lepelle

Course entry requirements: ECO1010, ECO1011, and MAM1010 (or an equivalent). A student will be permitted to take ECO2004S without having passed ECO2003F, although it is desirable to pass ECO2003F prior to taking ECO2004S. If a student gets at least 40% for MAM1000W they will be allowed to register for ECO2004.

Course outline:

The course builds upon ECO1011S and aims to provide students with the analytical tools and formal models to explain the behaviour of output, inflation, employment, interest rates, and other economic aggregates. These tools are used to understand current economic issues, forecast the behaviour of the economy, and assess the impact of policy choices. Specifically, the course starts with analysing the short run behaviour of the economy through the IS-LM model before it moves on to consider the medium run through the AS-AD model. Finally, it looks at the factors that influence long run growth

using the Solow growth model. Analysis of the open economy, such as trade and exchange rate regimes, is also undertaken.

Lecture times: 09h00 – 10h00 Monday, Tuesday, Wednesday, Thursday,12h00 – 13h00 Monday, Tuesday, Wednesday, Thursday,13h00 – 14h00 Monday, Tuesday, Wednesday, Thursday

DP requirements: Students must write the 2 tests and the essay and must obtain a weighted average mark of 30% for the 2 tests and the essay. Only students who have obtained DP certificates may write the final examination.

Assessment: Coursework: 50%; Exam: 50%. The course outline will detail the breakdown for submission weighting and variation for exemptions and absences.

SCHOOL OF MANAGEMENT STUDIES

Head of Department:
S Goodman, BSocSc(Hons) MBusSc PhD *Cape Town*

BUS1036F/S   EVIDENCE-BASED MANAGEMENT
First year status, first or second semester, (depending on degree stream).
18 NQF credits at NQF level 5
Convener: J Rousseau
Course entry requirements: Admission as First Year Faculty of Commerce students, or by permission of Head of the School.
Course outline:
This course is intended to furnish students with the intellectual resources required for success in a globalised knowledge-dependent economy. The focus is on the development of critical reasoning skills, in particular, the skills involved in assessing the quality of evidence available; using that evidence to reach the best-justified conclusion possible; and then efficiently and persuasively communicating those conclusions to relevant stakeholders. More broadly, the course focuses on developing the means to form independent judgements about contentious issues of policy and practice. The approach of the course is centred on case studies and controversies in areas of special relevance to understanding commercial activity as occurring within particular social and political environments, and on how those environments affect our ability to make rational decisions.
DP requirements: Submission of all coursework assignments. Achieving a weighted average of at least 40% for all coursework.
Assessment: Tutorials 50% Examination 50%A sub-minimum of 45% must be achieved in the final examination. First semester students who qualify are permitted to write their Supplementary Exams with the second semester students, by permission of the Head of School.

BUS2010F/S   MARKETING I
0 credits if taken as part of a Postgraduate Diploma in Management offered by the School of Management Studies
18 NQF credits at NQF level 6
Convener: N Madinga
Course entry requirements: Students should be in their second AYOS or above
Objective: To give an overview of the Marketing Process considering current trends in the South African context. The course will stress the importance of the Marketing Concept, Target Marketing and the Marketing Mix as a means of formulating a Marketing Strategy with the view to achieving the strategic objectives of an organisation.
Course outline:
The marketing concept, the marketing environment, consumer markets and industrial markets, buyer behaviour, marketing research, the use and importance of differentiation, market segmentation and target marketing, the marketing mix, product policy, pricing policy, distribution policy, promotion policy, marketing strategy, marketing organisation and implementation, measurement and control of marketing effectiveness including the marketing audit.

DP requirements: 40% class mark and the completion of all required assignments.
Assessment: Essays, case studies, project and test 50%; June / October examinations (2 hours) 50%

Centres and Departments Established in the Faculty of Humanities

AFRICAN STUDIES AND LINGUISTICS, DEPARTMENT OF

The Department of African Studies and Linguistics is housed in TBA and can be contacted by email at: TBA, or telephone at: TBA.

The letter code for all courses offered in the Department is ASL.
Departmental website: TBA

Head of Department:
TBA

Emeritus Professors:
B Cooper, MA *Birmingham* PhD *Sussex*
R Lass, PhD *Yale*
N Love, DPhil *Oxon*
K McCormick, PhD *Cape Town*
R Mesthrie, DST/NRF Chair in Migration, Language and Social Change, BPaed *UDW* BA(Hons) *Cape Town* BA(Hons) *Unisa* MA *Texas* PhD *Cape Town*
L Ntsebeza MA *Natal* PhD *Rhodes*

Honorary Professor:
A Bogues, PhD *West Indies*

Professors:
H Chitonge, MA PhD *UKZN*
A Deumert, MA *Freiburg* PhD *Cape Town*
TBA

Associate Professor:
C Ouma, BA(Hons) *Moi University Eldoret* MA PhD *Witwatersrand*

Lecturers:
J Brown, BA(Hons) MA *Cape Town*
S Mpendukana, BA(Hons) MA *UWC*
Z Msomi, MPhil *Rhodes* PhD *Cape Town*
T Thipe, MSocSc *Cape Town* MA MPhil PhD *Yale*
M Thompson, BA(Hons) MA *UWC* PhD *Stell*

Administrative Assistants:
F Steffenson
TBA

ASL1200S   AFRICA: CULTURE, ID & GLOBALISATION

Please note that this course does not count as a credit towards a Humanities degree. NB: this is a service course designed specifically for non-Humanities students preparing themselves for a life of professional practice.

8 NQF credits at NQF level 5; First-year, second-semester course, one lecture and one compulsory tutorial per week.

Convener: Dr T Thipe

Course entry requirements: This course is for non-Humanities students only and does not count towards Humanities degrees.

Course outline:

This is a service course designed specifically for non-Humanities students preparing themselves for a life of professional practice. Broad-based and introductory, it is intended to satisfy the complementary studies requirements of professional institutes (like the Engineering Council of South Africa). It does this by focusing on contexts and ideas which will be of direct benefit in professional practices, as well as on more abstract ideas which will be generally enriching.

In the time available, this course sets out to introduce and discuss the dynamic interplay between the various forces of globalisation and the impact on culture and identity in Africa. The ideas explored and debates encouraged in the course are expected to contribute towards a more thoughtful professional practice and critical awareness of social and historical context, particularly, the post-colonial context in Africa.

From Cape Town to Algiers and Puntland, the course examines a range of different contemporary issues, historical moments and diverse localities across the continent. Dominant concepts and vocabularies that operate in relation to complex processes of globalisation which impact everyday life in distinctly different ways are critically discussed as "tools to think with."

Lecture times: Friday, 5th period.

DP requirements: Attendance at lectures and tutorials is compulsory, failing which students' papers may not be marked.

Assessment: Continuous assessment (essays, projects, tests, etc.) counts 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

Director: J Franco

Administrator: T Murphy

CML1001F   BUSINESS LAW I

18 NQF credits at NQF level 5

Convener: K Lehmann

Course entry requirements: None

Course outline:

The purpose of the course is to provide students with a general introduction to the South African legal system, with its main focus the law of contract. The course starts with an overview of the South African court structure and contemporary sources and branches of South African law, and also introduces students to the Constitution and the impact that it continues to have on legal development. The course then provides students with a general but comprehensive introduction to the general principles of contract, focusing on formation of contracts, the content of contracts, breach of contract and remedies for breach. The course also aims to provide students with an

introduction to certain specific contracts, most notably contracts of sale, lease and agency. The general principles of contract are supplemented by a consideration of legislation, in particular the provisions of the Consumer Protection Act, where relevant.
Lecture times: The course is an intensive one, with 5 contact periods per week for the full semester.
DP requirements: Coursework is compulsory. If the student does not submit hand-ins or write a test the student will receive a mark of 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Coursework 40%; final examination 60%.

CML1004S   BUSINESS LAW I
18 NQF credits at NQF level 5
Convener: K Lehmann
Course entry requirements: None
Course outline:
The purpose of the course is to provide students with a general introduction to the South African legal system, with its main focus the law of contract. The course starts with an overview of the South African court structure and contemporary sources and branches of South African law, and also introduces students to the Constitution and the impact that it continues to have on legal development. The course then provides students with a general but comprehensive introduction to the general principles of contract, focusing on formation of contracts, the content of contracts, breach of contract and remedies for breach. The course also aims to provide students with an introduction to certain specific contracts, most notably contracts of sale, lease and agency. The general principles of contract are supplemented by a consideration of legislation, in particular the provisions of the Consumer Protection Act, where relevant.
Lecture times: The course is an intensive one, with 5 contact periods per week for the full semester.
DP requirements: Coursework is compulsory. If the student does not submit hand-ins or write a test the student will receive a mark of 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Coursework 40%; final examination 60%.

CML2001F   COMPANY LAW
18 NQF credits at NQF level 6
Convener: R Bradstreet
Course entry requirements: Business Law 1 and no undergraduate student in his/her first year of study may register for Company Law.
Course outline:
The course offers an overview of the laws that govern the nature, formation, and management of partnerships, trusts, companies and close corporations with the main focus being on companies. Students are encouraged to apply the analytical abilities acquired in previous law courses and these skills are further developed. After the course students will be able to, amongst others, navigate the Companies Act 71 of 2008 and will be familiar with its core provisions and their practical impact.
Lecture times: The course is an intensive one with 5 contact periods per week for the full semester.
DP requirements: Coursework is compulsory. If the student does not submit hand-ins or write a test the student will receive a mark of 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Coursework 40%; final examination 60%.

CML2005F   LABOUR LAW
18 NQF credits at NQF level 6
Convener: TBA
Course entry requirements: No undergraduate student in his/her first year of study may take Labour Law. It is recommended that students have passed a foundation course in law, e.g. Business Law I.
Course outline:
This course aims to provide students with an understanding of the common law contract of employment and labour law statutes; including the Labour Relations Act; Basic Conditions of the Employment Act; and the Employment Equity Act. The course will specifically focus on the following issues that commonly arise in the workplace: the legal definition of 'employee'; discipline and dismissals; unfair labour practices; unfair discrimination in employment and recruitment and selection; employment equity issues; collective bargaining; strikes and lock-outs; and dispute resolution.
Lecture times: This course is an intensive one, with 3 lectures per week for the full semester.
DP requirements: Coursework is compulsory. If the student does not submit hand-ins or write a test the student will receive a mark of 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Coursework 40%; final examination 60%.

CML2010S   BUSINESS LAW II
18 NQF credits at NQF level 6
Convener: J Franco
Course entry requirements: Business Law I and no undergraduate student in his/her first year of study may register for Business Law II.
Course outline:
Business law 2 is designed to give students an understanding of commercial transactions, how they are financed and the risks involved. The course covers insolvency, credit agreements, the various forms of security that can be used to finance commercial transactions as well as insurance. By the end of the course, students should have an appreciation of the types of legal issues that commonly arise in financing transactions – how creditors can best secure themselves in the event of non-payment and ultimately the risk of insolvency and how debtors are protected under the National Credit Act. The course also covers the responsibilities of an accounting officer in the public sector, looking specifically at the Public Finance Management Act 1999 and the Municipal Finance Management Act 2003 and related laws.
Lecture times: The course is an intensive one, with 5 contact periods per week for the full semester.
DP requirements: Coursework is compulsory. If the student does not submit hand-ins or write a test the student will receive a mark of 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Coursework 40%; final examination 60%.

CML4607F   LAW FOR ENGINEERS
First semester course, four lectures per week.
10 NQF credits at NQF level 8
Convener: Dr E Fergus
Course entry requirements: This course is only available to BSc(Eng) Electrical Engineering; BSc(Eng) Electrical and Computer Engineering and BSc(Eng) Mechatronics students.
Course outline:
The course is designed to give students a general understanding of the legal issues they will face in their engineering careers and to enable them to act professionally and ethically. The course gives an overview of the South African legal system, and then provides a general but comprehensive synopsis of the law of contract, labour law, corporate governance and the various entities which can

be used for conducting business and the legal implications of each. In addition students are given an introduction to intellectual property. By the end of the term students should have an appreciation of the types of issues and risks that commonly arise in the socio-legal context of engineering practice.
Lecture times: There are 4 contact sessions per week in this intensive course.
DP requirements: Completion of assignment and class test is compulsory. If the student does not submit the assignment or write the test the student will receive 0 for that assessment (unless granted an exemption). But the student will be able to write the exam.
Assessment: Assignment (20%), Class test (20%), Exam (60%)

SUMMER TERM SERVICE COURSES
Admission Criteria: The following courses will be limited to a **maximum of 75 students**. Once this number has been reached, no further students will be registered for the course.
Note: A first year student may not do a law course during Summer Term.
Note: Students may not anticipate a course in order to lighten their standard workload

In addition to the above, only the following students are eligible to do these law courses in Summer Term:
a) Semester Study Abroad Students (from UCT), registered in the Commerce Faculty who need the course to graduate in the current year;
b) Construction Studies students who require Business Law I as a prerequisite for CON3032W and who already have a full credit load and which could impact on their graduation;
c) Students for whom the course is the only course required in order to graduate (i.e. it is the only scheduled course outstanding for the degree);
d) Students who require the course in order to graduate in the current year of study and who are already carrying a normal scheduled workload.

Note: In the event of an over-subscription students may have to be de-registered for the course and preference will be given to students in the order of the above categories i.e. first group (a), second group (b) and so on. **Students must register by 1 October and will be notified by the end of October if they are to de-register. But students in categories (c) and (d) may register up to 15 December.**

Note: A course will only run if **a minimum of 45 students** register for the course – if fewer students register, the course will be withdrawn due to insufficient demand.

The authority and responsibility for administering the admission criteria and registering students on the Summer Term programme rests with each student's home faculty.

STUDENTS MUST STATE WHICH CATEGORY (a-d) THEY FALL INTO WHEN REGISTERING.

CML1001P   BUSINESS LAW I - SUMMER TERM
18 NQF credits at NQF level 5
Convener: TBA
Course entry requirements: None
Course outline:
Refer to course outline for CML1001F/CML1004S.
Lecture times: Lectures are offered on a daily basis for three hours over a four-week period.
DP requirements: Writing the test is compulsory. If a student does not write the test and does not get an exemption then the student will be marked absent and awarded 0 for the test. But the student will be able to write the exam.
Assessment: Test 40%; final examination 60%.

CML2001P   COMPANY LAW - SUMMER TERM
18 NQF credits at NQF level 6
Convener: TBA
Course entry requirements: No undergraduate student in the first year of study may register for Company Law. Business Law I is a prerequisite for Company Law, and students cannot register for Company Law unless they successfully completed Business Law I in the previous year of study.
Course outline:
Refer to course outline for CML2001F.
Lecture times: Lectures are offered on a daily basis for three hours over a four-week period
DP requirements: Writing the test is compulsory. If a student does not write the test and does not get an exemption then the student will be marked absent and awarded 0 for the test. But the student will be able to write the exam.
Assessment: Test 40%; final examination 60%.

CML2005P   LABOUR LAW - SUMMER TERM
18 NQF credits at NQF level 6
Convener: TBA
Course entry requirements: No undergraduate student in his/her first year of study may take Labour Law. It is recommended that students have passed a foundation course in law, e.g. Business Law I.
Course outline:
Refer to course outline for CML2005F.
Lecture times: Lectures are offered on a daily basis for three hours over a four-week period.
DP requirements: Writing the test is compulsory. If a student does not write the test and does not get an exemption then the student will be marked absent and awarded 0 for the test. But the student will be able to write the exam
Assessment: Test 40%; final examination 60%

CML2010P   BUSINESS LAW II - SUMMER TERM
18 NQF credits at NQF level 6
Convener: TBA
Course entry requirements: Business Law I. No undergraduate student in the first year of study may register for Business Law II.
Course outline:
Refer to course outline for CML 2010S.
Lecture times: Lectures are offered on a daily basis for three hours over a four-week period.
DP requirements: Writing the test is compulsory. If a student does not write the test and does not get an exemption then the student will be marked absent and awarded 0 for the test. But the student will be able to write the exam.
Assessment: Test 40% and final examination 60%.

Departments Established in the Faculty of Health Sciences

HUMAN BIOLOGY

Associate Professor and Head of Department:
M R Collins, BSc(Hons) *Stell* PhD *Cape Town* FECSS

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

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

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

HUB2005F   INTRODUCTION TO MEDICAL ENGINEERING
This course is intended as an introduction to the field of Biomedical Engineering and for students with an interest in applying for their engineering skills to the solution of problems in healthcare. This course is offered by the Division of Biomedical Engineering in the Department of Human Biology, and is particularly valuable for students considering postgraduate studies in Biomedical Engineering. Entrance may be limited.
8 NQF credits at NQF level 6
Convener: Dr T Mutsvangwa and Dr T Abdalrahman
Course entry requirements: None
Objective: To provide an introduction to biomedical engineering in particular to undergraduate students.
Course outline:
This course provides an introduction to the field of biomedical engineering to undergraduate students in the Faculty of Engineering and the Built Environment and others. Topics include an overview of medical technology and innovation, medical imaging, image processing, and biomechanics of the musculoskeletal system.
DP requirements: None
Assessment: Class test: 20%; Group presentation: 30%; June examination: 50%.

HUB4045F   INTRODUCTION TO MEDICAL IMAGING & IMAGE PROCESSING
12 NQF credits at NQF level 8
Convener: Dr M Jankiewicz
Course entry requirements: Students must be in their fourth year of study.
Course outline:
This course provides an introduction to the principles of physics and engineering involved in the acquisition and processing of medical images. Topics include mathematical tools of image processing; computed tomography; ultrasound; and magnetic resonance imaging.
DP requirements: A class average of 40% shall be obtained for the course.
Assessment: The assessment is through assignments, written assessment and/or a final project.

Departments and Units Established in the Faculty of Science

BIOLOGICAL SCIENCES

Associate Professor and Head of Department:
A M Muasya, MPhil *Moi* PhD *Reading*

BIO1000F   CELL BIOLOGY
18 NQF credits at NQF level 5
Convener: Dr J M Bishop
Course entry requirements: Admission will be restricted to students who have passed either NSC Physical Science or Life Science with at least 60%. *NOTE: Preference will be given to students registered in the Science Faculty. Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to BIO1000H from week 7.*
Course outline:
Basic biological principles and processes at a cellular level provide an essential grounding for future study in the life sciences. The structure and function of cell components is introduced, followed by an introduction to chemistry, including the structure and functions of biological macro-molecules. Cell division and the role of genetics in inheritance and the control of biological systems is then considered. This leads into an introduction to membrane physiology, metabolism and its regulation. Cellular processes that are considered in detail include the functioning of photosynthesis and cellular respiration, and how these relate to organismal physiology. Cellular communication and the immune system of animals complete the organismal physiology.
Lecture times: Monday - Friday, 5th period, Tutorials: One per week, by arrangement, Practicals: One afternoon per week, Monday, Tuesday, Wednesday or Thursday, 14h00 - 17h00. Attendance is compulsory for all lectures and practicals.
DP requirements: Attendance of at least 80% of practicals; completion of at least 80% of deliverables (including class tests); minimum of 40% for the class record.
Assessment: Class record counts 40% (three class tests count 27%; two practical tests count 5%; and a practical book mark counts 8%). One 2-hour examination paper (Theory) written in June counts 40%; a subminimum of 40% is required for this paper. One 1.5-hour examination paper (Practical) in June counts 20%.

CHEMISTRY

Professor and Head of Department:
T J Egan, BSc Hons PhD *Witwatersrand* MSACI

CEM1000W   CHEMISTRY 1000
NOTES: Preference will be given to students registered in the Science Faculty. Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to CEM1009H from week 7.
36 NQF credits at NQF level 5
Convener: Associate Professor G S Smith
Course entry requirements: Students wishing to register for CEM1000W will normally be expected to have passed NSC Physical Science with at least 60% and NSC Mathematics with at least 70%.

Course outline:
This course lays the foundation of chemistry in its context as a central science for scientists and engineers working in the chemical, biological or earth sciences or in chemical engineering. Fundamental concepts in chemistry are covered to illustrate their application to understanding the molecular nature of the world around us. Topics include microscopic and macroscopic concepts, atomic structure, chemical bonding and molecular structure, the chemistry of the elements and inorganic chemistry, chemical equilibrium, acids and bases, solubility, phases of matter, thermochemistry and thermodynamics, colligative properties, oxidation and reduction, electrochemistry and chemical kinetics. The course continues with an introduction to the language of organic chemistry, including structure and reactivity in organic chemistry, describing and predicting organic reactivity and the properties and reactivity of biologically important molecules. Practicals aim to develop essential manipulative and technical laboratory skills, as well as to draw links to interpreting the physical world in terms of its molecular nature. A blended approach to learning may be used where academic activities will be delivered online and face-to-face, if feasible. This will be at the discretion of the course convener.
Lecture times: Monday to Wednesday and Friday, 2nd or 4th period. Tutorials: Thursday 2nd or 4th period. Practicals: Tuesday, Thursday or Friday, 14h00 - 17h00.
DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.
Assessment: Class record (comprising tests, tutorials and practicals) counts 50%; one 3-hour examination written in November counts 50%. A subminimum of 40% is required in the final examination.

CEM1008F   CHEMISTRY FOR ENGINEERS
1 practical and/or tutorial per week.
16 NQF credits at NQF level 5
Convener: Dr C Oliver
Course entry requirements: Passed NSC Physical Sciences with at least 60% and NSC Mathematics with at least 70%.
Course outline:
This course is intended to develop an understanding of basic chemical concepts for students in Civil, Electro-mechanical and Mechanical Engineering. The course includes topics in chemical stoichiometry, some systematic inorganic chemistry, atomic structure and chemical bonding, with the emphasis on the structure of solids, chemical equilibrium and aqueous solution chemistry, acids and bases, thermochemistry, electrochemistry and corrosion of metals, polymers.
Lecture times: Monday to Wednesday & Friday 4th period. Tutorial/practical Monday 6th to 8th period.
DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.
Assessment: June examination of 2 hours counts 60%, course record counts 40%. It is necessary to obtain a subminimum of 40% for the June examination and obtain an aggregate of 50% to pass the whole course overall.

CEM2005W   INTERMEDIATE CHEMISTRY
48 NQF credits at NQF level 6
Convener: Dr G A Venter
Course entry requirements: For Science students: CEM1000W (or equivalent), 1000-level full course in Physics, 1000-level full or semester course in Mathematics. Concurrent registration for STA1000F/S (or equivalent) is highly recommended. For Chemical Engineering students: CEM1000W (or equivalent), PHY1012F/S, MAM1020F/S, CHE1005W
Course outline:
This course develops the foundations of a major in Chemistry at an intermediate level and allows continuation to third-year Chemistry for the completion of a major in Chemistry. The theory component features a set of intermediate topics, and the laboratory component develops both

experimental and interpretative skills. The course includes the following topics: spectroscopy and modern analytical tools, introduction to inorganic chemistry, organic structure and reactivity, thermodynamics, thermodynamics of solutions, phase equilibria, chemical reaction kinetics and equilibria, reactions of organic molecules (patterns, predictions and preparation of new products), introduction to coordination chemistry, structures and energetics of inorganic solids and electrochemistry. The practical course covers the same topics and aims to develop manipulative and technical laboratory skills including the application of modern analytical methods to the elucidation of chemical structures.

Lecture times: Monday - Friday, 3rd period. Tutorials by arrangement. Practicals, EBE: Tuesday, 14h00 - 17h00; Science: Thursday, 14h00 - 17h00.

DP requirements: Attendance and completion of practicals, tests and tutorial exercises; at least 40% average for practical exams.

Assessment: The class record (comprising tests and practicals) counts 50%; one 3-hour examination written in November counts 50%. The class record consists of class tests (25%), tutorials (5%) practical reports (10%) and practical exams (10%). A subminimum of 40% is required in the final examination.

COMPUTER SCIENCE

Associate Professor and Head of Department:
H Suleman, MSc *UDW* PhD *Virginia Tech*

CSC1015F/S   COMPUTER SCIENCE 1015
18 NQF credits at NQF level 5
Convener: A Safla
Course entry requirements: At least 70% for NSC Mathematics. *Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to CSC1010H from week 7.*
Course outline:
This course is an introduction to problem solving, algorithm development and programming in the Python language. It includes fundamental programming constructs and abstractions, sorting and searching techniques, and machine representations of data. The practical component covers input/output, conditionals, loops, strings, functions, arrays, lists, dictionaries, recursion, text files and exceptions in Python. Students are taught testing and debugging, as well as sorting and searching algorithms, algorithm complexity and equivalence classes. Number systems, binary arithmetic, Boolean algebra and logic gates are also introduced. The course is offered in a blended-learning format. Students are provided with a set of video lectures that they can watch multiple times. Student contact time is in a tutorial/practical format aimed at reinforcing the principles introduced in the online lectures and giving students time to do exercises under the supervision of tutors.
Lecture times: 4th or 5th period once per week, Tutorials: One per week, replacing one lecture, Practicals: One per week, Monday, Tuesday, Wednesday or Thursday 14h00 - 16h00 or 16h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Theory tests 15%; practical tests and practical assignments 25%; June examination 2 hours 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1016S   COMPUTER SCIENCE 1016
18 NQF credits at NQF level 5
Convener: A Safla
Course entry requirements: CSC1015F (At least 45% for CSC1015F or at least 70% for CSC1017F)
Course outline:
This course builds on the foundation of CSC1015F/CSC1010H, with a focus on object-oriented design and programming in Java, as well as introducing important considerations relating to ethical and professional issues. The latter introduces students to ethical issues such as property rights, freedom of expression and privacy, and concepts such as free and open source software, ICT for Development, and Professional Codes of Conduct. The Java component of the course covers object-oriented design techniques and UML class diagrams, as well as elementary data structures such as lists, stacks and queues. The practical component includes use of inheritance, polymorphism, interfaces, generics and GUI programming in Java.
Lecture times: 4th or 5th period daily, Tutorials: One per week, replacing one lecture, Practicals: One per week, Monday, Tuesday or Wednesday, 14h00 - 16h00 or 16h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 2-hour exam written in November counts 60%. Subminima: 45% for practicals and 45% on weighted average of theory tests and examination.

CSC1017F   INTRODUCTION TO PROGRAMMING
16 NQF credits at NQF level 5
Convener: A Safla
Course outline:
This course aims to provide an introduction to programming and algorithms, using the Python programming language. Topics to be included will be: basic syntax, variables, operators, comments, expressions, strings, input and output; conditional statements, if, nested ifs, if-else ladders, Boolean expressions; loops, for and while, nested loops; functions, parameters, return values; testing and debugging; arrays and lists, multidimensional arrays; sorting and searching; text files; and number systems. The course is offered in a blended-learning format. Students are provided with a set of video lectures that they can watch multiple times. Student contact time is in a tutorial/practical format aimed at reinforcing the principles introduced in the online lectures and giving students time to do exercises under the supervision of tutors.
DP requirements: 45% weighted average for practical work.
Assessment: Theory tests count for 20%, practicals count for 20%, practical tests count for 10%, June examination counts for 50% of the course mark. Subminima: 45% weighted average for practical work, 45% weighted average of tests and exams.

CSC1019F   FOUNDATIONS OF COMPUTER PROGRAMMING FOR ENGINEERS
12 NQF credits at NQF level 5
Convener: A Safla
Course outline:
This course offers an introduction to the development of algorithms and design of computer programs and provides an introduction to programming and algorithms, using the Python programming language. Topics include: basic syntax, variables, operators, comments, expressions, strings, input and output; conditional statements, if, nested ifs, if-else ladders, Boolean expressions; loops, for and while, nested loops; functions, parameters, return values; arrays and lists, multidimensional arrays and text files. The course is offered in a blended-learning format. Students are provided with a set of video lectures that they can watch multiple times. Student contact time is in a tutorial/practical format aimed at reinforcing the principles introduced in the online lectures and giving students time to do exercises under the supervision of tutors.
DP requirements: 45% weighted average for practical work.

Assessment: Theory tests count for 20%, practicals count for 20%, practical tests count for 10%, June examination counts for 50% of the course mark. Subminima: 45% weighted average for practical work, 45% weighted average of tests and exams.

CSC2001F   COMPUTER SCIENCE 2001
Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.cs.uct.ac.za/teaching. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
24 NQF credits at NQF level 6
Convener: To be advised
Course entry requirements: (CSC1015F and CSC1016S) or (CSC1010H and CSC1011H)
Course outline:
This course builds on the first year Computer Science foundation with an emphasis on data storage and manipulation. The course covers abstract data types and assertions, recursive algorithms, tree structures such as AVL and B-trees, graph traversals, minimum spanning trees, sets, hashing and priority queues. An introduction to conceptual modelling, database design and relational database manipulation is included. Practical programming in Java in a Unix environment is an important part of the course
Lecture times: Monday - Friday, 2nd period, Four or five lectures per week, Practicals: One 4-hour practical per week, Monday - Friday, 14h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count for 16.7%; practicals count 33.3%; one 3-hour paper written in June counts 50%. Subminima: 45% on weighted average of theory tests and examination.

CSC2002S   COMPUTER SCIENCE 2002
Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.cs.uct.ac.za/teaching. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
24 NQF credits at NQF level 6
Convener: To be advised
Course entry requirements: CSC2001F (At least 45% for CSC2001F)
Course outline:
The goal of this course is to complete the basic education of a Computer Scientist. Topics include: mobile application development and interface design, an introduction to computer architecture and concurrent programming. Practical work in Java and in assembler programming are included.
Lecture times: Monday - Friday, 2nd period, Four lectures per week, Practicals: One 4-hour practical per week, Monday - Friday, 14h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count for 16.7%; practicals and practical test count 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% on weighted average of theory tests and examination.

CSC2004Z   PROGRAMMING ASSESSMENT
This is a required course for all students majoring in Computer Science and/or who wish to continue to any third year courses in Computer Science. It should be taken in the second year of study and will demonstrate competency in programming, which is assumed in all third year courses. It is a compulsory course in the Computer Science major CSC05.
0 NQF credits at NQF level 6
Convener: To be advised
Course entry requirements: (CSC1015F and CSC1016S) or (CSC1010H and CSC1011H)

Course outline:
All students who take advanced courses in Computer Science need to build on a foundation of strong programming skills. The aim of this course is to assess and confirm mastery in fundamental programming skills before students can proceed to advanced courses.
Lecture times: None
DP requirements: None
Assessment: Practical programming examination counts for 100%

CSC3002F COMPUTER SCIENCE 3002

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.cs.uct.ac.za/teaching. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
36 NQF credits at NQF level 7
Convener: Associate Professor P Marais
Course entry requirements: CSC2001F, CSC2002S and ((MAM1004F+MAM1008S) or MAM1000W). CSC2004Z is required if CSC2002S was passed after 2017.
Course outline:
The course provides an introduction to the two topics (1) structure and organization of operating systems and (2) a basic knowledge of computer networks that will take the student through the various logical layers of the ISO OSI layers, focusing on the Internet Protocol suite.
Lecture times: Monday - Friday, 2nd period, Practicals: Two 4-hour practicals per week, Monday - Friday, 14h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count 15%; practical work counts 35%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals; 45% on weighted average of theory tests and examinations.

CSC3003S COMPUTER SCIENCE 3003

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.cs.uct.ac.za/teaching. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
36 NQF credits at NQF level 7
Convener: Associate Professor P Marais
Course entry requirements: CSC2001F, CSC2002S and ((MAM1004F+MAM1008S) or MAM1000W), and either INF2009F or permission from the Head of Department to do compensation work to a satisfactory standard. CSC2004Z is required if CSC2002S was passed after 2017.
Course outline:
This is a course on two advanced topics: (1) advanced software design is about turning requirements into effective and efficient implementations in a systematic manner; and (2) the algorithms module expands on a topic central to computing. This module describes how algorithms are categorised, and shows interesting algorithms in each category and analyses their complexity. It also touches on Turing machines and the limits of computation.
Lecture times: Monday - Friday, 2nd period, Practicals: Two 4-hour practicals per week, Monday - Friday, 14h00 - 18h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count 15%; practical work counts 35%; one 3-hour paper written in November counts 50%. Subminima: 45% for practicals, 45% on weighted average of theory tests and 35% for the algorithms module (comprising Theory of Algorithms and Theory of Computation) in the final examination.

CSC3023F   COMPUTER SCIENCE 3023
Credit will not be given for this course if credit is also given for CSC3002F and/or CSC3022F.
24 NQF credits at NQF level 7
Convener: Associate Professor P Marais
Course entry requirements: CSC2001F, CSC2002S. CSC2004Z is required if CSC2002S was passed after 2017.
Course outline:
This course aims to develop an understanding of operating system structure and operations; computer system organisation; process management and storage management; protection and open source operating systems. Also included is an introduction to C++; pointers and memory management; streams and I/O; OO in C++; operator overloading; function objects; templates; the STL; and exceptions.
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count for 15%; practicals count for 35%; June examination counts for 50%. Subminima: 45% for practicals; 45% for tests and examination.

ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE

Associate Professor and Head of Department:
M R Sowman, MSc PhD *Cape Town*

EGS1003S   GEOGRAPHY, DEVELOPMENT & ENVIRONMENT
There is a compulsory fieldwork component involving half-day field excursions.
18 NQF credits at NQF level 5
Convener: Dr P Mbatha
Course entry requirements: At least 50% for NSC Geography or GEO1009F
Course outline:
The course introduces students to development, sustainability and environment debates in geography, by exploring different landscapes at different scales and levels, focusing on the historical roots and spatial patterns that underpin development.
Lecture times: Monday - Friday, 2nd period
DP requirements: Attendance and satisfactory completion of tutorial assignments; students must attain an average mark of not less than 40% for the coursework component.
Assessment: Essays, a class test and tutorial work count 50%; one 2-hour theory examination written in November counts 50% (subminimum of 40% required).

EGS1005F   INTRODUCTION TO ENVIRONMENTAL ASSESSMENT & MANAGEMENT
12 NQF credits at NQF level 5
Convener: Dr K Winter
Co-requisites: Any one of CIV4041F, CIV4042F, CIV4045F and CIV4046F
Course outline:
This course aims to introduce environmental management, sustainable development and climate change. Students are guided through the process of environmental assessment, methods, reports, and public involvement. The environmental management of construction is also covered. The course includes practical sessions: case studies, field trips and a course project.
Assessment: A class test, practical assignments and field report count 50%; one 2-hour examination written in June count 50% (sub-minimum of 40% required).

EGS2013F   THE PHYSICAL ENVIRONMENT
There is a compulsory fieldwork component involving half-day field excursions.
24 NQF credits at NQF level 6
Convener: Associate Professor F Eckardt
Course entry requirements: GEO1009F
Course outline:
The course focuses on contemporary Atmosphere-Earth surface interactions, in particular the role of precipitation and water from a global to a regional scale and examines temporal dynamics, driven by natural process as well as anthropogenic pressures. It covers in detail global circulation patterns, climate variability, soil formation, polar response to climate change, informants of regional biome formation, tropical deforestation, and desertification and earth observation technology. It is expected that students will enhance their understanding of Earth system dynamics, systems interactions and develop an appreciation for scales both temporal and spatial. Students are also expected to put the local context into a regional setting and make linkages to the larger global picture.
Lecture times: Monday - Friday, 5th period
DP requirements: Satisfactory completion of practicals and all written assignments, including projects, fieldwork reports, practicals, essays and class tests. Students must attain an average mark of not less than 40% for the coursework.
Assessment: Project, essays, class tests and practical assignments including fieldwork report count 50%; one 3-hour examination written in June count 50% (subminimum of 40% required).

EGS2015S   SOCIETY & SPACE
There is a compulsory fieldwork component involving half-day field excursions.
24 NQF credits at NQF level 6
Convener: Dr S Scheba
Course entry requirements: For BSc: EGS1003S; For BA or BSocSc: EGS1003S or Social Science Foundation course and two full first year Humanities courses, or equivalent.
Course outline:
Spatial thinking sits at the core of Geographical scholarship, and space and human societies are always mutually constitutive. This course explores how geographers have theorised space and place as central to understanding historical processes, social relations and cultural practices. Focusing particularly on Africa and other regions of the global South, the course covers foundational Human Geography concepts including modernity, landscape, memory, heritage, identity and inclusion. Through theoretical work and field-based experiential learning, we examine how space and place both shape and are shaped by a range of power dynamics.
Lecture times: Monday - Friday, 5th period
DP requirements: Attendance and satisfactory completion of practical including fieldwork and tutorial assignments; students must attain an average mark of not less than 40% for the coursework.
Assessment: Essays, a class test, practical assignments based on compulsory fieldwork and tutorial work count 50%; one 2-hour theory examination written in November counts 50% (subminimum of 40% required).

EGS3012S   ATMOSPHERIC SCIENCE
36 NQF credits at NQF level 7
Convener: Associate Professor B J Abiodun
Course entry requirements: GEO1009F or equivalent, EGS2013F or SEA2004F (or SEA2002S or SEA2003F) or any approved 2000-level Science course, and or any approved 1000-level Physics or Mathematics course.
Course outline:
This course aims to provide a thorough understanding of the physical processes that control the Earth's atmosphere. It covers the following topics: atmospheric energy balance, thermodynamics, dynamics, and general circulation; tropical and mid-latitude weather producing systems; weather and climate extreme events (e.g. heat-waves, drought, and floods) in Africa; climate variability and

change; atmospheric boundary layer turbulence, chemistry, and pollution. The lectures are complemented with field measurements and laboratory practicals to demonstrate basic data analysis techniques employed in atmospheric sciences.
Lecture times: Monday - Friday, 1st period
DP requirements: Satisfactory completion of practicals and all written assignments, including essays, project reports and class tests.
Assessment: Essays and tests count 20%; project reports and practicals count 20%; one 3-hour examination in November counts 60% (subminimum of 40% required).

EGS3021F   SUSTAINABILITY & ENVIRONMENT
There is a compulsory fieldwork component involving a half-day field excursion.
36 NQF credits at NQF level 7
Convener: Professor M Sowman
Course entry requirements: EGS2013F, EGS2015S
Course outline:
The course critically engages with current debates and discourses in the fields of sustainability, vulnerability and environmental management, including examination of key concepts such as integration, systems-thinking, complexity, equity, vulnerability, risk, resilience, adaptation and mitigation. Approaches and methods for analysing environmental problems and integrating risk reduction as well as sustainability principles and practices into policy, programme, plan and project cycle processes are investigated and applied in different contexts.
Lecture times: Monday - Friday, 3rd period
DP requirements: Attendance and satisfactory completion of practicals (including fieldwork), other assignments and tests; students must attain an average mark of not less than 40% for the coursework.
Assessment: Practical reports (including fieldwork), class tests and other assignments count 50%; one 3-hour June examination counts 50% (subminimum of 40% required).

EGS3022S   GEOGRAPHIC THOUGHT
36 NQF credits at NQF level 7
Convener: Associate Professor Z Patel
Course entry requirements: EGS2015S
Course outline:
The course focuses on debates in classical and contemporary human geography. It considers important thematic areas in the geographical literature, such as development; spatiality; urban, political and feminist geographies. Each thematic area explores specific debates and key author's work in the field, providing students with an introduction to literature, a content overview, and skills to deconstruct and build conceptual and analytical arguments related to evidence drawn from geographical research from around the world, other than South Africa. The course also emphasises academic reading and writing skills taught in the practical sessions.
Lecture times: Monday - Friday, 4th period
DP requirements: Satisfactory completion of essay and practical assignments and participation in tutorials; students must attain an average mark of not less than 40% for the coursework
Assessment: Essay and other assignments count 70%; one 3-hour written examination in November count 30% (subminimum of 40% required).

EGS3023F   ANTHROPOCENE ENVIRONMENTS IN PERSPECTIVE
36 NQF credits at NQF level 7
Convener: Associate Professor P Anderson
Course entry requirements: EGS2013F
Course outline:
The course deals with the dynamic physical environment including the human impact on global environments at various spatial and temporal scales during the so-called Anthropocene. The general

aim of this course is to illustrate the nature and scale of changes that characterise the earth's environment, against a background of both natural and anthropogenically-induced processes. This provides an important perspective when thinking about contemporary environments and how they might change in the future – with obvious consequences for our own species and that of the others with which we share the planet.

Lecture times: Monday - Friday, 5th period

DP requirements: Satisfactory completion of practicals and all written assignments, including fieldwork report, essays and class tests. Students must attain an average mark of not less than 40% for the coursework.

Assessment: Field report, essays, class tests and practical assignments count 50%; one 3-hour examination written in June count 50% (sub-minimum of 40% required).

GEOLOGICAL SCIENCES

Philipson Stow Professor of Mineralogy & Geology and Head of Department:
C Harris, MA DPhil *Oxon*

GEO1008F   INTRODUCTION TO GEOLOGY FOR CIVIL ENGINEERS

12 NQF credits at NQF level 5

Convener: Dr D A Quiros Ugalde

Course outline:

This course introduces students in civil engineering to the structure of planet Earth and plate tectonics of the lithosphere. Physical and chemical properties of rock forming minerals. Clay minerals, their structure and properties. Petrology of igneous, sedimentary and metamorphic rocks. Weathering and applied geomorphology. Structural geology, geomechanical classification of jointed rock masses. Field and laboratory testing techniques. Case studies of problem soils throughout South Africa and problem soils in general.

DP requirements: Attendance of at least 80% of the practicals.

Assessment: June examination 3 hours 60%, year mark 40%.

GEO1009F   INTRODUCTION TO EARTH AND ENVIRONMENTAL SCIENCES

This course is presented jointly by the Departments of Archaeology, Environmental & Geographical Science and Geological Sciences, but administered by Geological Sciences. Students are required to attend three half-day excursions in the Cape Peninsula.

18 NQF credits at NQF level 5

Convener: Associate Professor E M Bordy

Course entry requirements: At least 50% for NSC Geography or at least 60% for NSC Physical Science or Life Sciences. NOTE: Preference will be given to students registered in the Science Faculty.

Course outline:

This course aims to develop a broad understanding of how the Earth works, leading to majors in Archaeology, Environmental & Geographical Sciences, Geology and Ocean & Atmosphere Science. The course covers the following general topics: structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; humans and the environment.

Lecture times: Monday - Friday, 2nd period

DP requirements: An average of 30% on all marked classwork and tests.

Assessment: Marked classwork counts 24%; marked class tests count 16%; June examination 3 hours 60%. A Subminimum of 40% is required in the theory examination paper. Supplementary examinations for GEO1009F will be written in July.

GEO2006S   APPLIED MINERALOGY FOR CHEMICAL ENGINEERS
24 NQF credits at NQF level 6
Convener: Dr P J le Roux
Course entry requirements: CEM1000W
Course outline:
Introduction to mineralogy; the structure and composition of minerals, how minerals form, their general properties and how this can be exploited in minerals beneficiation. Minerals and element associations and their implications for mining and processing. Identification of minerals in hand specimen, and using a petrographic microscope. Overview of instrumental analytical methods used in geology and mineralogy. Application of different analytical methods to rocks, minerals and minerals beneficiation products.
Assessment: Coursework: 30%. Exam: 70%.

MATHEMATICS AND APPLIED MATHEMATICS

Professor and Head of Department:
P K S Dunsby, BSc PhD *London*
Refer to the Science Faculty Handbook for details of other courses offered by the Department.

MAM1010F   MATHEMATICS 1010
18 NQF credits at NQF level 5
Convener: To be advised
Course entry requirements: At least 60% in NSC Mathematics, or 50% in Higher Grade Mathematics (SC), or passes in both MAM1014F and MAM1015S.
Course outline:
The aim of this course is to introduce topics in mathematics that are of interest to Commerce students, with applications to economics. Introductory financial mathematics including compound interest and annuities, functions, limits, differential calculus and applications of the derivative including graph sketching and Newton's Method, introduction to integral calculus and techniques of integration.
Lecture times: Monday - Friday, 1st, 3rd, or 4th period
DP requirements: Minimum of 30% in class tests and full attendance at workshops.
Assessment: Semester mark up to 40%. June examination 1 x 2 hour paper

MAM1020F   MATHEMATICS 1A FOR ENGINEERS
18 NQF credits at NQF level 5
Convener: M Mokhithi
Course entry requirements: A pass in NSC Mathematics with at least 70%, or at least a D symbol at A-level.
Course outline:
The course aims to develop a good conceptual and visual understanding of the fundamentals of the mathematics of differential and the beginning of integral calculus as applied in engineering contexts. Topics include: Functions, limits and continuity. Rational functions, the natural exponential and logarithm functions. Radian measure and the Trigonometric functions. The rules of differentiation. Curve sketching. Applications of the mean value theorem. Rates of change and optimization involving functions of a single variable. L'Hospital's rules, indeterminate forms and the squeeze theorem. Anti-differentiation. Finite series, permutations, combinations and the binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.
Lecture times: Monday & Thursday & Friday, 1st & 2nd period; Tuesday & Wednesday, 1st & 2nd period, 1 double-period tutorial per week, offered in each semester.
DP requirements: 30% For class record, high tutorial attendance.
Assessment: Examination, not longer than 3 hours in June: Class record up to 40%.

MAM1020S   MATHEMATICS 1A FOR ENGINEERS

18 NQF credits at NQF level 5; 5 lectures per week, 1 double-period tutorial per week, offered in each semester.

Convener: To be advised

Course entry requirements: A pass in NSC Mathematics with at least 70%, or at least a D symbol at A-level.

Course outline:

The course aims to develop a good conceptual and visual understanding of the fundamentals of the mathematics of differential and the beginning of integral calculus as applied in engineering contexts. Topics include: Functions, limits and continuity. Rational functions, the natural exponential and logarithm functions. Radian measure and the Trigonometric functions. The rules of differentiation. Curve sketching. Applications of the mean value theorem. Rates of change and optimization involving functions of a single variable. L'Hospital's rules, indeterminate forms and the squeeze theorem. Anti-differentiation. Finite series, permutations, combinations and the binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.

Lecture times: Monday & Thursday & Friday, 1st & 2nd period; Tuesday & Wednesday, 1st, 2nd & 7th period

DP requirements: 30% For class record, high tutorial attendance.

Assessment: Examination, not longer than 3 hours in June or November: Class record up to 40%.

MAM1021F   MATHEMATICS 1B FOR ENGINEERS

18 NQF credits at NQF level 5

Convener: To be advised

Course entry requirements: MAM1020F.

Course outline:

The course aims to develop a good conceptual and visual understanding of the fundamentals of the mathematics of differential and the beginning of integral calculus as applied in engineering contexts. The course covers the following: Further calculus of a single variable. The inverse trigonometric functions. Integration by parts. Partial fractions. Areas, volumes and arc length. Taylor series. An introduction to modelling and differential equations. Vector algebra and geometry. Points, lines and planes. Dot products and cross products. Matrices. Systems of linear equations. Gauss reduction. Matrix algebra. Linear transformations. The matrix representing a linear map. Inverses. An introduction to complex numbers. The complex plane. Moduli and arguments, conjugates. De Moivre's theorem. Roots of polynomials.

Lecture times: Monday & Thursday & Friday, 1st & 2nd period; Tuesday & Wednesday, 1st & 2nd period, 1 double-period tutorial per week, offered in each semester.

DP requirements: 30% for class record, high tutorial attendance.

Assessment: Examination, not longer than 3 hours in June or November: Class record up to 40%.

MAM1021S   MATHEMATICS 1B FOR ENGINEERS

18 NQF credits at NQF level 5

Convener: T C van Heerden

Course entry requirements: MAM1020F.

Course outline:

The course aims to develop a good conceptual and visual understanding of the fundamentals of the mathematics of differential and the beginning of integral calculus as applied in engineering contexts. The course covers the following: Further calculus of a single variable. The inverse trigonometric functions. Integration by parts. Partial fractions. Areas, volumes and arc length. Taylor series. An introduction to modelling and differential equations. Vector algebra and geometry. Points, lines and planes. Dot products and cross products. Matrices. Systems of linear equations. Gauss reduction. Matrix algebra. Linear transformations. The matrix representing a linear map. Inverses. An introduction to complex numbers. The complex plane. Moduli and arguments, conjugates. De Moivre's theorem. Roots of polynomials.

Lecture times: Monday & Thursday & Friday, 1st & 2nd period; Tuesday & Wednesday, 1st & 2nd period, 1 double-period tutorial per week, offered in each semester.
DP requirements: 30% for class record, high tutorial attendance.
Assessment: Examination, not longer than 3 hours in June or November: Class record up to 40%.

MAM1023F   MATHEMATICS 1A FOR ENGINEERS EXTENDED
18 NQF credits at NQF level 5
Convener: K Ramesh-Kanjee
Course outline:
An introduction to differential and integral calculus. Functions, limits and continuity. Rational functions, the natural exponential and logarithm functions. Radian measure and the Trigonometric functions. The rules of differentiation. Curve sketching. Applications of the mean value theorem. Rates of change and optimization involving functions of a single variable. L'Hospital's rules, indeterminate forms and the squeeze theorem. Anti-differentiation. The binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.
Lecture times: Lectures from Monday - Friday, 1st and 2nd period. Tutorials on Tuesday from 6th to 8th period.
DP requirements: 35% in class record
Assessment: Class record (tests, problem sets) 50%, Final examination 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supplementary tutoring and revision programme.

MAM1023S   MATHEMATICS 1A FOR ENGINEERS EXTENDED
18 NQF credits at NQF level 5
Convener: Dr A Campbell
Course outline:
An introduction to differential and integral calculus. Functions, limits and continuity. Rational functions, the natural exponential and logarithm functions. Radian measure and the Trigonometric functions. The rules of differentiation. Curve sketching. Applications of the mean value theorem. Rates of change and optimization involving functions of a single variable. L'Hospital's rules, indeterminate forms and the squeeze theorem. Anti-differentiation. The binomial theorem. The definite integral and the fundamental theorem of calculus. The substitution rule.
Lecture times: Lectures from Monday - Friday, 1st and 2nd period. Tutorials on Tuesday from 6th to 8th period.
DP requirements: 35% in class record
Assessment: Class record (tests, problem sets) 50%, Final examination 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supplementary tutoring and revision programme.

MAM1024F   MATHEMATICS 1B FOR ENGINEERS EXTENDED
18 NQF credits at NQF level 5
Convener: Dr A Campbell
Course entry requirements: MAM1020F/S or MAM1023F/S
Course outline:
Further calculus of a single variable. The inverse trigonometric functions. Integration by parts. Partial fractions. Areas, volumes and arc length. Taylor series. An introduction to modelling and differential equations. Vector algebra and geometry. Points, lines and planes. Dot products and cross products. Matrices. Systems of linear equations. Gauss reduction. Matrix algebra. Linear transformations. The matrix representing a linear map. Inverses. An introduction to complex

numbers. The complex plane. Moduli and arguments, conjugates. De Moivre's theorem. Roots of polynomials
Lecture times: Lectures Monday - Friday 1st period. Tutorials on Tuesday from 6th to 8th.
DP requirements: 35% in class record
Assessment: Class record (test, problem sets) 50%, Final examination 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supplementary tutoring and revision programme.

MAM1024S   MATHEMATICS 1B FOR ENGINEERS EXTENDED
18 NQF credits at NQF level 5
Convener: K Ramesh-Kanjee
Course entry requirements: MAM1020F/S or MAM1023F/S
Course outline:
Further calculus of a single variable. The inverse trigonometric functions. Integration by parts. Partial fractions. Areas, volumes and arc length. Taylor series. An introduction to modelling and differential equations. Vector algebra and geometry. Points, lines and planes. Dot products and cross products. Matrices. Systems of linear equations. Gauss reduction. Matrix algebra. Linear transformations. The matrix representing a linear map. Inverses. An introduction to complex numbers. The complex plane. Moduli and arguments, conjugates. De Moivre's theorem. Roots of polynomials
Lecture times: Monday, Tuesday, Wednesday & Friday 1st& 2nd periods. Workshops: Wednesday 6th – 8th periods.
DP requirements: 35% in class record
Assessment: Class record (test, problem sets) 50%, Final examination 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supplementary tutoring and revision programme.

MAM2083F   VECTOR CALCULUS FOR ENGINEERS
This course is designed specifically for students in the Faculty of Engineering & the Built Environment.
16 NQF credits at NQF level 6
Convener: Dr E Fredericks
Course entry requirements: MAM1020 or equivalent and MAM1021 or equivalent.
Course outline:
This course aims to develop an understanding of differentiation of vector valued functions, space curves and surfaces. Partial derivatives, chain rule, maxima and minima, Lagrange multipliers. Gradient, divergence and curl. Taylor's theorem for one and several variables, Jacobians, Newton's method for several variables. Multiple integrals and change of variable. Surface integrals. Line integrals, work done by a force, potentials. Green's theorem, divergence theorem, and Stokes' theorem.
DP requirements: 35% class record and satisfactory tutorial attendance.
Assessment: One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

MAM2083S   VECTOR CALCULUS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.
16 NQF credits at NQF level 6
Convener: To be advised
Course entry requirements: MAM1020 or equivalent and MAM1021 or equivalent.
Course outline:
This course aims to develop an understanding of differentiation of vector valued functions, space curves and surfaces. Partial derivatives, chain rule, maxima and minima, Lagrange multipliers. Gradient, divergence and curl. Taylor's theorem for one and several variables, Jacobians, Newton's method for several variables. Multiple integrals and change of variable. Surface integrals. Line integrals, work done by a force, potentials. Green's theorem, divergence theorem, and Stokes' theorem.
DP requirements: 35% class record and satisfactory tutorial attendance.
Assessment: One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

MAM2084F   LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.
16 NQF credits at NQF level 6
Convener: T C van Heerden
Course entry requirements: MAM1021F/S or equivalent.
Course outline:
This course aims to develop an understanding of linear algebra and differential equations for engineers. Topics include: First order ordinary differential equations. Systems of linear equations, linear combinations, linear dependence, linear subspaces and basis. Determinants. Eigenvalues and eigenvectors, diagonalization, applications to systems of linear differential equations and finding principal axes. Solution of n-th order linear differential equations. The Laplace transform.
Lecture times: 4 lectures per week, 1 double-period tutorial per week.
DP requirements: 35% class record and satisfactory tutorial attendance.
Assessment: One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

MAM2084S   LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.
16 NQF credits at NQF level 6
Convener: To be advised
Course entry requirements: MAM1021F/S or equivalent.
Course outline:
This course aims to develop an understanding of linear algebra and differential equations for engineers. Topics include: First order ordinary differential equations. Systems of linear equations, linear combinations, linear dependence, linear subspaces and basis. Determinants. Eigenvalues and eigenvectors, diagonalization, applications to systems of linear differential equations and finding principal axes. Solution of n-th order linear differential equations. The Laplace transform.
Lecture times: 4 lectures per week, 1 double-period tutorial per week.
DP requirements: 35% class record and satisfactory tutorial attendance.
Assessment: One paper written in June or November no longer than 2.5 hours: up to 80%, year mark: up to 40%.

MAM2085F   VECTOR CALCULUS FOR ASPECT
16 NQF credits at NQF level 6
Convener: Dr A Campbell
Course entry requirements: END1020 and END1021, or MAM1023 and MAM1024
Course outline:
This course aims to develop an understanding of vector calculus. Topics include: differentiation of vector valued functions, space curves and surfaces. Partial derivatives, chain rule, maxima and minima, Lagrange multipliers. Gradient, divergence and curl. Taylor's theorem for one and several variables, Jacobians, Newton's method for several variables. Multiple integrals and change of variable. Surface integrals. Line integrals, work done by a force, potentials. Green's theorem, divergence theorem, and Stokes' theorem.
Lecture times: Monday-Friday 1st period, 1 afternoon tutorial, optional additional mini-tutorials in 2nd or 3rd period
DP requirements: 35% class record; attendance of tutorials
Assessment: One paper written in June or November no longer than 2.5 hours: 60%, class record 40%.

MAM2085S   VECTOR CALCULUS FOR ASPECT
16 NQF credits at NQF level 6
Convener: Dr P Padayachee
Course entry requirements: END1020 and END1021, or MAM1023 and MAM1024
Course outline:
This course aims to develop an understanding of vector calculus. Topics include: differentiation of vector valued functions, space curves and surfaces. Partial derivatives, chain rule, maxima and minima, Lagrange multipliers. Gradient, divergence and curl. Taylor's theorem for one and several variables, Jacobians, Newton's method for several variables. Multiple integrals and change of variable. Surface integrals. Line integrals, work done by a force, potentials. Green's theorem, divergence theorem, and Stokes' theorem.
Lecture times: Monday-Friday 1st period, 1 afternoon tutorial, optional additional mini-tutorials in 2nd or 3rd period
DP requirements: 35% class record; attendance of tutorials
Assessment: One paper written in June or November no longer than 2.5 hours: 60%, class record 40%.

PHYSICS

Professor and Head of Department:
A Buffler, MSc PhD HDE *Cape Town*

Refer also to the Science Faculty Handbook.

PHY1012F   PHYSICS A FOR ENGINEERS
18 NQF credits at NQF level 5; First-year, first semester course.
Convener: D R Geduld
Co-requisites: MAM1020F (or equivalent)
Course outline:
The course aims to provide students with a strong foundation in mechanics, properties of matter and thermodynamics. The aims are to encourage conceptual understanding, the development of certain mathematical and graphical skills as well as problem solving. Mechanics forms the basis of all the engineering disciplines. It is therefore crucial that students have a good grasp of the concepts and proficiency in the skills. Problem solving abilities develop through the course as a preparation for further development in later engineering courses. Topics include: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum,

collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, elasticity, elastic moduli, hydrostatics, hydrodynamics, temperature, heat, kinetic theory of gases, thermodynamics and entropy.

DP requirements: An average of at least 40% for class record, including 50% for laboratories.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour examination counts 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1012S   PHYSICS A FOR ENGINEERS

It is assumed that students in PHY1012S have first attempted PHY1012F.
18 NQF credits at NQF level 5; First-year, second semester course.
Convener: Associate Professor W A Horowitz
Co-requisites: MAM1020F (or equivalent)
Course outline:
The course aims to provide students with a strong foundation in mechanics, properties of matter and thermodynamics. The aims are to encourage conceptual understanding, the development of certain mathematical and graphical skills as well as problem solving. Mechanics forms the basis of all the engineering disciplines. It is therefore crucial that students have a good grasp of the concepts and proficiency in the skills. Problem solving abilities develop through the course as a preparation for further development in later engineering courses. Topics include: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, elasticity, elastic moduli, hydrostatics, hydrodynamics, temperature, heat, kinetic theory of gases, thermodynamics and entropy.

DP requirements: An average of at least 40% for class record, including 50% for laboratories.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour examination counts 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1013F   PHYSICS B FOR ENGINEERS

18 NQF credits at NQF level 5; First-year, first semester course.
Convener: D R Geduld
Course entry requirements: PHY1012F/S or PHY1014F/S
Co-requisites: MAM1020F (or equivalent)
Course outline:
The course is the second part of the first year engineering Physics sequence. It aims to provide a foundation in the concepts and mathematics of physical phenomena within the context of vibrations and waves, and electromagnetism, and features the topics of electric charge, electric field, Gauss' Law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance, simple harmonic motion, damped osillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference and diffraction.

DP requirements: An average of at least 40% for class record, including 50% for laboratories.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour examination counts 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1013S   PHYSICS B FOR ENGINEERS
18 NQF credits at NQF level 5; First-year, second semester course.
Convener: D R Geduld
Course entry requirements: PHY1012F/S or PHY1014F/S
Co-requisites: MAM1020F (or equivalent)
Course outline:
The course is the second part of the first year engineering Physics sequence. It aims to provide a foundation in the concepts and mathematics of physical phenomena within the context of vibrations and waves, and electromagnetism, and features the topics of electric charge, electric field, Gauss' Law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance, simple harmonic motion, damped osillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference and diffraction.
DP requirements: An average of at least 40% for class record, including 50% for laboratories.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour examination counts 50%. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1014F   PHYSICS A FOR ASPECT
18 NQF credits at NQF level 5
Convener: P le Roux
Co-requisites: MAM1020F/S or MAM1023F/S, or equivalent
Course outline:
The course aims to provide students with a strong foundation in mechanics, properties of matter and thermodynamics. The aims are to encourage conceptual understanding, the development of certain mathematical and graphical skills as well as problem solving. Mechanics forms the basis of all the engineering disciplines. It is therefore crucial that students have a good grasp of the concepts and proficiency in the skills. Problem solving abilities develop through the course as a preparation for further development in later engineering courses. Topics include: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, elasticity, elastic moduli, hydrostatics, hydrodynamics, temperature, heat, kinetic theory of gases, thermodynamics and entropy.
DP requirements: An average of at least 40% for the class record.
Assessment: Class record (tests, tutorials, workshops and laboratory record) counts 50%; one 2-hour examination counts 50%. A subminimum of 40% is required for the theory examination paper. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1014S   PHYSICS A FOR ASPECT
18 NQF credits at NQF level 5
Convener: P le Roux
Co-requisites: MAM1020F/S or MAM1023F/S, or equivalent
Course outline:
The course aims to provide students with a strong foundation in mechanics, properties of matter and thermodynamics. The aims are to encourage conceptual understanding, the development of certain mathematical and graphical skills as well as problem solving. Mechanics forms the basis of all the engineering disciplines. It is therefore crucial that students have a good grasp of the concepts and proficiency in the skills. Problem solving abilities develop through the course as a preparation for

further development in later engineering courses. Topics include: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, elasticity, elastic moduli, hydrostatics, hydrodynamics, temperature, heat, kinetic theory of gases, thermodynamics and entropy.

DP requirements: An average of at least 40% for the class record.

Assessment: Class record (tests, tutorials, workshops and laboratory record) counts 50%; one 2-hour examination counts 50%. A subminimum of 40% is required for the theory examination paper. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1015F   PHYSICS B FOR ASPECT

18 NQF credits at NQF level 5
Convener: P le Roux
Course entry requirements: PHY1014F/S or PHY1012F/S.
Co-requisites: MAM1020F/S or MAM1023F/S, or equivalent
Course outline:
The course is the second part of the first year engineering Physics sequence. It aims to provide a foundation in the concepts and mathematics of physical phenomena within the context of vibrations and waves, and electromagnetism, and features the topics of electric charge, electric field, Gauss' Law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance, simple harmonic motion, damped osillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference and diffraction.

DP requirements: An average of at least 40% for the class record.

Assessment: Class record (tests, tutorials, workshop and laboratory record) counts 50%; one 2-hour examination counts 50%. A subminimum of 40% is required for the theory examination paper. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1015S   PHYSICS B FOR ASPECT

18 NQF credits at NQF level 5
Convener: P le Roux
Course entry requirements: PHY1014F/S or PHY1012F/S.
Co-requisites: MAM1020F/S or MAM1023F/S, or equivalent
Course outline:
The course is the second part of the first year engineering Physics sequence. It aims to provide a foundation in the concepts and mathematics of physical phenomena within the context of vibrations and waves, and electromagnetism, and features the topics of electric charge, electric field, Gauss' Law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, the magnetic field, Biot-Savart Law, Ampere's Law, electromagnetic induction, inductance, simple harmonic motion, damped osillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference and diffraction.

DP requirements: An average of at least 40% for the class record.

Assessment: Class record (tests, tutorials, workshop and laboratory record) counts 50%; one 2-hour examination counts 50%. A subminimum of 40% is required for the theory examination paper. Although a supplementary examination is usually granted for a final grade in the range 45-49%, a supplementary examination may also be granted for certain key courses in the range 40-44% under conditions agreed to by the Deans of EBE and Science, normally involving a mandatory pre-supp tutoring and revision programme.

PHY1031F   GENERAL PHYSICS A

18 NQF credits at NQF level 5
Convener: Dr S M Wheaton
Course entry requirements: At least 60% for NSC Physical Science. *Note: Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to PHY1023H from week 7.*
Course outline:
PHY1031F is an algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used. The course includes the following topics: Mechanics: vectors, kinematics, forces, dynamics, momentum, impulse, work, energy, power, collisions, rotation, rotational dynamics, torque, angular momentum, static equilibrium, gravitation. Properties of matter: elasticity, hydrostatics, hydrodynamics. Vibrations and waves: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, superposition, standing waves, sound waves, sound intensity and Doppler Effect.
Lecture times: Monday - Friday, 3rd period
DP requirements: Minimum of 40% for the class record; including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination in June counts 50%.

PHY1032F   GENERAL PHYSICS B

18 NQF credits at NQF level 5
Convener: Dr T Salagaram
Course entry requirements: PHY1031F or PHY1023H
Course outline:
PHY1032F is an algebra-based introductory course usually taken by Science students who have completed PHY1023H. Some calculus may be used. The course includes the following topics: Electricity and magnetism: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents. Thermal physics: temperature, heat, kinetic theory of gases, first and second laws of thermodynamics. Optics: Geometrical optics, polarization, electromagnetic waves, interference, diffraction. Modern physics: atomic structure, quantum physical phenomena, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.
Lecture times: Monday - Friday, 3rd period
DP requirements: Minimum of 40% for the class record, including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination in June counts 50%.

PHY1032S   GENERAL PHYSICS B

18 NQF credits at NQF level 5
Convener: Associate Professor H W G Weigert
Course entry requirements: PHY1031F or PHY1023H
Course outline:
PHY1032F is an algebra-based introductory course usually taken by Science students who have completed PHY1023H. Some calculus may be used. The course includes the following topics: Electricity and magnetism: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents. Thermal physics: temperature, heat, kinetic theory of gases, first and second laws of thermodynamics. Optics: Geometrical optics, polarization, electromagnetic waves, interference, diffraction. Modern physics: atomic structure, quantum physical phenomena, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.

Lecture times: Monday - Friday, 3rd period
DP requirements: Minimum of 40% for the class record, including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination in November counts 50%.

PHY2010S   ELECTROMAGNETISM FOR ENGINEERS

16 NQF credits at NQF level 6
Convener: Dr T Salagaram
Course entry requirements: PHY1012F/S and PHY1013F/S; or PHY1014F/S and PHY1015F/S. MAM2083F/S.
Co-requisites: MAM2084F/S.
Course outline:
This course aims to develop an understanding of electromagnetism in an engineering context. Topics include: Semiconductors, energy bands in solids, charge carriers in semiconductors, diodes and transistors, Coulomb's Law, Gauss' Law. The vector differential operator; div, grad curl. Poisson and Laplace's equations, the magnetic field, Biot-Savart Law, Ampere's Law, electric and magnetic fields in materials, and propagation in optical fibres.
DP requirements: Minimum of 40% for the class record; completion of all laboratory reports and 75% of tutorial work and problem sets; attendance at all tests.
Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; 2-hour examination in November counts 50%. There is a subminimum of 40% required for the final examination.

STATISTICAL SCIENCES

Associate Professor and Head of Department:
F Little, MSc PhD *Cape Town*

For further information refer to Handbook of the Faculty of Science or Faculty of Commerce.

STA1000F   INTRODUCTORY STATISTICS

(No first year students) STA1000F and STA1000S are identical courses offered in first and second semesters. Owing to the mathematics prerequisites, first-year students can only register for STA1000S in the second semester and STA1000F on completion of the mathematics prerequisite. One lecture per week, one workshop per week and one tutorial per week. A student cannot obtain credits for more than one of STA1000F/S/P/L, STA1007S, STA1006S, STA1008F/S.
18 NQF credits at NQF level 5
Convener: Associate Professor L Scott
Course entry requirements: A pass in any of MAM1004F/S or MAM1005H or MAM1000W or MAM1006H or MAM1020F/S or MAM1010F/S.
Course outline:
This is an introductory statistics course aimed at exposing students to principles and tools to support appropriate quantitative analysis. The aim is to produce students with a functional sense of statistics. We introduce students to statistical modelling and also cover exploratory data analysis. Appropriate tools for display, analysis and interpretation of data are discussed. This course is offered predominantly, but not exclusively, to Commerce students. The aim is to give a foundation to students who will encounter and apply statistics in their other courses and professions. Topics covered include: exploratory data analysis and summary statistics; probability theory; random variables; probability mass and density functions; Binomial, Poisson, Exponential, Normal and Uniform distributions; sampling distributions; confidence intervals; introduction to hypothesis testing (including tests on means; tabular data and bivariate data); determining sample sizes; simple linear regression and measures of correlation. Students are assessed on their knowledge of the topics

covered and their ability to perform simple and appropriate statistical analyses using spreadsheet functions.

DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or exercises as set out in course outline. Class record of at least 35%.

Assessment: Class record 40% and a 2-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA1000S   INTRODUCTORY STATISTICS

STA1000F and STA1000S are identical courses offered in first and second semesters. Owing to the mathematics prerequisites, first-year students can only register for STA1000S in the second semester and STA1000F on completion of the mathematics prerequisite. One lecture per week, one workshop per week, and one tutorial per week. A student cannot obtain credits for more than one of STA1000F/S/P/L, STA1007S, STA1006S, STA1008F/S.

18 NQF credits at NQF level 5

Convener: Associate Professor L Scott

Course entry requirements: A pass in any of MAM1004F/S or MAM1005H or MAM1020F/S or MAM1010F/S. In addition students will be admitted to STA1000S if they (1) are concurrently registered for MAM1000W, or (2) are concurrently registered for MAM1005H, or (3) have a supplementary examination for MAM1010F, MAM1004F, or MAM1020F that will be written in November of the year of registration.

Course outline:

This is an introductory statistics course aimed at exposing students to principles and tools to support appropriate quantitative analysis. The aim is to produce students with a functional sense of statistics. We introduce students to statistical modelling and also cover exploratory data analysis. Appropriate tools for display, analysis and interpretation of data are discussed. This course is offered predominantly, but not exclusively, to Commerce students. The aim is to give a foundation to students who will encounter and apply statistics in their other courses and professions. Topics covered include: exploratory data analysis and summary statistics; probability theory; random variables; probability mass and density functions; Binomial, Poisson, Exponential, Normal and Uniform distributions; sampling distributions; confidence intervals; introduction to hypothesis testing (including tests on means, tabular data and bivariate data); determining sample sizes; simple linear regression and measures of correlation. Students are assessed on their knowledge of the topics covered and their ability to perform simple and appropriate statistical analyses using spreadsheet functions.

DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or exercises as set out in course outline. Class record of at least 35%.

Assessment: Class record 40% and a 2-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA1008F   STATISTICS FOR ENGINEERS

A student cannot obtain credits for more than one of STA1000F/S/P/L, STA1007S, STA1006S, STA1008F/S.

12 NQF credits at NQF level 5

Convener: Associate Professor L Scott

Course entry requirements: MAM1020F (or equivalent)

Co-requisites: CHE1005W or CIV1005W or EEE1006F or MEC1005W

Course outline:

This course aims to introduce engineering students to the basic concepts and tools of Statistics which are of particular relevance in an engineering context, and to enable students to apply these to data collected from engineering experiments. Topics include: Random variables, sampling and basic statistical measures; Normal, t, F and Chi-square distributions; Confidence intervals; Statistical models, such as the means and the effects models; t, F and Chi-square tests; Regression and correlation; One-way analysis of variance; Introduction to the design of experiments; Application of statistical tools to experimental data in an engineering setting.

DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or class exercises as set out in course outline. Class record of at least 35%.
Assessment: Class record 40% and a 2-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA1008S   STATISTICS FOR ENGINEERS
A student cannot obtain credits for more than one of STA1000F/S/P/L, STA1007S, STA1006S, STA1008F/S.
12 NQF credits at NQF level 5
Convener: Associate Professor L Scott
Course entry requirements: MAM1020F (or equivalent)
Co-requisites: CHE1005W or CIV1005W or EEE1007S or MEC1005W
Course outline:
This course aims to introduce engineering students to the basic concepts and tools of Statistics which are of particular relevance in an engineering context, and to enable students to apply these to data collected from engineering experiments. Topics include: Random variables, sampling and basic statistical measures; Normal, t, F and Chi-square distributions; Confidence intervals; Statistical models, such as the means and the effects models; t, F and Chi-square tests; Regression and correlation; One-way analysis of variance; Introduction to the design of experiments; Application of statistical tools to experimental data in an engineering setting.
DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or class exercises as set out in course outline. Class record of at least 35%.
Assessment: Class record 40% and a 2-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA2020F   APPLIED STATISTICS
A student cannot obtain credits for more than one of STA2020F/S, STA2007F/H/S, STA2005S.
24 NQF credits at NQF level 6
Convener: N Watson
Course entry requirements: STA1000S or STA1006S or STA1007S or STA1008F/S and MAM1000W or MAM1004F or MAM1010F/S or MAM1020F/S.
Course outline:
This is designed to extend the student's basic knowledge acquired in STA1000F/S/P/L. The emphasis of the course is on applying statistical methods and modelling techniques to data rather than focusing on the mathematical rigour underpinning these methods. Topics covered include: Analysis of variance and experimental design; revision and extension of simple linear regression; multiple regression; time series analysis; and non-parametric statistics. Students will continue to analyse data using Excel.
Lecture times: Monday - Thursday, 1st or 5th period
DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or class exercises as set out in course outline. Class record of at least 35% and at least 50% for Excel test.
Assessment: Class record 40% and a 3-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA2020S   APPLIED STATISTICS

A student cannot obtain credits for more than one of STA2020F/S, STA2007F/H/S, STA2005S.
24 NQF credits at NQF level 6
Convener: N Watson
Course entry requirements: STA1000S or STA1006S or STA1007S or STA1008F/S and MAM1000W or MAM1004F or MAM1010F/S or MAM1020F/S.
Course outline:
This is designed to extend the student's basic knowledge, acquired in STA1000F/S/P/L. The emphasis of the course is on applying statistical methods and modelling techniques to data rather than focusing on the mathematical rigour underpinning these methods. Topics covered include: Analysis of variance and experimental design; revision and extension of simple linear regression; multiple regression; time series analysis; and non-parametric statistics. Students will continue to analyse data using Excel.
Lecture times: Monday - Thursday, 7th period
DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or class exercises as set out in course outline. Class record of at least 35% and at least 50% for Excel test.
Assessment: Class record 40% and a 3-hour exam counting 60%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

STA3022F   APPLIED MULTIVARIATE DATA ANALYSIS

36 NQF credits at NQF level 7
Convener: Dr S Er
Course entry requirements: STA2020F/S or STA2005S or STA2007F/S/H
Course outline:
The aim of the course is to create a practical working familiarity with the analysis of data, focusing on multivariate methods as applied in areas such as marketing, the social science and the sciences. Topics covered include item reliability analysis, multidimensional scaling, correspondence analysis, principal component and factor analysis, cluster analysis, discriminant analysis, classification trees and structural equation modelling.
Lecture times: Monday - Thursday, 4th period
DP requirements: Satisfactory attendance of lectures, tutorials, practicals and tests and completion of assignments and/or class exercises as set out in course outline. Class record of at least 35%.
Assessment: Class record 30% and a 3-hour exam counting 70%. Weights will be adjusted in the case of missed assessments, as detailed in the course outline.

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 Tow*n DPhil *Stellenbosch*
LR Cirolia, BA *UCBerkeley* MCRP PhD *Cape Town*
S Croese, BA MA *Groningen* PhD *Stellenbosch*
NR Hassan, BA (Hons) MA *Stellenbosch*
G Haysom, MPhil *Stellenbosch* PhD *CapeTown*
B Knemeyer, BAFA (Hons) *Cape Town* MLA *Edinburgh*
N Marrengane, BA *Earlham* MA Clark *Atlanta*
N Ngwenya, BA (Hons) MPhil MCRP *Cape Town*
L Nkula-Wenz, Dipl (MA equivalent) DPhil *Münster*
S Oldfield, BA (Hons) MA *Syracuse* PhD *Minnesota*
A Pulker, BSocSci MCRP *Cape Town*
A *S*elmeczi*,* MA PhD *Central European*
R Sitas, BA *Cape Town* BA (Hons) *UKZN* MA *DUT* PhD *Cape Town*
C Skinner, BSocSci *Cape Town* MSc *Natal*
W Smit, BSc MCRP PhD *Cape Town*
A Weimann, BSocSci (Hons) MSocSci *Cape Town*

Finance and Operations Manager:
I Najaar, BCom *UWC*

Administrative Officers:
M Joubert

Administrative Assistants:
S Jeppie
M Waglay, BSocSc *Cape Town* BA (Hons) *UNISA*

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. The governing balance equations of mass, energy and momentum are solved for steady-state and transient operating modes using a combination of detail 3D computational fluid dynamics and 1D network-based models. These are often combined with data driven machine learning techniques to enable the development of accurate and computationally inexpensive numerical tools to address industry needs.. 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
R Laubscher BEng (Mech) MEng (Mech) PhD *Stellenbosch*
P Gosai BSc (Eng) MSc (Eng) UCT GDE (Mech) *Witwatersrand*
CF du Sart, PrEng BCom(Hons) BSc(Eng) MSc(Eng) UCT
AG Malan, PrEng BEng (Mech) MEng (Mech) PhD *Swansea*
ES Boje, PrEng BSc (Eng) MSc (Eng) PhD *Natal* SMSAIMC MIEEE
AK Mishra, BE (*REC India*) PhD *Edinburgh* SMIEEE

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 30 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 and structural response
• Impact: energy absorbers
• Survivability: human response, injury criteria, and structural survivability
• Material characterisation: at elevated strain rates, "soft" materials, constitutive modelling.

Associate Professor and Director
S Chung Kim Yuen, BSc (Eng) MSc PhD *Cape Town*

Associated Academic Staff
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 FSAIMechE 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 70 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.

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)*
J Chamier, PhD (Chem), *Stell*
M Claeys, Dipl.Ing Dr-Ing (Chem Eng) *Karlsruhe,* FRSC
MI Fadlalla, BSc (Hons), MSc and PhD (Heterogeneous catalysis) *UKZN*
N Fischer, Chem MSc (Eng) Chem PhD (Eng) *Cape Town*
JV Fletcher MSc (Applied Science) *Cape Town South Africa*, PhD (Chemical Engineering and Chemistry) *Eindhoven, Netherlands*
P Kooyman, PhD (Eng), *TU-Delft*
N Luchters, BSc (Eng) *Leiden* Chem MSc(Eng) *Cape Town*
R Mohamed, BSc (Eng), Chem MSc (Eng), Chem PhD (Eng) *Cape Town*
Thulani M. Nyathi, BSc, BSc (Hons) Chemistry, MSc (Eng) and PhD (Chemical Engineering) *Cape Town*
CT O'Connor, PrEng BSc *Unisa* STD *Natal* BSc (Hons) PhD *Cape Town* DEng *Stell* FSAIMM FSAIChE FSAAE FRSSAf
D. Susac, PhD Physical Chemistry, *University of British Columbia*, *Canada*
E van Steen, MSc (Eng) *Eindhoven* PhD *Karlsruhe* FSAIChE FSAAE

Technical & Scientific Staff
R Cupido, NDip (Analytical Chemistry), BTech (Chemistry), MTech (Chem) CPUT
Z Jabe, NDip (Anal Chem) BTech (Chemistry) CPUT
P Johnston, BSc (UCT) *Cape Town*

B Kaine Tawa, NDip (Chem Eng), CPUT
W Koorts, BTech (Chem Eng) CPT, MTech (Chem) NMMU *Cape Town*
C Le Roux, NDip CPUT, BTech (Chem) Unisa
K U Nyambi, NDip (Chem Eng) CPUT
E Oldman, NDip (Chem Eng) CPUT

Postdoctoral Researchers
Qiang Chang, PhD (Heterogeneous catalysis) Institute of Coal Chemistry, Chinese Academy of Sciences, *China*
MI. Fadlalla, BSc (Hons), MSc and PhD (Heterogeneous catalysis) *UKZN*
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*
L Solà-Hernández, BSc (Chemistry) and MSc (Chemical research) *UAB, Barcelona, Spain*, PhD (Materials for Energy), *Université PSL, Sophia Antipolis, France*
Tayyibah Tahier, BSc (Hons) and MSc (Chemistry) *Cape Town* PhD (Chemistry, Heterogeneous catalysis), *UWC*

Honorary Professors
GJ Hutchings BSc (Chem) UCL PhD (Chem) UCL DSC (Heterogeneous Catalysis) London FIChemE FRS CBE
JW Niemantsverdriet, BSc (Phys+Math) *Amsterdam* MSc (Exp Phys) *Amsterdam* PhD *Delft* (TechSciences)
C Hebling Dipl.(Phys) PhD (Phys) Konstanz

Management Staff
LK. Kallam, NDip Accounting & Computers Protea College, BCom (IS) Unisa, PGDip *Cape Town*
SJ Roberts, PrEng BSc (Eng) Chem MSc (Eng) Chem *Cape Town*
RW Weber, BSc (Eng) Chem MSc (Eng) Chem PhD (Eng) MBA *Cape Town*

Finance & Administrative Officers
S Heugh, Dip Bookkeeping Institute of Certified bookkeepers *Cape Town*

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, PrEng BSc (Eng) Chem MSc (Eng) Chem *Cape Town*

Website: www.catcentre.uct.ac.za

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

Website: www.cchange.ac.za

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)*

Website: www.hysacatalysis.uct.ac.za

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:

- 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,
- the provision of research expertise in key aspects of bioprocess engineering relevant to South Africa through contract research,
- the contribution to fundamental insights in bioprocess engineering and related processes, and

- the transfer and application of knowledge across disciplines in which bioprocesses play a role, 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

Deputy Director
A Kotsiopoulos, BSc (Eng)Chem MSc (Eng)Chem PhD *Cape Town*

Associated Academic and Research Staff
JR Amaral Filho, BSc (Eng) Environmental PhD *Rio Grande do Sul – Brazil*
C Edward, BSc (Eng)Chem *Cape Town*
MA Fagan-Endres, BSc (Eng)Chem *Cape Town* PhD *Cantab*
E Govender-Opitz, BSc (Eng)Chem PhD *Cape Town*
MN Naidoo, BSc (Eng)Chem *UKZN*
M Smart, BSc (Hons) MSc *Stellenbosch* PhD *Cape Town*
SL Tai, BSc (Eng) *UMIST* MSc (Biochemical Engineering) PhD (Industrial Microbiology) *TU Delft*
NN Zulu NDip *DUT* BSc (Hons) *UJ* MSc *UCT* PhD *UGöttingen*

Technical Staff
S Rumjeet, BSc (Eng) Chem MSc (Eng) Chem *Cape Town*
S Rademeyer, NDip BTech (Chem Eng) MEng *CPUT*
T Samkange, NITC NTC NHD(Eng)Elec *Harare Polytechnic* MBA *Rhodes*

Postdoctoral Researchers
C Horn, BSc (Eng)Chem PhD *University of Cape Town*
DX Makaula, BSc (Hons) MSc *University of the Western Cape* PhD *University of Cape Town*
TS Marais, BSc (Biotech) *University of Western Cape* PhD *University of Cape Town*
D Wilbers, BSc (Chem) (Hons) MSc (Chem) PhD *Stellenbosch University*

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*
LD Mostert, BSc (Eng)Chem *Cape Town* MTh *Stellenbosch*

Website: www.ceber.uct.ac.za   *Instagram: ceber_uct   Facebook: CeBER   UCT Twitter:@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.

Associate Professor and Director
T Becker, BSc (Eng) MSc(Eng) PhD *Cape Town*

Associated Academic staff
RD Knutsen, BSc PhD *Cape Town*

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

Visiting Lecturers
P Evans, BA (Nat Sci) *Cambridge* PhD *Cambridge*
RA Ricks, BSc (Hons) *Leeds* PhD *Cambridge*
CI Lang, BSc PhD *Cape Town*

Emeritus Professor
RB Tait, PrEng BSc (Hons) *Rhodes* MA *Oxon* BSc (Eng) PhD *Cape Town* MSAIMechE

Senior Technical Officer
P Louw, NHD (Metallurgy)*Wits Tech*, BSC Hons (Mat Sci) *Cape Town*

Scientific Officer
S von Willingh, BSc (Hons) MSc (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*
S Bremner, BSc (Applied Maths, Astrophysics, Physics), BSc (Hons) *Cape Town* (NASSP) *Cape Town*, MSc (Physics) *UKZN*, PhD (Physics) *Cape Tow*n
K Corin, BSc (Hons) PhD *Cape Town* MSAIMM
S Geldenhuys, BEng (Chem) Stell MSc *Cape Town*
MC Harris,BSc (Hons) MSc(Eng) *Cape Town*
R Manenzhe, BSc (Hons) *Cape Town*
J Mann, BSc (Eng) *Wits* MBL *UNISA*
M Manono, BSc (Hons) PhD *Cape Town*
B McFadzean, BSc PhD *NMMU*
K Pillay, BSc (Hons) *UKZN* MSc *Cape Town* Pr. Sci. Nat.
M Richter, BSc (Physics), BSc (Hons), MSc (Physics), PhD (Physics) *Cape Town*
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, and applied mathematics. Research in the area of solid and structural mechanics focuses on modelling and simulation of inelastic material behaviour and of various structural systems, while work in computational fluid and particulate dynamics includes activities in 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 and aspects of cerebral aneurysms.

Director and Associate Professor
M Ngoepe, BSc (Eng) *Cape Town* PhD *Oxon*

Members
T Chinyoka, MSc *Zimbabwe* PhD *Virginia Tech*
F Ebobisse Bille, BSc (Hons) *Yaounde' l 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*
BD Reddy, OMB, BSc(Eng) *Cape Town* PhD *Cantab,*DSc(hc) *Stellenbosch* FSAAE,MASSAf

Associate members
TJ Cloete, MIng *Stell*
DA Deglon, BSc (Eng) *Wits* MBA PhD *Cape Town* MSAIMM

Research Officer
Vacant

Administrative Assistant
N Bent

Website: www.cerecam.uct.ac.z a

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 researchers offer supervision of post graduate qualifications specializing in engineering education including structured MPhil and PhD programmes. Contact the relevant departmental staff members for details.

Director
R Smit, BSc HDE MSc (ScEd) 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.

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* FSAICE MITSSA
M Zuidgeest, MSc PhD *Twente*

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
G Verster

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 FIChemE

Associated Academic and Technical Staff
J Chivavava, BEng (Chem) *NUST* MSc (Chem) *Cape Town* AMIChemE
HR Heydenrych, BSc (Eng) Chem MSc (Eng) *Cape Town*

Administrative Staff
TBA

Website: www.crystal.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.

Acting Director
K Carden, BSc MSc PhD *Cape Town* FWISA

Professor and Deputy Director
NP Armitage, PrEng BSc (Eng) *Natal* MSc (Eng) *CapeTown* 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
H Chitonge, BA *Zimbabwe* MA PhD *Natal*
A Dalvie, BSc Med *Cape Town* MSc *Cape Town* PhD *Cape Town*
D Ikumi, BSc *Cape Town* PhD *Cape Town*

A Mkhonza, LLB *Free State* LLM *Witwatersrand*
J Okedi, BSc *Makerere* MSc *Leuven* PhD *Cape Town*
D Randall, BSc (ChemEng) *Cape Town* PhD *Cape Town*
T Sanya, BArch *Makerere* MPlan *Stuttgart* PhD *Oslo*
N Solomon, BSocSci *Cape Town* MSocSci *Cape Town*
K Winter, BA HDE *Cape Town* MA *London* PhD *Cape Town*

Key Research Staff and Postdoctoral Fellows
A Abrams, BA *Columbia* MPhil *Cape Town*
C Teta, *BSc NUST Zimbabwe PhD NUST Zimbabwe*
M Cole, *BSc Cape Town MSc Witwatersrand PhD Oxford*

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

Associate Professor and Co-Director
JL Broadhurst, BSc (Hons) MSc *Port Elizabeth* PhD *Cape Town*

Associated Academic Staff
M Becker, BSc (Hons) MSc Geology *Cape Town* PhD *Pret*
DA Deglon, BSc (Eng) *Wits* MBA PhD *Cape Town* MSAIMM
STL Harrison, BSc (Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAIMM FSAAE ASSAf FWISA
A Mainza, BSc (Eng) UNZA PhD *Cape Town*
T Moyo, BSc (Eng) *NUST Zimbabwe* PhD *Cape Town*

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

Honorary Professor
MJ Nicol, BSc (Hons) PhD *Witwatersrand*

Adjunct Professors
B J Chicksen, MBChB *Harare* FCP (SA) *Durban* MBA *Johannesburg*
CM Digby, BA Hons(Econ) *Trinity College Dublin* MA(Econ) *British Columbia*
MSc(Environment) *London School of Economics and Political Science*
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*

Junior Research Fellows
CT Mangunda, BSc(Eng) MSc *NUST Zimbabwe* PhD *Cape Town*
M Cole*,* BSc *Cape Town* MSc *Witwatersrand* PhD *Oxford*

Finance and Administrative Officer
M Shaik

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 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 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
F Ametefe, BSc (Admin) *Ghana*, M Phil (Finance) *Ghana* PhD (Real Estate and Finance) *Reading*
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*

C Madell, BA *UWC*, BA Hons (Geography) *UWC*, MCRP, *UCT*, MSc (LED)
SD Nurick, BCom BSc(Hons)(Property Studies), MPhil *Cape Town* MRICS
U Ordor BSc(Architecture) *Jos* MSc (Architecture) *Jos* MNIA MSc (Property Studies) *Cape Town*

Honorary Research Affiliate
C Kariuki, BA (Land Economics), *Nairobi* MA (Housing) Nairobi

Other entities
Continuing Professional Development

Manager
H Tait, BHE *Stell*

Administrators
S Jemaar
G Williams

The CPD programme offers short courses, workshops and small 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. 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. The mode of delivery for each course differs, some are offered face to face only, and others are offered online. 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 Lab acts as a consulting and resource centre for 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. You can book a virtual consultation on our website.

Website: *www.gis.uct.ac.za*

Professional Communication Studies

Head of Department
Professor M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* FSAICE MITSSA

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 academic sources, referencing, citation, academic writing and professional ethics;
- report writing, business proposals, executive summaries, letters of application, eportfolios and CV's;
- visual literacy, graphics and posters;
- presentation skills.

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: Full tuition fees for a BSC Property Studies student during their 3rd year and Honours year. Preference will be given to a student from Kwa Zulu Natal or Gauteng due to availability for holiday work during July and December over these two years. On completion of their studies the student will be required to do a compulsory one year internship/work experience with JT Ross. Students will be interviewed and a decision on the award will be made at the sole discretion of 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.

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:

APG1016H	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.

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 Architects Prize: Certificate of Excellence for Teamwork in the BAS(Hons) Simulated Office Studio, including a two-year free membership with the Institute.

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: R1000 for the best student in Landscape Construction in the second year of the Master of Landscape Architecture programme.

CNdV Landscape Architects' Prize: R1000 for the best student in History and Theory of Landscape Architecture 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.

Newurban Architects and Urban Designers Prize: R1500 gift voucher for a Project of Merit that deals with sustainability and/or environmental issues in BAS.

Newurban Architects and Urban Designers Prize: R1500 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: R500 book prize for the best Landscape Design Studio Portfolio in the Bachelor of Landscape Architecture (Honours) Programme.

Institute of Landscape Architects of South Africa Prize: R1000 and certificate for the best student in the Master of Landscape Architecture Programme.

Institute of Landscape Architects of South Africa Prize: R500 book prize for the best Landscape Architecture dissertation in 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 the Bachelor of Landscape Architecture (Honours) 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 five years.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best student in the Bachelor of City Planning (Honours) programme.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best overall student work in the Master of City and Regional Planning programmes.

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

Urban Design Institute of South Africa (Western Cape) Prize: R1000 awarded to the top student in a Master of Urban Design Programme.

The Vanessa Watson Prize for Planning Theory and Practice: R1500. This prize is to be awarded annually to the best student in the Planning Theory and Practice course registered on the Bachelor of City Planning Honours programme.

The Vanessa Watson Prize for Urban Economic Development Processes: R1500. This prize is to be awarded annually to the best student in the Urban Economic Development Processes course registered on the Bachelor of City Planning Honours programme.

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 currently involved in the Built Environment and 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.

CEM Departmental 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 Asset Management Prize: R1500 for the best student collectively in the subjects of Property Investment, Finance and Portfolio Management (CON2024S, CON3034F and CON4051F).

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.

CEM Departmental 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).

CEM Departmental 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

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.

Women's Property Network prize: to top female student achiever in BSc Property Studies, BSc in Construction Studies or Bachelor of Architectural Studies: Certificate and R1500 book voucher for SA female student with Term GPA of 65% or more in good financial standing with the university – endorsed by HOD and Programme Convenor, BSc Property Studies.

The CIOB Certificate of Excellence: for BSc Honours in Construction Management based on the following: Highest Term GPA mark in degree and should be a Student member of the CIOB.
 Prize will be in the form of an electronic voucher for £50

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 & Metalurgy: Text book for best student in Mineral Processing for CHE4069F.

Astron Energy Prize for Chemical Engineering Design: R7000 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: *Engineering Textbook* for the most promising First Year student.

Omnia Prize: R2000 for the student pair completing the final year reasearch 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.

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.

IStructE SA and SAICE Prize: R2000, awarded for best overall academic achievement in structural engineering.

JG Afrika: R2000 for the fourth year civil engineering student with the highest overall achievement in professional communication.

Mariswe (Pty) Ltd Health and Safety Prize: R1500 for the best performing student in the Health and Safety module in Professional Practice (CIV4041F).

Mariswe (Pty) Ltd Prize: R1500 for the student with the best result for the Urban Water Services course (CIV3047S).

MPAMOT 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.

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: R1000

Thesis Talk Prize: R1000

Zutari Best Overall Achievement Prizes: R2500, R1500, R1000 for the three best performing students.

Zutari Prize for Water Engineering: R2000 to the student achieving the highest aggregate score in Water Engineering courses (CIV2040S, CIV3043F, CIV3044F, CIV3046S, CIV3047S, CIV4042F).

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 MEC4128S Final Year Engineering 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 MEC4128S Final Year Engineering 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 I1: R500 awarded to the student with the top mark in MEC3078S Mechanics of Machines.

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 MEC3076F Stress Analysis and Materials.

Best Final-Year BScEng Project or BSc (Hons) Project: R1000 awarded for the top mark in the final-year BScEng project or BSc (Hons) project in an Impact-Related topic.

The Gerald Nurick Prize for Excellence in Impact-Related Postgraduate Research: R1500 awarded to either an MSc student (the dissertation must be awarded with distinction) or PhD student (the thesis must have excellent reviews).

The Patterson & Cooke prize for the top Mechanical Engineering Student in Engineering Product Design: R2000 awarded to the Mechanical Engineering student with the highest final mark in MEC4124W, Engineering Product Design. Only eligible for students registered EB005 and EB805.

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 MEC3081S: Achievement certificate and R1000 for the best third-year student in the course MEC3081S, Manufacturing Sciences.

SASOL Prize for MEC3082S: Achievement certificate and R1000 for the best third-year student in the course MEC3082S, Mechanical Engineering Machine Element Design.

SASOL Prize for MEC124W: Achievement certificate and R1500 for the best fourth-year student in the course MEC4124W, Engineering 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 also as a Professional Geoinformatics Practitioner if APG3039B is taken as an elective. 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, who qualify for 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 ones 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 organisation.

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 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). 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 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. The MSc in Property Studies together with an additional Valuation elective is similarly accredited.
Address: The Registrar, SACPVP, PO Box 114, Menlyn 0063.

Engineering

The current BSc(Eng) degrees in Chemical, Civil, Electrical, Electrical and Computer, Mechanical Engineering, Mechanical and Mechatronic Engineering, and Mechatronics are accepted by the Engineering Council of South Africa (ECSA) as fulfilling all the academic requirements for registration as a Professional Engineer. In terms of the Washington Accord signed in June 2000, of which South Africa is a signatory, the Faculty's engineering qualifications have been recognised by professional engineering accrediting bodies in the United States of America, Canada, Australia, New Zealand, the United Kingdom, Ireland and Hong Kong.
In terms of the Engineering Profession Act (Act No 46 of 2000), ECSA has stipulated a minimum period of three years' approved practical training and experience after graduation under the guidance of a Professional Engineer before a candidate may register as a Professional Engineer. This period may be shortened by up to one year in recognition of successful postgraduate degree work. It is of the utmost importance that every graduate should register immediately as a candidate engineer.
The University of Cape Town enjoys a special relationship with the Association of Commonwealth Universities. The curricula, systems and standards of engineering education at the University

conform to the general pattern of the British universities and professional institutions. The degrees are therefore widely recognised.

The better known of the British and South African professional institutions are listed below. Graduates are eligible for exemption from the written Associate Membership examinations of the British institutions, as detailed below, but in all cases a period of approved professional work is required before admission to corporate membership. Student membership of these institutions is generally available to undergraduates. Information on other professional engineering bodies is available from the relevant department in the Faculty.

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

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

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

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

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

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

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

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

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

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