UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT (UNDERGRADUATE)

2014

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

This handbook is part of a series that consists of

Book 1:	Undergraduate Prospectus
Book 2:	Authorities and information of record
Book 3:	General Rules and Policies
Book 4:	Academic Calendar and Meetings
Book 5:	Student Support and Services
Books 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 (see below) each of which has a particular focus. The sections are interlinked by cross-references where relevant.

(a) *General Information:* This section includes information on the professional status and recognition of the Faculty's degrees, its links with professional bodies and the list of qualifications offered. It also includes lists of the various prizes, medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.

(b) *Rules for degrees:* This section covers the Faculty rules for each of the various degree programmes. These rules should be read in conjunction with the general University rules in the General Rules and Policies Handbook (Handbook 3). Students are expected to acquaint themselves with the rules in both Handbooks and to check annually whether the rules or curriculum requirements have changed since the last edition. *Important rules:* All students must familiarise themselves with the Degree Rules in this Handbook. In addition, students must refer to Handbook 3, General Rules and Policies and particularly take note of the following:

    rules relating to registration and examinations;

    rules relating to changes of curriculum;

    rules relating to leave of absence;

    rules on Academic Conduct, N.B. the rules concerning dishonest conduct and plagiarism.

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

(c) *Departments and Programmes:* This section contains entries for each department in the Faculty. Each lists members of staff, a summary of laboratory, workshop and other facilities, the research entities, and the programmes of study administered by each department. The curriculum for each programme (list of required courses) is set out in table form. The curriculum tables must be read together with (cross-referenced to) the lists of courses in the Courses Offered section which is described under (e) below.

(d) *Centres/Units established in the Faculty* and *Centres, Departments, Schools and Units Established in other Faculties:* There are entries for the principal Faculty entities/units which do not fall directly under academic departments e.g. the Centre for Research in Engineering Education and the Continuing Professional Development Programme and entries for the centres, units and departments in other faculties which offer courses for students registered in the Faculty. This is cross referenced to the list of courses offered in section (e).

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

GENERAL INFORMATION

Officers in the Faculty

Academic

Dean of the Faculty:
Professor F W Petersen, PrEng BEng MEng PhD *Stell* MSAIChEf

Personal Assistant to the Dean:
Ms J Baron

Deputy Deans:
Associate Professor B I Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* MSAIMechE
Professor S T L Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAAE ASSAfI
Professor V Watson, BA(Hons) *Natal* MCRP*Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

Assistant Deans:
Associate Professor M E Dlodlo, BSEE BS *Geneva* MSc *Kansas* PhD *Delft* FZweIE MIEEE
Professor J E van Zyl, PrEng BEng MEng *Rand Afrikaans* PhD *Exeter*MASCE, MSAICE, MIWA, FWISA

Heads of Departments:
Architecture, Planning and Geomatics:
Associate Professor A Steenkamp, B.Arch *Pret* M.Arch *Pret* PhD *Delft* PrArch

Chemical Engineering:
Professor A E Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAIChE FSAIMM MASSAf FSAAE

Civil Engineering:
Associate Professor N P Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA FSAIMunE MIWA

Construction Economics and Management:
Professor K S Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

Electrical Engineering:
Professor M Braae, MSc(Eng) *Cape Town* PhD *UMIST* MIEEE

Mechanical Engineering:
Professor R D Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE

Associate Professor and Convener Professional Communication Studies:
J English, BA MPhil *Cape Town* PhD *Glasgow Caledonian*

Academic Administration

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

Undergraduate Manager (Academic Administration):
Ms D Chuter, BA HDE *Cape Town*

Senior Administrative Officer (Postgraduate Studies):
Ms C Thomas, BSc HED *UNISA*, BSc (Hons) *North-West*, Master of Marine and Coastal Management *Natal*

Administrative Officer and Statistician:
Vacant

Administrative Assistants:
Ms B Davids
Ms K Hendricks
Ms S Naidoo Dipl Primary Education *Hewat*
Mrs J Rumbelow (in Professional Communication Studies)
Mr M van der Westhuizen BA *Cape Town*

Senior Secretary - Receptionist:
Ms S Reizenburg

Clinical Psychologist

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

Communications, Marketing and Development

Manager:
Ms M Hilton
Alumni Officer:
Ms M Zitha, BA (Media Studies) *Cape Town*

Finance

Faculty Finance Manager:
Mr B Daubenton, HND Civil Engineering Structures *Cape Technikon*

Assistant Faculty Finance Manager:
Ms N Ngubo

Senior Finance Officer:
Mrs M Hyland

Finance Officer:
Ms A Burmeister, BA *UNISA*

Human Resources

Human Resources Officer:
Ms Z Matthews, BAdmin *UWC*

IT and Facilities

Manager:
Ms E le Roux

Student Councils

The Engineering & the Built Environment Student Council in the Faculty represents the interests of the student body. The EBESC and its counterparts in other faculties are concerned with promoting the academic and social interests of the students they represent. The 2013/2014 Chair of the undergraduate student council is Ms Kelly Blair (BLRKEL002@myuct.ac.za) and Ms Tebaco Lejake (LJKTEB001@myuct.ac.za) is the Vice-Chair. Further information concerning the Council is obtainable from the EBESC Office, Room 337 Menzies Building.

A Faculty Postgraduate Student Council represents the specific interests of postgraduate students. The 2013/2014 Chair is Lisalokuhle Mbobo (MBBLIS001@myuct.ac.za) and Ms Nothando Khumalo (KHMNOT001@myuct.ac.za) is the Vice-Chair. They can be contacted at room 338 Menzies Building.

Postgraduate Centre

The Postgraduate Centre is situated in the OttoBeitBuilding, Upper Campus. This state-of-the-art facility houses the executive committee of the Postgraduate Students Association (PGSA) as well as the Postgraduate Funding Office. The centre is equipped with IT facilities and includes a seminar room. This facility is open to all Master's and Doctoral students as well as postdoctoral research fellows. Postgraduates are encouraged to make full use of this centre, in particular, the Funding Office, which administers all postgraduate bursaries and scholarships. The Postgraduate Centre may be contacted at gradcentre@uct.ac.za. or visited at www.pgfo.uct.ac.za.

Distinguished Teachers

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

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

Fellows in the Faculty

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

Professor M G Alexander	(Civil Engineering)
Professor D Dewar	(Architecture, Planning and Geomatics)
Professor G A Ekama	(Civil Engineering)
Professor A E Lewis	(Chemical Engineering)
Professor G Nurick	(Mechanical Engineering)
Emeritus Professor C T O'Connor	(Chemical Engineering)
Professor H Rüther	(Architecture, Planning and Geomatics)
Professor V Watson	(Architecture, Planning and Geomatics)

Lecture timetable

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

Minimum Requirements for Admission

Refer to rule FB 1, in the section on Degree Rules, for the minimum formal entrance requirements for the bachelor's degrees offered in the Faculty of Engineering & the Built Environment.
The minimum requirements for admission for Postgraduate Diploma, Honours and Master's degree

programmes in the Faculty of Engineering & the Built Environment are set out in the rules for the appropriate postgraduate diplomas/degrees. The PhD requirements are set out in Handbook 3 of this series.

Further detailed information on Faculty entrance requirements can be found in the *Undergraduate Prospectus.* Refer to the University's web page: http://www.uct.ac.za

Degrees and Diplomas Offered in the Faculty

Degrees	SAQA ID
Bachelor of Architectural Studies	3933
Bachelor of Architectural Studies (Honours)	66569
Bachelor of Science in Construction Studies	11703
Bachelor of Science in Engineering in Chemical Engineering	13983
Bachelor of Science in Engineering in Civil Engineering	13974
Bachelor of Science in Engineering in Electrical Engineering	13979
Bachelor of Science in Engineering in Electrical & Computer Engineering	66518
Bachelor of Science in Engineering in Mechatronics	13980
Bachelor of Science in Engineering in Electro-Mechanical Engineering	13982
Bachelor of Science in Engineering in Mechanical Engineering	13977
Bachelor of Science in Geomatics	TBC
Bachelor of Science in Property Studies	11693
Bachelor of Science (Honours) in Geographical Information Systems	TBC
Bachelor of Science (Honours) in Construction Management	11703
Bachelor of Science (Honours) in Materials Science	21339
Bachelor of Science (Honours) in Property Studies	11699
Bachelor of Science (Honours) in Quantity Surveying	14435
Master of Architecture	3977
Master of Architecture (Prof)	TBC
*Master of City Planning and Urban Design	
*Master of City and Regional Planning	
Master of Engineering	TBC
*Master of Landscape Architecture	
Master of Science in Engineering	10681
Master of Science in Project Management	13854
Master of Philosophy	TBC
Master of Science in Property Studies	11697
Doctor of Philosophy	TBC
Doctor of Architecture	19272
Doctor of Science in Engineering	10687

Diplomas

*Postgraduate Diploma in Project Management	
*Postgraduate Diploma in Engineering	
*Postgraduate Diploma in Engineering Management	
*Postgraduate Diploma in Property Studies	
*Postgraduate Diploma in Transport Studies	

*Unless otherwise indicated all qualifications are HEQS-F aligned but SAQA registration numbers are still to be confirmed (TBC), except for those marked with * which are to be discontinued.*

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   A person who wishes to be considered as a candidate for one of the above mentioned degrees must hold:

      (a)   a National Senior Certificate endorsed by Umalusi to state that he or she has met the minimum admission requirements for degree study; or

      (b)   a senior certificate with matriculation endorsement issued by the South African Certification Council; or

      (c)   a certificate of complete or conditional exemption issued by the Matriculation Board; or

      (d)   a degree of this, or another university recognised for the purpose by the Senate.

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

Duration of Degree

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

FB2.1   The curriculum shall extend over not less than 3 academic years of study.

BSc(Eng) and BSc(Geomatics) candidates

FB2.2   The curriculum shall extend over not less than 4 academic years of study.

Curriculum

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

FB3.1   A candidate must comply with the curriculum and course requirements prescribed by Senate which are published in the Programmes of Study and Courses Offered sections of this Handbook.

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

FB3.3   A candidate's curriculum in each year shall be subject to the approval of the Dean and the Head of the Department administering the Degree Programme for which the candidate is registered.

FB3.4   When registering for courses a candidate shall be required to adhere to the prescribed lecture timetable slots, as documented in the departmental Lecture Timetable. A candidate shall inform the Head of the Department in writing of any clash of courses (lectures/tutorials/practicals etc.) arising from adherence to this Rule immediately it becomes apparent that such a clash exists. Except with the permission of the Head of Department, a candidate may not be permitted to register for a course which clashes with another in the lecture timetable. In the event of such a clash precedence shall be given,

for registration purposes, to courses which are being repeated or undertaken in arrears.

FB3.5   Except by permission of Senate a candidate may not withdraw from a course which he or she is repeating.

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

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

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

Progress through the Degree
FB5   A candidate's academic year of study shall be determined on the basis of the year in which he or she is expected to graduate.

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

FB6.1   *General*
         Courses are assessed by formal examination, by review or by satisfactory performance of the duly performed certificate (DP) requirements. If a course is assessed by formal examination or review, a student may be refused permission (DPR) to present himself/herself for the examination or review if he/she fails to satisfy the Senate that he/she has satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate.

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

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

FB6.4   *Duly Performed (DP) Courses*
         In courses where the DP certificate constitutes the final result, the candidate is required to satisfy the assessor that he or she has satisfactorily attended and duly performed the work of the class by the date set in the conditions for the award of a DP certificate. The result is published as an ungraded 'pass' (PA) or 'duly performed certificate refused' (DPR).

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

Supplementary Examinations
BSc(Eng) and BSc(Geomatics) candidates

FB7.1   Senate may permit a candidate to take a supplementary examination in the courses END1017F/S and END1018F/S. However, a supplementary examination will not be offered for any other course in a department established in the Faculty of Engineering &

the Built Environment.

FB7.2   Senate may permit a candidate to take a supplementary examination in a course offered by a department other than a department established in the Faculty of Engineering & the Built Environment, subject to supplementary examinations being offered by the department concerned.

Readmission Requirements

BAS candidates

FB8.1   A BAS candidate shall not be permitted to renew his or her registration except by permission of the Senate, if he or she:

   (a)   at the end of first year fails either APG1020W or APG1003W;

   (b)   fails any major course prescribed for second or third year, after having been registered twice for the course;

   (c)   fails in any semester to obtain a DP for either or both major courses;

   (d)   fails to complete the courses prescribed for first year within two years; the courses prescribed for second year within four years;

BSc(Eng) and BSc(Geomatics) candidates

FB8.2   Except by permission of the Senate a candidate may not renew his or her registration if:

   (a)   he/she is in his/her first year of registration at a tertiary institution, and in the courses recognised for the degree fails to obtain at least 80 credits or, if registered through the Academic Development Programme, ASPECT, to obtain at least 64 credits; or

   (b)   he/she is a transferee from another tertiary institution or another faculty, is in his/her first year of registration in the Faculty, and fails in the courses recognised for the degree to obtain at least 96 credits, or if registered through ASPECT, to obtain at least 80 credits; or

   (c)   he/she has re-registered in the Faculty after a break of one or more years, or is granted a concession to continue and fails in the courses recognised for the degree to obtain at least 96 credits in his/her first year of re-registration or, if first registered through ASPECT, to obtain at least 80 credits; or

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

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

FB8.3   Except by permission of the Senate a candidate may not renew his or her registration if:

   (a)   he/she is in his/her first year of registration at a tertiary institution and in the courses recognised for the degree fails to obtain at least 72 credits; or

   (b)   he/she is a transferee from another tertiary institution or another faculty, is in his/her first year of registration in the Faculty, and fails in the courses recognised for the degree to obtain at least 80 credits; or

   (c)   he/she has re-registered in the Faculty after a break of one or more years, or is granted a concession to continue and fails in the courses recognised for the degree to obtain at least 80 credits in his/her first year of re-registration; or

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

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

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

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

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

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

BAS, BSc(ConstStudies), BSc(Eng), BSc(PropStudies) and BSc(Geomatics) candidates
FB8.5   A candidate who has not been readmitted in terms of rule FB8.1, FB8.2 or FB8.3, who does not appeal, or whose appeal is unsuccessful, may be considered for readmission by the Senate, after an interval of at least one year, if he/she shows evidence of academic rehabilitation or evidence of significantly improved motivation to the satisfaction of the Senate.

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

BSc(Eng) and BSc(Geomatics) candidates
FB9.2   In order to be considered for the award of the degree with first class honours or honours, a student must (i) complete the requirements for the degree in the minimum time 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)   The award of the honours or first class honours will be assessed on the basis of a student's credit weighted average for each of the four years of study, with a multiplication factor of 1 being applied to the credit weighted average of the first year, 2 for the second year, 3 for the third year and 4 for the fourth year. The overall weighted percentage mark required will be 65% for honours and 75% for first class honours.
   (b)   The research project is defined as one of APG4003/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/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   In order to be considered for the award of the degree with distinction a candidate must obtain a minimum credit weighted average mark of 75% for the degree.

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

DEPARTMENTS IN THE FACULTY AND PROGRAMMES OF STUDY

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

Associate Professor and Director:
A Steenkamp, B.Arch *Pret* M.Arch *Pret* PhD *Delft* PrArch

Professors:
I Low, BArch Cape Town MArch(Urban Design) Penn PrArch MIArch CIA
J Noero, BArch *Natal* MPhil (Architecture) *Newcastle-Upon-Tyne* Hon DSc *Brighton* MIArch
E Pieterse, BA(Hons) *UWC* MA Development Studies *ISS* PhD *LSE*
V Watson, BA(Hons) *Natal* MCRP *Cape Town* AA Dip *London* PhD *Witwatersrand* MSAPI SACP

Adjunct Associate Professor:
S Townsend, PhD *Cape Town*

Emeritus Professors:
H Rüther, Dipl-Ing *Bonn* PhD *Cape Town* PrS*(SA)* FRSSAf FSAAE
F Todeschini, BArch *Cape Town* MCP MArch (Urban Design) *Penn* MIA MUDISA ArchSA

Associate Professors:
N Coetzer, BArch *Natal* MArch *Denver* PhD *London*
H P Comrie, BArch Pret MUD Wits PhD Greenwich Arch (SA)
J L Smit, BSc(Surv) PhD *Cape Town*
J F Whittal, BSc(Surv) MSc(Eng) *Cape Town,* PhD *Calgary* PrL(SA) MSAGI

Emeritus Associate Professor:
C L Merry, BSc(Surv) *Cape Town* PhD *New Brunswick* FAIG

Senior Lecturers/Studio Master's:
F Carter, BAS BArch MPhil *Cape Town* PrArch PRCPM MIA RIBA
C Hindes, BLA *Pret* MLArch
T Katzschner, BSocSc MCRP *Cape Town*
T Sanya, BArch *Makerere* MIP *Stuttgart* PhD *Oslo*
G Sithole, BSc Surveying(Hons) *Zimbabwe* MSc IGP *ITC(NL)* PhD *TU Delft(NL)* LSZ *Zimbabwe*
T Winkler, BSc(TRP) MUD *Witwatersrand* PhD *British Columbia*
N Odendaal, NDip(TRP) *ML Sultan* BA *UNISA* MTRP *UND* PhD *Witwatersrand*
M Silverman,B.Arch *Johannesburg* MUD *Johannesburg*

M Fraschini, MSc(Arch) *Milan* PhD Arch and Urban Design *Milan*
R Govind, BSc(Surveying) *Natal* MSurvSc *New South Wales* PhD *Colorado*

Lecturers:
A Crowder, ND Arch (PTech), BTech (Applied Design) CPUT, BArch (UP), MArts (BTU-Cottbus)
K Fellingham, BArch (WITS), SM Archs (MIT), PR Arch (SA), ARB (UK), RIBA (UK)
S Hull, BSc Surveying *Kwazulu Natal* MSc(Eng) *Cape Town* PGCE *UNISA* PrL(SA)
F Isaacs, BArch *Cape Town* MIP *Stuttgart*
S Le Grange, BArch *Cape Town* M Urban Design *UC Berkeley*
M Louw, BArch *Pretoria* MPhil *Stellenbosch* PrArch(SA), MIArch
S S Papanicolaou, BArch *Cape Town*

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

Principal Technical Officer:
Mr D Matthee, NHD (Mechanical Eng.) ND (Surveying)

Chief Technical Officer:
Mr J Coetzee, NHD (Building Tech)

Senior Technical Officer:
Ms M Wells

Photographic Technician:
Mr P Kanye

Administrative Officers:
Mrs J Meyer
Mrs J M Thompsett

Administrative Assistant:
Ms N Walker

Senior Secretaries:
Ms A du Plooy
Ms N Pickover
Ms M Waglay

Print Room Manager:
Mr T Swarts

Departmental Assistant:
Mr N Stanley

Laboratory Assistant:
tba

Technical Assistant:
Mr S Matthews

IT Liaison:
Mr L Coetzee

Bachelor of Architectural Studies
BAS [EB012APG01]

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

Associate Professor and Programme Convener:
S Papanicolaou, B.Arch *Cape Town*

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG1003W	Technology I (major course)	24	05
APG1004F	History &Theory of Architecture I	12	05
APG1005S	History &Theory of Architecture II	12	05
APG1017F	Academic Development Class	0	05
APG1018S	Academic Development Class	0	05
APG1020W	Design &Theory Studio I (major course)	72	05
APG1021W	Representation I	24	05
	Total credits per year	**144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2000F	History &Theory of Architecture III	8	06
APG2003S	History & Theory of Architecture IV	8	06
APG2009F	Theory of Structures III	6	06
APG2011S	Theory of Structures IV	6	06

APG2021W	Technology II (Major Course) 24	06
APG2038W	Environment &Services II 18	06
APG2039W	Design &Theory Studio II (Major Course) 74	06
APG2027X	Work Experience 0	06
	Total credits per year **144**	**06**

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG3000F	History &Theory of Architecture V 8		07
APG3001S	History & Theory of Architecture VI..8		07
APG3023W	Technology III (major course) 24		07
APG3028X	Independent Research 0		07
APG3034W	Environment & Services III 6		07
APG3035F	Theory of Structures V 6		07
APG3036S	Management Practice Law III...12		07
APG3037W	Design & Theory Studio III (major course) 80		07
	Total credits per year **144**		

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
BSc(Geomatics) [EB019]

The courses given in the four year Geomatics programme comprise lectures, tutorials, laboratory sessions, computation and draughting sessions, and practical fieldwork. Students must show satisfactory performance in each aspect of the work in order to obtain a duly performed certificate. Students are required to complete approved courses of a value not less than 576 credits and to comply with the prescribed curriculum requirements. Students may choose a stream in Surveying, Geoinformatics or Planning. The Surveying stream is targeted at students wishing to register as a Professional Practitioner with the South African Professional and Technical Surveyors organisation (PLATO); the Geoinformatics stream is targeted at students wishing to work in the spatial information industry and for registration as a Professional Geoinformatics Practitioner with PLATO; the Planning stream enables students to obtain both a Master's degree in Planning (MCRP) and a BSc(Geomatics) degree in five years and is targeted at students wishing to work as a Professional Planner.

The design of the degree is outcomes based, with a strong emphasis on the ability to plan, execute and report on Geomatics projects with demonstrated knowledge of underlying theory and the ability to critically analyse the project outputs. The degree is designed to meet the challenges of geomatics practice in the African and developing world context as well as in the developed world, while maintaining international standards of teaching and research.

Department of Rural Development and Land Reform Bursaries: The Department of Rural Development and Land Reform offers bursaries to students who are South African citizens to study in one of the following fields:
National Diploma in Cartography
National Diploma in Surveying

BSc in Geomatics/Land Surveying
National Diploma in Land Management
Diploma in Town and Regional Planning
BSc in Town and Regional Planning
Geomatics Information System (GIS)
Applicants are expected to study in any accredited South African tertiary institution. They will be expected to enter into a contract with the Department. The bursary is for a full programme, but annually renewable based on performance results. It also covers tuition and registration, 10 % of tuition and registration as book fees, accommodation and meals.

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

Surveying: Standard survey equipment such as theodolites, tacheometers, levels and other items are available for field and laboratory work in all types of engineering, topographical and cadastral surveys. Global Positioning System (GPS) to support Static and RTK teaching and research, electronic theodolites, electromagnetic distance measurement equipment are also available. A number of survey control points on and in the vicinity of the University campus provide the basis for a variety of field practicals, and vehicles are available for field work off the campus.

Geographic Information Systems: Computation facilities include access to the Faculty's microcomputer laboratories as well as the Geomatics computer laboratory, which consists of twenty eight workstations. The workstations in the Geomatics computer laboratory run ESRI's ArcGIS, and QGIS Open Source software in support of the GIS courses. There is also an operational ArcGIS Server to allow for web mapping services.

Geodesy: There are facilities for undertaking fundamental geodetic surveys, gravity surveys and levelling, and control network adjustment. Research interest in geodesy is centred currently on measurement and modelling of the earth's gravity field, vertical datums and networks and satellite positioning. A two-computer laboratory is established for dedicated GPS processing.

Photogrammetry and Remote Sensing: The Geomatics computer laboratory has ERDAS and Inpho Photogrammetry Suite software installed for use in these courses. These are both industry leading products which provide extensive digital image processing functionality. There is also a variety of in-house software and Open Source software available to support ongoing remote sensing and photogrammetric research activities. Digital SLR and video cameras form the basis for image capture for both research and practical assignments.

Streams in Geomatics: There are three streams in the Geomatics programme, and streaming only takes place at the start of year three. However, if the Geoinformatics stream is a possible choice, then certain first and second year courses must be taken to allow that option. You will be counselled at registration, but also think about whether you may want to take environmental and geographical science or computer science to third year level prior to registration as these options may affect your courses in first year.

Bachelor of Science in Geomatics : Surveying Stream [EB019APG09]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG1016F	Geomatics I 18		05
CSC1017F	Python Programming for Engineers 16		05
GEO1009F	Introduction to Earth and Environmental Sciences 18		05

Number	Course	NQF Credits	HEQS-F Level
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
STA1000S	Statistics	18	05
	Elective	36	
	Total credits per year	**142**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2014S	Geomatics II	24	06
APG2015F	Geographic Information Systems I	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
APG2018X	Geographic Information Systems Camp	4	06
MAM2083F	Vector Calculus for Engineers	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	General Physics A	18	05
PHY1032S	General Physics B	18	05
APG2019X	Practical Training I	0	06
	Total credits per year	**148**	

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3014X	Control Survey Camp	4	07
APG3016C	Surveying II	12	07
APG3017D	Surveying III	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
APG3033W	Land & Cadastral Survey Law	16	07
CON2027F	Real Property Law	16	06
APG3015X	Practical Training I	0	07
	Total credits per year	**148**	

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG4001S	Geodesy.	24	08
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	Research Project	40	08
APG4005F	Engineering Surveying & Adjustment	18	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
APG4012S	Geomatics Management & Professionalism	24	08
CHE3062S	Professional Communication Studies	12	07
	Total credits per year	**162**	

Bachelor of Science in Geomatics : Planning Stream [EB019APG10]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

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

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG4003Z*	Research Project	40	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
APG4020F	Planning Theory and Practice	8	08
APG4021F	Urban Infrastructure	12	08
APG4022F	Planning Project A	32	08
APG4023S	Urban Economic Development Processes	12	08
APG4024S	Planning & Governmental Systems	12	08
APG4025S#	Regulatory and Legal Framework	12	08
APG4028F	Aspects of City Design	12	08
APG4029F	Natural Systems	12	08
	Total credits per year	**180**	

*APG4003Z *to be co-supervised by Geomatics and Planning academic staff*
#APG4025S *may be substituted by options focussing on professional practice and business management by those students not continuing with the Fifth Year, i.e. exiting with the BSc(Geomatics) in Planning only.*

Fifth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
	Fifth Year MCRP Core Courses	160	

Bachelor of Science in Geomatics : Geoinformatics Stream [EB019APG11]
Computer Science or Environmental and Geographical Science Major

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements. Students must choose a core elective option, which must be approved by the Programme Convener.

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CSC1015F *or*	Computer Science I A (for CSC major)	18	05
CSC1017F	Python Programming for Engineers (for EGS major)	16	05
APG1016F	Geomatics I	18	05
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
STA1000S	Statistics	18	05
	Elective	18	
	Elective Core (eg 2nd Semester CSC, EGS courses)	18	
	Total credits per year	**142/144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2014S	Geomatics II	24	06
APG2015F	Geographic Information Systems I	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
APG2018X	Geographic Information Systems Camp	4	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	Physics of Natural Systems A	18	05
PHY1032S	Physics of Natural Systems B	18	05
APG2019X	Practical Training I	0	06
	Total credits per year	**148**	

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3016C	Surveying II	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
CON2027F	Real Property Law	16	06
	Elective core (2nd Year CSC or EGS)	48	
APG3015X	Practical Training II	0	07
	Total credits per year	**164**	

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	Research Project	40	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
APG4012S	Geomatics Management & Professionalism	24	08
CHE3062S	Professional Communication Studies	12	07
	Elective Core (e.g. 3rd Year CSC or EGS)	72	08
	Total credits per year	**192**	

Elective Courses

Students must take a sufficient number of elective courses which, together with the core and elective core courses, will comprise a total of not less than 576 credits.

A list of recommended electives can be obtained from the Department. It should be noted that timetable clashes might prevent the student from taking some of these courses, and that some of them have course entry requirements not listed here.

Bachelor of Science in Geomatics : Geoinformatics Stream [EB019APG11] Geology Major

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

A candidate shall complete approved courses of a value not less than 576 credits and shall comply with the prescribed curriculum requirements. Students must choose a core elective option, which must be approved by the Programme Convener.

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CSC1015F	Computer Science I A	18	05
APG1016F	Geomatics I	18	05
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
CEM1000W	Chemistry	36	05
GEO1006S	Introduction to Minerals, Rocks & Structures	18	05
	Total credits per year	**144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2014S	Geomatics II	24	06
APG2016W	Surveying I	24	06
APG2017X	Basic Survey Camp	4	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
PHY1031F	Physics of Natural Systems A	18	05
PHY1032S	Physics of Natural Systems B	18	05
STA1000S	Statistics	18	05
GEO2001F	Mineralogy & Crystallography	24	06
APG2019X	Practical Training I	0	06
	Total credits per year	**162**	

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2015F	Geographic Information Systems I	24	06
APG2018X	Geographic Information Systems Camp	4	06
APG3011S	Geographic Information Systems II	24	07
APG3012S	Geomatics III	24	07
APG3013F	Numerical Methods in Geomatics	16	07
APG3016C	Surveying II	12	07
APG3027Z	Cadastral Survey & Registration Projects	24	07
CON2027F	Real Property Law	16	06
GEO2004S	Physical Geology	24	06
APG3015X	Practical Training II	0	07
	Total credits per year	**168**	

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG4002Z	Land Use Planning & Township Design	16	08
APG4003Z	Research Project	40	08
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
APG4012S	Geomatics Management & Professionalism	24	08
CHE3062S	Professional Communication Studies	12	07
GEO3001F	Stratigraphy & Economic Geology	36	07
GEO3005F	Petrology & Structural Geology	36	07
	Total credits per year	**192**	

Elective Courses

Students must take a sufficient number of elective courses which, together with the core and elective core courses, will comprise a total of not less than 576 credits.

A typical programme of elective core courses for the CSC and EGS majors in this stream is given below. It should be noted that timetable clashes may prevent the student from taking some of these courses.

The elective END1019L **Social Infrastructures: engaging with community for change** 18 credits, is offered in the Winter Term (July vacation) and is open to all students in EBE.

Major in Computer Science EBE019APG11]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Courses

Number	Course	NQF Credits	HEQS-F Level
CSC1015F	Computer Science 1015	18	05
CSC1016F	Computer Science 1016	18	05

Second Year Courses

| CSC2001F | Computer Science 2001 | 18 | 06 |
| CSC2002S | Computer Science 2002 | 18 | 06 |

Third Year Courses

Number	Course	NQF Credits	HEQS-F Level
CSC3002F	Computer Science 3002	18	07
CSC3003S	Computer Science 3003	18	07

Major in Environmental and Geographical Science [EBE019APG11]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Courses

Number	Course	NQF Credits	HEQS-F Level
GEO1009F	Introduction to Earth & Environmental Sciences	18	05
EGS1003S	Geography, Development & Environment	18	05

Third Year Courses

Number	Course	NQF Credits	HEQS-F Level
EGS2013F	The Physical Environment	24	06
EGS2014S	Contemporary Urban Challenges	24	06

Fourth Year Courses

Number	Course	NQF Credits	HEQS-F Level
EGS3020F	Environmental Change & Challenge	36	07
or EGS3021F	Sustainability & the Environment	36	07
EGS3012S	Atmospheric Science	36	07
*or*EGS3022S	Geographic Thought	36	07

Major in Geoinformatics (for Science students only) [EBE019APG11]

Programme Convener:
G Sithole, BSc Surveying(Hons) *Zim* MSc IGP *ITC(NL)* PhD *TUDelft(NL)* LSZ(*Zim*)

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CSC1015F	Computer Science I A	18	05
APG1016F	Geomatics I	18	05
MAM1000W	Mathematics I	36	05
or			
MAM1004F	Mathematics 1004	18	05
STA1000S	Statistics	18	05
	Total credits per year	**72/90**	

Note:
One year of mathematics (MAM1000W) is required. Alternatively, one semester of mathematics (MAM1004F) and one semester of statistics (STA1000S or equivalent) will suffice.

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG2015F	Geographic Information Systems I	24	06
APG2018X	Geographic Information Systems Camp	4	06
APG2026F	Elementary Surveying	16	06
APG3012S	Geomatics III	24	07
	Total credits per year	**68**	

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
APG3011S	Geographic Information Systems II	24	07
APG4010X	Geoinformatics Camp	4	08
APG4011F	Geomatics IV	24	08
	Total credits per year	**52**	

Curriculum for Technikon/University of Technology Transferees to the Bachelor of Science in Geomatics [EB019APG08]

1) Transferees must hold a Technikon/University of Technology National Diploma in Surveying and must have obtained:
   (a) An average of at least 70% in all prescribed final year University of Technology subjects.
   (b) A minimum of 75% for Mathematics II at the University of Technology.
   (c) A minimum of 70% for Physics I at the University of Technology.
2) Students who satisfy the criteria listed above may be granted 144 credits (for the first year) and may be exempted from the courses: APG1016F, APG2016W, APG2017X, APG2019X, CHE3062S, PHY1031F and PHY1032S.
3) Such students will be required to take the following courses (or their equivalents) in their first year of registration:

Number	Course	NQF Credits	HEQS-F Level
APG2014S	Geomatics II	24	06
CSC1017F	Python Programming for Engineers	16	05
APG2015F	Geographical Information Systems	24	06
APG2018X	Geographical Information Systems Camp	4	06
GEO1009F	Introduction to Earth and Environmental Sciences	18	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
	Electives	58	
	Total credits	**180**	

Plus at least 58 credits of elective courses

4)   After completing the above courses, students will be required to complete the prescribed Third and Fourth years of study.
5)   Students with a BTECH in surveying will need to have each course assessed for credit and/or exemption towards the BSc Geomatics degree.

Course descriptions are set out in the section on Courses Offered. Certain descriptions of optional courses, which are not contained in this Handbook, may be found in the Handbook of the Faculty of Science.

CHEMICAL ENGINEERING

The Department offers the following Degree Programme:

BSc(Eng) Programme in Chemical Engineering

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

Website: www.chemeng.uct.ac.za

Staff

Professor and Head of Department:
A E Lewis, PrEng BSc(Eng)Chem MSc(Eng) PhD *Cape Town* FSAIChE FSAIMM MASSA fFSAAE

Professors:
J M Case, BSc(Hons) *Stell* HDE MSc *Cape Town* MEd *Leeds* MSc *Cape Town* PhD *Monash* MASSAf
M Claeys, Dipl.Ing (Chem Eng) Dr. –Ing.*Karlsruhe*
D A Deglon, BSc(Eng) *Witwatersrand*MBA PhD *Cape Town* MSAIMM (Director of Postgraduate Studies)
J C Q Fletcher, BSc(Eng)Chem PhD *Cape Town* MACS FSAAE
J-P Franzidis, BSc(Eng)Chem MSc(Eng) *Cape Town* PhD *Open* MSAIChE MSAIMM
S T L Harrison, BSc(Hons) *Cape Town* PhD *Cantab* MSAIChE SASM FSAIMM FSAAE ASSAf FWISA
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H B von Blottnitz, BSc(Eng)Chem *Cape Town* BSc(Hons) *Unisa* MSc(Eng) *Cape Town* Dr.-Ing. *RWTHAachen* MSAIChE

Emeritus Professors:
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C T O'Connor, PrEng BSc *Unisa* STD *Natal* BSc(Hons) PhD *Cape Town* DEng *Stell* FSAIMM FSAIChE FSAAE FRSSAf

Honorary Research Associate:
M A Petersen, BSc(Maths, Physics) MSc (Applied Science) *Cape Town* PhD *Cantab*

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

Honorary Adjunct Professors:
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D Wright, BSc(Eng)Chem *Natal* MSAIChE FSAAE

Associate Professors:
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R Rawatlal, BSc(Eng)Chem PhD *UKZN*

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M Powell

Senior Lecturers:
O Conrad, MSc(Eng)Chem, PhD *Munster*
A Isafiade, BSc(Hons) *Ilorin* MSc(ChemEng) *Ife* PhD *Cape Town AMIChemE*
L Bbosa, MSc(Eng)*,* PhD *Cape Town*
S Tai, BSc(Hons)*UMIST* MSc *TU Delft* PhD *TU Delft*
W Böhringer, Diplom –Chem,VN*,Karlsruhe*

Part-time Senior Lecturers:
M E Dry, MSc *Rhodes* PhD *Bristol*
M Williamson, M.A. PhD *(Cantab)* C.Eng

Academic Development Lecturer:
H R Heydenrych, BSc(Eng)Chem MSc(Eng) *Cape Town* (Director of Undergraduate Studies)

Chief Research Officer:
M C Harris, BSc(Eng), MSc(Eng) Cape Town
Senior Research Officers:
M Becker, BSc(Hons) MSc Geology *Cape Town* PhD *Pret*
W Böhringer, Diplom-Chemiker *Karlsruhe*
R P van Hille, BSc(Hons) PhD *Rhodes* SASM
P Levecque, MSc (Eng) PhD *Leuven*
J A Sweet, BSc(Eng)Chem MSc *Cape Town*
A P P van der Westhuizen, BEng *Stellenbosch* MSc(Eng) *Cape Town*
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Research Officers:
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K C Corin, BSc BSc(Hons) PhD *Cape Town*
C J Fenner, PhD *Cape Town*
B J McFadzean, BSc, BSc(Hons) MSc *Port Elizabeth* PhD *NMMU*
J G Wiese NatDip *CPUT* MSc(Eng) *Cape Town*

Chief Technical Officers:
Mr K Hauslaib, BSc(Eng) Mechatronics
Mr P Dobias
Mr H J Macke, Dip Mechanical Engineering Technician
Technical Officer:
Mr G de la Cruz

Analytical Laboratory Manager:
Mrs S Snoek, BTech Chemistry *CPUT*

Building Supervisor:
Mr E Matthews
Mr N Minnie

Administration Manager:
Mrs R September, Nat Dip HRM BTech HRD *CPUT*

Administrative Staff:
Mrs J Broadley (Senior Secretary)
Mrs B Cloete (UG Administrative Assistant)

N Davids (Purchaser)
Ms N Dili (Receptionist)

Ms A Warrin (Finance Assistant)

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

Minerals processing research focused on the milling, classification and flotation of ores;

Catalysis research aimed at the synthesis and characterisation of heterogeneous catalysts and their evaluation for a wide variety of reactions and reactor types;

Hydrogen and fuel cell technologies focusing on fuel processing catalysis and devices, electrodes development and fuel cell and stack development;

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

Bioprocess engineering focused on biotransformation, bioreactor design, process kinetics, novel bioprocesses and the recovery of biological products;

Hydrometallurgy for Metal extraction;

Environmental process engineering, both at a conceptual and a practical level;

Process synthesis featuring the application of pinch technology to heat and mass transfer systems as well as the control of process systems;

Crystalization 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 Process modelling and optimisation.

Bachelor of Science in Engineering in Chemical Engineering
BSc(Engineering)(Chemical Engineering) [EB001CHE01]

A four-year undergraduate chemical engineering degree is offered which prepares graduates for careers in the chemical, metallurgical, and process industries. There is a limited amount of specialisation in the areas of minerals processing, bioprocess engineering, catalytic processing, crystallisation and process modelling, and environmental process engineering. The degree focuses on the development of technical expertise, problem-solving, teamwork and communication skills, and is accredited by the Engineering Council of South Africa.

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

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

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CEM1000W	Chemistry 1000	36	05
CHE1005W	Chemical Engineering I	44	05
MAM1020F	Engineering Mathematics A	18	05
MAM1021S	Engineering Mathematics B	18	05
PHY1012F	Engineering Physics A	18	05
STA1008S	Statistics for Engineers	12	05
	Total credits per year	**146**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CEM2007F	Physical Chemistry & Spectroscopy	24	06
CEM2008S	Organic & Inorganic Chemistry	24	06
CHE2031F	Material & Energy Balances	20	06
CHE2032Z	Design of Chemical Processes	8	06
CHE2033W	Chemical Engineering Laboratory I	4	06
CHE2035S	Thermodynamics I	12	06
CHE2040S	Fluid Flow & Heat Transfer	20	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
	Total credits per year	**144**	

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CHE3040S	Solid Fluid Operations	12	07
CHE3044F	Reactor Design I	12	07
CHE3046F	Thermodynamics II	12	07
CHE3049W	Chemical Engineering Laboratory II	16	07
CHE3050S	Chemical Process Unit Design	6	07
CHE3053S	Separation Processes	13	07
CHE3054S	Reactor Design II	13	07
CHE3062S	Professional Communication	12	07
CHE3063F	Mass Transfer	16	07
MAM3085F	Computing for Chemical Engineers	8	07
	Total credits per year	**120**	
CHE3000X	Workplace Experience	0	07

Fourth Year Core Courses

Students must be in their final year of study. Up to 16 credits of electives are considered to be part of the regular programme and should preferably be taken in the first semester. Concessions to take additional credits (consisting of more electives or outstanding core courses) will be considered.

Number	Course	NQF Credits	HEQS-F Level
CHE4029Z	Professional Communication Studies	8	08
CHE4036Z	Chemical Engineering Design	28	08
CHE4042F	Process Dynamics & Control	16	08
CHE4045Z	Chemical Engineering Project	32	08
CHE4048F	Business, Society & Environment	20	08
CHE4049F	Process Synthesis & Equipment Design	20	08
	Total credits per year	**124**	

Elective Courses

Students need to complete at least 48 credits of elective courses. At least 16 of these credits need to be from the Humanities group; and 16 from the EBE Specialisation group. The final 16 credits (Free Elective) can be taken from any course(s) offered at UCT for which the student meets the course entry requirements, subject to the approval of the Programme Convener. If possible, all elective courses should be completed before the Second Semester of the Fourth Year.

Humanities Group

This group consists of courses typical of studies in the Humanities. A list of courses satisfying this requirement is available from the Academic Administration Officer in the Department of Chemical Engineering, and is provided to students during registration. Courses not on this list require the approval of the Programme Convenor.

EBE Specialisation Group

This group consists of the following courses offered by the Department of Chemical Engineering:

Number	Course	NQF Credits	HEQS-F Level
CHE3035S	Bioprocess Technology I	8	07
CHE3039S	Catalysis	8	07
CHE3064S*	Mineral and Metallurgical Processing I	8	07
CHE3065S	Numerical Simulation for Chemical Engineers	8	07
CHE3066S	Crystallisation & Precipitation	8	07
CHE4024F	Introduction to Environmental Process Engineering	8	08
CHE4050F*	Mineral & Metallurgical Processing II	8	08
EEE4103F+	Nuclear Power Sources	12	08

* CHE3064S and CHE4050F are compulsory for mining-house bursars.
+ EEE4103F is compulsory for ESKOM bursars.

Alternatively, students may wish to take any EBE course at or above the Third Year level (including Master's level) for which they meet the course entry requirements. Such courses must be approved by the Programme Convener.

Three-Year Programme for Transferees into Bachelor of Science in Engineering in Chemical Engineering [EB001CHE01]

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 I [Applications from students who have completed Mathematics I, Chemistry I and Physics I – but 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 (HEQS-F Credits 22, HEQS-F Level 05), 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, and will have to complete all Second, Third and Fourth Year Core Courses, as well as meeting the rules for elective credits.

Since CHE1001Z Introduction to Chemical Engineering (HEQS-F Credits 22) carries fewer credits than CHE1005W Chemical Engineering I (HEQS-F Credits 44), students on the three-year transferee programme will have to complete additional elective credits to make up this shortfall.

Students may apply for exemption with credit for MAM2083F, MAM2084S, MAM3085F, CEM2007F, CEM2008S and elective courses, if equivalent courses have been completed previously.

Conversion Programmes for Bachelor of Science Graduates to Bachelor of Science in Engineering in Chemical Engineering [EB001CHE01]

Three-year conversion programme

The entrance requirements are: a BSc degree in minimum time with Mathematics I, Chemistry I and Physics I.

BSc graduates who are provisionally accepted into the three-year conversion programme must first complete the course CHE1001Z Introduction to Chemical Engineering (HEQS-F Credits 22, HEQS-F Level 05), 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, and will have to complete all Second, Third and Fourth Year Core Courses, as well as meeting the rules for elective credits.

Since CHE1001Z Introduction to Chemical Engineering (HEQS-F Credits 22) carries fewer credits than CHE1005W Chemical Engineering I (HEQS-F Credits 44), three-year conversion students will have to complete additional elective credits to make up this shortfall.

Students may apply for exemption with credit for MAM2083F, MAM2084S, MAM3085F, CEM2007F, CEM2008S and elective courses, if equivalent courses have been completed in their initial degree.

Two-year conversion programme

The entrance requirements are: a BSc degree in minimum time with above 60% in Mathematics II and Chemistry II, with majors in Mathematics or Applied Mathematics or Physics or Computer Science or Chemistry or Biochemistry or Microbiology, and an average of above 60% in the final year.

BSc graduates who are provisionally accepted into the two-year conversion programme must first complete the course CHE1001Z Introduction to Chemical Engineering (HEQS-F Credits 22, HEQS-F Level 05), which takes place over the four weeks prior to registration. If this course is successfully completed, students will have to complete the following programme over two years.

First Year of Conversion Programme (2-year programme)

Number	Course	NQF Credits	HEQS-F Level
CHE2031F	Material & Energy Balances	20	06
CHE2032Z	Design of Chemical Processes	8	06
CHE2033W	Chemical Engineering Laboratory I	4	06
CHE2035S	Thermodynamics I	12	06
CHE2040S	Fluid Flow & Heat Transfer	20	06
CHE3044F	Reactor Design I	12	07
CHE3049W	Chemical Engineering Laboratory II	16	07
CHE3053S	Separation Processes	13	07
CHE3054S	Reactor Design II	13	07
CHE3062S	Professional Communication Studies	12	07

MAM3085F   Computing for Chemical Engineers...8   07
                       Total credits per year **138**
CHE3000X   Workplace Experience……………………………………………..0   07

Second Year of Conversion Programme (2-year programme)

Number	Course	NQF Credits	HEQS-F Level
CHE3040S	Solid-Fluid Operations 12		07
CHE3046F	Thermodynamics II 12		07
CHE3063F	Mass Transfer 16		07
CHE4029Z	Professional Communication Studies 8		08
CHE4036Z	Chemical Engineering Design 28		08
CHE4042F	Process Dynamics & Control 16		08
CHE4045Z	Chemical Engineering Project 32		08
CHE4048F	Business, Society & Environment 20		08
CHE4049F	Process Synthesis & Equipment Design 20		08
	Total credits per year **164**		

Students in the two-year conversion programme must also meet the rules for elective credits.

Students may apply for exemption with credit for MAM3085F 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 (with credit, where applicable) from CHE2033W and 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 write the examinations (through self-study) for MAM1017F, MAM1018S, CEM1000W, PHY1012F and PHY1013S (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 (HEQS-F Credits 22, HEQS-F Level 05), 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, and will have to complete all Second, Third and Fourth Year Core Courses (except for CHE2033W and CHE3000X), as well as meeting the rules for elective credits.

Since CHE1XXXZ Introduction to Chemical Engineering (HEQS-F Credits 22) carries fewer credits than CHE1005W Chemical Engineering I (HEQS-F Credits 44), such students will have to complete additional elective credits to make up this shortfall.

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 Courses Offered. The course code abbreviation for Chemical Engineering is CHE.

CIVIL ENGINEERING

The Department offers the following Undergraduate Degree Programme:

BSc Engineering Degree 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 brand new facility is shared with the Department of Chemical Engineering and the Faculty Office.

Staff

Associate Professor and Head of Department:
N P Armitage, PrEng BSc(Eng) *Natal* MSc(Eng) *Cape Town* PhD *Stell* FSAICE FWISA
  FSAIMunE MIWA

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

Associate Professors:
R Behrens, Pr Pln BA MCRPPhD *Cape Town*
H Beushausen, Dipl-Ing HAW Hamburg MSc(Eng) PhD Cape Town
U K Rivett, Dipl-Ing *München* PhD *Cape Town*
M Vanderschuren, BSc(Eng) *Tilburg* MScEng *Delft* PhD *Enschede* MSAICE MSASITS
M B van Ryneveld, PrEng CEng BSc(Eng) *Cape Town* PhD *Witwatersrand* FSAICE,MICE,
MIWA, MWISA, MSASEE

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

Senior Lecturers:
D Kalumba, BSc(Eng) *Makerere* MSc(Eng) *Cape Town* PhD *Newcastle-upon-Tyne*
S Skatulla, Dipl-Ing *Karlsruhe* PhD *Adelaide*

Academic Development Senior Lecturer:
N S Wolmarans, MScEng *Cape Town*

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

Research Officers:

K J Carden, BSc MAppl.Sci. PhD *Cape Town*
H Schalekamp, BAS BArch MPhil *Cape Town*

Honorary Research Associates:
E Beukes, PhD *Cape Town*
V Collis, PrEng PrArch BSc(Eng) *Cape Town*
S Nhleko, BSc(Eng) MSc(Eng) *Cape Town* PhD *Oxford*
L A Kane, BEng *Wales(Cardiff)* MSc(Eng) *Cape Town*
M Santhanam, BTech *IIT Madras* MS *Purdue* PhD *Purdue*

Principal Technical Officer:
Mr C J Nicholas

Laboratory Manager/Principal Scientific Officer:
Mr N Hassen

Water Quality Laboratory Manager:
Vacant

Chief Technical Officer:
Mr A Rule

Laboratory Technician:
Vacant

Departmental Manager:
Ms A B Dalwai, BSocSc *Cape Town*

Administrative Officer:
Ms R Geswindt

Research Administrative Assistants:
Ms A E I Semler
Ms E Yelverton

Administrative Assistant:
Ms I Ncube

Purchaser:
Ms A Courie

Senior Secretary:
Ms C Wright

Departmental Assistants:
Mr H Mafungwa
Mr C May
Mr E Witbooi

Bachelor of Science in Engineering in Civil Engineering
BSc(Engineering)(Civil Engineering) [EB002CIV01]

Professor and Programme Convener:
P Moyo BSc(Eng) *Zimbabwe* MSc(Eng) *Newcastle-upon-Tyne* PhD *Nanyang*

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 <u>one</u> elective course of 16 or more credits, constitute the courses recognised for the degree in terms of Rule FB8.2. DP and examination requirements to pass the core courses are set out in the course information sheets issued at the start of all Civil Engineering core courses.

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

Professional aspects are covered by courses in communication and civil engineering practice.

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CEM1008F	Chemistry for Engineers	16	05
CIV1005W	Introduction to Engineering	24	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
MAM1042S	Engineering Statics	16	05
MEC1002W	Engineering Drawing	16	05
PHY1012F	Physics A for Engineers	18	05
PHY1013S	Physics B for Engineers	18	05
	Total credits per year	**144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CIV2011F	Mechanics of Materials	16	06
CIV2031S	Structural Engineering I	16	06
CIV2034S	Spatial Data Acquisition & Management	16	06
CIV2035X	Civil Engineering Camp	4	06
CIV2037F	Experimental Methods & Statistics	16	06
CIV2039S	Geotechnical Engineering I	16	06
CIV2040S	Fluid Mechanics	8	06
GEO1008F	Geology for Engineers	12	05
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**148**	
CIV2020X	Practical Experience	0	06

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CIV3031F	Structural Engineering II	16	07
CIV3035S	Structural Engineering III	16	07
CIV3042S	Geotechnical Engineering II	16	07
CIV3043F	Hydraulic Engineering	16	07
CIV3044F	Engineering Hydrology	8	07
CIV3045F	Transportation Planning	16	07
CIV3046F	Water Treatment	12	07
CIV3047S	Urban Water Services	12	07
ECO1007S	Economics for Engineers	16	05
	Elective	18	

Total credits per year **146**

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CIV4031F	Structural Engineering IV 16		08
CIV4035C	Design Project 24		08
CIV4041F	Professional Practice..16		08
CIV4042F	Waste Water Treatment 12		08
CIV4043F	Urban Design & Management 16		08
CIV4044S	Research Project 48		08
EGS1005F	Introduction to Environmental Assessment & Management.........12		05
	Total credits per year **144**		

Elective Courses

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

In the final year of study students may get a concession to take a maximum of 16 credits per semester over and above the published fourth year core curriculum. This may consist of outstanding courses from prior years or additional electives.

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 that will be made available to the student at the beginning of each year. This core elective will ordinarily be undertaken in the second half of the third year, although the elective END1019L (Social Infrastructures: engaging with community for change) is available in the Winter Term. It is the responsibility of the student when proposing electives to ensure that there are no lecture, practical or examination timetable clashes for courses so offered.

Programme for Technikon/University of Technology Transferees to Bachelor of Science in Engineering in Civil Engineering (CE) [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 Mathematics II in the National Diploma examinations. Students who satisfy these criteria will be granted credits and be exempted from the following courses; CIV1005W, MAM1042S, MEC1002W, CIV2011F, CIV2020X, CIV2034S and MEC2042F. Such Students will be required to register for the following courses in their first year at UCT:

Number	Course	NQF Credits	HEQS-F Leve
CEM1008F	Chemistry for Engineers 16		05
MAM1020F	Mathematics 1A for Engineers 18		05
MAM1021S	Mathematics 1B for Engineers...................................18		05
PHY1012F	Physics A for Engineers..18		05

PHY1013S	Physics B for Engineers	18	05
CIV2031S	Structural Engineering I	16	06
CIV2035X	Civil Engineering Camp	4	06
CIV2037F	Experimental Methods & Statistics	16	06
CIV2040S	Fluid Mechanics	8	06
ECO1007S	Economics for Engineers	16	05
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**160**	

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.

CONSTRUCTION ECONOMICS AND MANAGEMENT

The Department offers the following Undergraduate degree programmes:

BSc Degree Programmes in
Construction Studies
Property Studies

The Department is housed in Centlivres Building, situated at the southern end of University Avenue opposite the RobertLeslie Building. The building consists of a five-storey block, containing offices, lecture theatres, the Built Environment Library and the CAD Laboratory. The Building is shared with the School of Architecture, Planning and Geomatics.

Staff

Professor and Head of Department:
K S Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

Professor:
P A Bowen, BSc(QS) BCom *Natal* MSc(Construction Management) *Heriot-Watt* PhD *UPE* PrQS PMAQS FRICS FCIOB PrCM PrCPM MAACE PrValuer

Associate Professors:
K A Michell, BSc(QS) MPhil *Cape Town* PhD *Salford* PrQS PMAQS MRICS MAACE ICIOB MSAFMA
F Viruly, BA(Hons) *Witwatersrand* MA(Dev Econ) *Kent* FRICS

Emeritus Professors:
B G Boaden, BSc(QS) *Witwatersrand* MBA *British Columbia* PhD *Witwatersrand*
A J Stevens, MSc(Building) *Cape Town* PhD *UPE*

Adjunct Professors:
G J Paddock, BA LLB *Cape Town* AAArb
G J Snyman, BCom MCom *Stell* PhD *Cape Town* FCIOB FIHSA

Senior Lecturers:
E Edwardes, BSc BSc(QS) MSc(Project Management) *Pret* PrQS PMAQS
K Evans, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS
C I Jay, BSc(Hons)(Geology) *Cardiff* MBL *UNISA*
K Le Jeune, BSc(QS) MSc(Property Studies) *Cape Town* PrQS PMAQS MRICS
M W Massyn, BSc(Building) *UPE* FCIOB
R P T McGaffin, BSocSc *Cape Town* MCRP *Cape Town* MPhil *Cantab*
M M Mooya, BSc(Land Economy) *Copperbelt* MPhil(Land Economy) *Cantab* PhD(Real Estate) *Pret*
A Windapo, BSc(Building*) IfE* MSc(Construction Management) PhD *Lagos* FNIOB

Academic Development Lecturer:
A Street, BSc (QS)(Hons) *Cape Town* PrQS PMAQS

Departmental Manager:
Mrs E Koch

Administrative Officer:
Mrs M Fagodien (Postgraduate)

Administrative Assistants:
Ms A Haddon (Undergraduate and Honours)
Ms J Breda (Finance)

Reception and General Administration:
Mrs V Daries

Departmental Assistant:
Mr B Baron

Undergraduate Programmes

Please note that the offering of all undergraduate programmes is subject to a minimum student enrolment. A subminimum of 40% applies to the examination and coursework components of all undergraduate courses with a CON course code.

Bachelor of Science in Construction Studies

BSc (Construction Studies) [EB015CON04]

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 South African Council for the Project and Construction Management Professions (SACPCMP), and the South African Council for the Quantity Surveying Profession (SACQSP).

Professor and Programme Convener:
K S Cattell, BSc(QS) *UPE* MPhil*Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

A candidate shall complete approved courses of a value not less than 450 credits and shall comply with all the prescribed curriculum requirements (which may in any given year exceed 450 credits).

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CIV1006S	Building Science I	16	05
CON1004W	Construction Technology I	32	05
CON1010S	Construction Information Systems	8	05
BUS1036F	Evidence-based Management	18	05
ECO1010F	Microeconomics	18	05
ECO1011S	Macroeconomics	18	05
MEC1002W	Engineering Drawing	16	05
STA1001F	Statistics 1001	18	05
	Total credits per year	**144**	
CON1007X	Practical Training		05

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
ACC1006S	Financial Accounting I	18	05
APG2026F	Elementary Surveying	16	06

CML1001F	Business Law I	18	05
CML2005F	Labour Law	18	06
CON1019S	Professional Communication Studies	16	05
CON2006W	Construction Technology II	32	06
CON2020S	Construction Management I	16	06
CON2022W	Measurement & Design Appraisal I	16	06
	Total credits per year	**150**	
CON2013X	Practical Training	0	06

Third Year Core Courses

Number	Course		Credits
CON3012W	Construction Technology III	32	07
CON3030S	Construction Costing	16	07
CON3031W	Measurement & Design Appraisal II	32	07
CON3032W	Applied Contract Law I	12	07
CON3033F	Property Studies I	16	07
CON3038W	Construction Management II	32	07
CON3043W	Cost Engineering under Uncertainty	16	07
	Total credits per year	**156**	
CON3023X	Practical Training	0	07

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

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).

Professor and Programme Convener:
K S Cattell, BSc(QS) *UPE* MPhil *Cape Town* PrQS PMAQS MRICS MSAPCI MSAFMA

A candidate shall complete approved courses of a value not less than 432 credits and shall comply with all the prescribed curriculum requirements (which may in any given year exceed 432 credits).

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CON1011F	Property Studies I A	16	05
CON1012S	Property Studies I B	16	05
CON1015S	Property Information Systems	8	05
CON1017S	Property Investment Mathematics I	8	05
CON1018W	Building Technology I T	16	05
BUS1036F	Evidence-based Management	18	05

ECO1010F	Microeconomics	18	05
ECO1011S	Macroeconomics	18	05
STA1000S	Statistics 1000	18	05
STA1001F	Statistics 1001	18	05
	Total credits per year	**154**	

Second Year Core Courses

Number	Course	HEQS-F Credits	HEQS-F Level
ACC1006F/S	Financial Accounting I	18	05
CML1001F	Business Law I	18	05
CON2024S	Property Studies II A	16	06
CON2027F	Real Property Law I	16	06
CON2029S	Measurement	8	06
CON2030F	Property Investments Mathematics II	8	06
CON2031S	Property Studies II B	16	06
FTX2020F	Business Finance	18	06
	Total credits per year	**118**	

Elective Core Courses

Courses totalling a minimum of 34 credits must be chosen from the following:

Number	Course	HEQS-F Credits	HEQS-F Level
BUS2010F/S	Marketing I	18	06
CML2005F	Labour Law	18	06
ECO2003F	Microeconomics II	18	06
ECO2004S	Macroeconomics II	18	06
STA2020F	Business Statistics	24	06

Third Year Core Courses

Number	Course	HEQS-F Credits	HEQS-F Level
CML2010S	Business Law II	18	06
CON1019F	Professional Communication Studies	16	05
CON3034F	Property Studies III A	16	07
CON3035S	Property Studies III B	16	07
CON3036W	Property and Contract Law	16	07
CON3040W	Cost Engineering I T	16	07
CON3041F	Property Studies III C	16	07
	Total credits per year	**114**	

Elective Core Courses

Courses totalling a minimum of 34 credits must be chosen from the following:

Number	Course	HEQS-F Credits	HEQS-F Level
ACC1012S	Business Accounting	18	05
ACC2022F/S	Management Accounting I	18	06
BUS2010F/S	Marketing I	18	06
CML2001F	Company Law	18	06
CML2005F	Labour Law	18	06
CON3044S	Globalisation & the Built Environment	18	07
ECO2003F	Microeconomics II	18	06
ECO2004S	Macroeconomics II	18	06
STA2020F	Business Statistics	20	06
	Approved Elective(s)	18	

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

ELECTRICAL ENGINEERING

The Department offers the following Undergraduate Degree programmes:

Bachelor of Science in Engineering Degree Programme 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
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Staff

Professor and Head of Department:
M Braae, MSc(Eng) *Cape Town* PhD *UMIST MIEEE*

Professors:
A Baghai-Wadji, MSc(Eng) PhD *Vienna* DSc *Helsinki* FEMA SIEEE
E S Boje, PrEng BSc(Eng) *Wits* MSc(Eng) PhD *Natal* SMSAIMC MIEEE
M R Inggs, PrEng BSc(Hons) Rhodes PhD London MIEEE

Part-time Professor:
P Pillay, CEng BSEng *UDW* MSc(Eng) *Natal* PhD *Virginia Tech* FIET FIEEE

Emeritus Professors:
B J Downing, MSc *Bradford* PhD *Sheffield*
G de Jager, MSc *Rhodes* PhD *Manchester* MBL *SA* MIEEE
C T Gaunt, PrEng BSc(Eng) *Natal* MBL SA PhD *Cape Town* FIET FSAIEE
A Petroianu, Dipl Ing *USSR* Dr Ing *Bucharest* FIEEE VDE CIGRÉ
K M Reineck, CEng Dip Eng *Cologne* DipEIEng *Dunelm* PhD *Newcastle* VDE FIET

Associate Professors:
P Barendse, MSc(Eng) PhD *Cape Town*MIEEE
M E Dlodlo, BSEE BS *Geneva* MSc *Kansas* PhD *Delft* FZweIE MIEEE
K A Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ SMIEEE MSAIEE
R H Geschke, BEng MSc(Eng) PhD *Stellenbosch*
M A Khan, MSc(Eng) PhD *Cape Town* MIEEE MSAEE
F Nicolls, MSc(Eng) PhD *Cape Town*
A J Wilkinson, BSc(Eng) *Cape Town* PhD *London*

Emeritus Associate Professor:
J R Greene, MSc(Eng) *Cape Town* MIEEE

Adjunct Associate Professor (part-time):
M Malengret, BSc(Eng) *Natal* MSc(Eng) PhD *Cape Town* M(SA)IEE

Visiting Professors:
F Anderson, MSc *Georgia Tech*

C Baker, BSc(Hons) PhD *Hull*
H A Chan, BSc *HKU* PhD *Maryland* SMFIEEE
H Griffiths, BA *Oxon* PhD DSc *London*
T Magedanz, PhD *Berlin*
K Woodbridge, BSc(Hons) *Sussex* DPhil

Hon Research Associates:
J Collins, MSc *Oxon*
B T Farrimond, BA *Oxon* MSc(Computer Science) *Manchester*
A Langman, PhD *Cape Town*

Senior Lecturers:
S Chowdhury, BEE(Hons) PhD (Eng) *Kolkata* MIET SMIEEE MIE SMSAIEE
O E Falowo, BEng MEng *Akure* PhD *Cape Town* MIEEE
S I Ginsberg, MSc(Eng) Cape Town
M Hanif, BEng(Hons) *UK* PhD *Ireland* MIEEE
A Mishra, BE (*REC India*) PhD *Edinburgh*
A Murgu, MSc(Eng) *Bucharest* Ph Lic (Comp Sci) PhD (Appl Math) *Jyväskylä* MIEEE

Adjunct Professor:
P J Cilliers, PrEng BEng (Hons) *Pret* MS George Washington PhD *Ohio* SAIP

Adjunct Senior Lecturer:
I Khan, MSc(Eng) *Cape Town* MIEEE

Lecturers:
K Awodele, REng BSc(Eng) *Ife* MSc(Eng) *Abu* PGDM MNSE MIEEE
A Patel, MSc(Eng) Cape Town
M S Tsoeu, MSc(Eng) *Cape Town*
R A Verrinder, MSc(Eng) *Cape Town* MIEEE
S Winberg, BSc(Hons) *Cape Town* MSc *UTK* PhD *Cape Town*

Academic Development Senior Lecturer:
R Smit, MSc(ScEd) *Witwatersrand*

Senior Research Officers:
R Herman, BSc(Eng) *Cape Town* MSc(Eng) PhD(Eng) *Stell*
M J E Ventura, PrEng BSc(Maths, Physics) BSc(Eng) *Cape Town* BSc(Hons) *Pret* MIEEE MSAIEE

Research Officers:
A van der Byl, MTech *CPUT,* PhD *Cape Town*

Principal Technical Officer:
Mr A C Wozniak, BSc(Eng) *Cape Town*

Senior Technical Officers:
Mr P Daniels
Mr D De Maar, BEd(Hons) *Cape Town*
Mr P Titus

Technical Officers:
Mr P Bizimana

Departmental Manager:
Ms J Buxey

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

Finance Assistant:
Ms ME Joubert

Administrative Assistant (Postgraduate):
Ms N Moodley

Administrator (General):
Ms C Koonin

Receptionist:
Ms E Waqu

Departmental Assistant:
Mr B Daniels

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

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

Bachelor of Science in Engineering in Electrical Engineering
BSc(Engineering)(Electrical Engineering) [EB009EEE01]

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

Associate Professor and Programme Convener:
K A Folly, MSc(Eng) *Beijing* PhD *Hiroshima* MIEEJ SMIEEE MSAIEE

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, Nuclear Engineering, Power Electronics and Machines, Power and Energy Systems, Signal & Image Processing and Telecommunications and RF & Microwave Systems.

The first 3 years of the degree are quite general and cover the fundamentals of the Electrical Engineering disciplines.

First Year Core Courses (EE)

Number	Course	NQF Credits	HEQS-F Level
AXL1200S	Culture, Identity & Globalization in Africa	8	05
CSC1017F	Computer Science for Engineers	16	05

EEE1005W	Engineering I	24	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
MAM1042S	Engineering Statics	16	05
MEC1003F	Engineering Drawing	8	05
PHY1012F	Physics A for Engineers	18	05
PHY1013S	Physics B for Engineers	18	05
EEE1000X	Practical Training	0	05
	Total credits per year	**144**	

Second Year Core Courses (EE)

Number	Course	NQF Credits	HEQS-F Level
EEE2035F	Signals & Systems I	12	06
EEE2036S	Probability & Statistical Design in Engineering	12	06
EEE2038W	Fundamentals of Electrical Engineering	24	06
EEE2039W	Fundamentals of Electronic Engineering	36	06
MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
MEC2043F	Electrical & Mechanical Materials	12	06
PHY2010S	Electromagnetism for Engineers	16	06
	Total credits per year	**144**	

Second Year Optional Courses (EE)

Number	Course	NQF Credits	HEQS-F Level
AST1000F	Introduction to Astronomy (timetable permitting)	18	05
END1019L	Social Infrastructures: engaging with community for change	18	05

Third Year Core Courses (EE)

A maximum of 24 second year credits can be carried concurrently with Third Year EEE courses.

Number	Course	NQF Credits	HEQS-F Level
EEE3017W	Digital Electronics	16	07
EEE3055W	Electromagnetic Engineering	20	07
EEE3057S	Power Engineering	20	07
EEE3068F	Electronic Circuits	12	07
EEE3069W	Control Engineering	20	07
EEE3073S	Professional Communication Studies	12	07
EEE3083F	Communications System & Network Design I	12	07
EEE3086F	Signals & Systems II	12	07
MEC2026S	Project Management	8	06
	Total credits	**132**	
EEE3000X	Practical Training		07

Third Year Optional Courses (EE)

Number	Course	NQF Credits	HEQS-F Level
AST2002H	Astrophysics (timetable permitting)	24	06
EEE3064W	Digital Electronics & Microprocessors	16	07
EEE3085S	Communication System & Network Design II	12	07
END1019L	Social Infrastructures: engaging with community for change	18	05
	Total credits per year	**144**	

Fourth Year Core Courses (EE)

Number	Course	NQF Credits	HEQS-F Level
EEE4006F	Professional Communication Studies	8	08
EEE4022S/F	Final Year Project	40	08
EEE4036C/A	Electrical Engineering Design	8	08

EEE4051F	New Venture Planning	8	08
MEC4022Z	Industrial Law	8	08
MEC4063C	Industrial Ecology	8	08

Fourth Year Elective Core Courses (EE)
Select courses amounting to at least 60 credits from the following:
At least one course (20 credits) from:

Number	Course	NQF Credits	HEQS-F Level
EEE4087F	Mobile Broadband Networks	20	08
EEE4089F	Power Distribution & Transmission Networks	20	08
EEE4093F	Process Control & Instrumentation	20	08

And further courses from:

Number	Course	NQF Credits	HEQS-F Level
EEE4001F	Digital Signal Processing	20	08
EEE4088F	Wireless Communication Systems Design	20	08
EEE4090F	Power Systems Analysis Operation and Control	20	08
EEE4099F	Electrical Machines & Power Electronics	20	08
EEE4101F	Nuclear Power Engineering	20	08
EEE4104C	Electrical Machines & Drives	10	08
EEE4105C	RF & Microwave Devices & Circuits	10	08
	Total credits per year	**144**	

Students cannot register for the following courses in the same year as these courses are timetabled in the same periods:
EEE4001F and EEE4089F; EEE4087F and EEE4090F; EEE4088F and EEE4099F.

Fourth Year Optional Courses (EE)
Students must select three or more of the elective-core courses above plus additional optional courses listed below to bring their credit totals to at least 576 credits.

Number	Course	NQF Credits	HEQS-F Level
EEE4096S	Neural Fuzzy & Evolving Systems	8	08
END1019L	Social Infrastructures: engaging with community for change	18	05
HUB4045F	Introduction to Medical Imaging & Image Processing	12	08
	Total degree credits	**576**	

Programme for University of Technology Transferees

University of Technology students will be granted credit and exemption on a course by course basis if they obtained a matriculation exemption or the NSC endorsed for degree studies before they started their National Diploma, achieved a minimum of 75% for Maths II and Maths III, and achieved a minimum of 70% in other equivalent courses.

Suitably qualified University of Technology transferees who have completed the Bachelor of Technology degree in minimum time, will be granted credit and exemption on a course by course basis, up to a maximum of 288 credits for equivalent courses passed. Applicants must complete all the core and elective core courses, or their equivalent, prescribed for the degree and pass at least 288 credits resulting in a total credit value of at least 576 credits.

All such applicants need to meet the knowledge and learning outcomes specified by ECSA.

Conversion Programme for University Graduates

Suitably qualified Graduates entering the BSc(Eng) Electrical Engineering, BSC(Eng) Electrical and Computer Engineering or BSc(Eng) Mechatronics degree programme are granted up to a maximum of 288 credits on a course by course basis, and are required to complete specific courses amounting to a value of not less than 288 credits in 2 years. Graduates who do not satisfy the required entry

criteria for the 2-year programme may follow a 3 year programme prescribed by the Department. Applicants need to meet the knowledge and learning outcomes specified by ECSA.

Bachelor of Science in Engineering in Electrical and Computer Engineering
BSc(Engineering)(Electrical and Computer Engineering) [EB022EEE02]

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

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

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

The Electrical and Computer Engineering Programme is administered as a distinct Programme within the Department of Electrical Engineering, and student advice specific to the needs of Electrical and Computer Engineering undergraduates is available to students on the Programme.

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

First Year Core Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
AXL1200S	Culture, Identity & Globalization in Africa	8	05
CSC1015F	Computer Science IA	18	05
CSC1016S	Computer Science IB	18	05
EEE1005W	Engineering I	24	05
MAM1020F	Mathematics 1A for Engineers	18	05
MAM1021S	Mathematics 1B for Engineers	18	05
MEC1003F	Engineering Drawing	8	05
PHY1012F	Physics A for Engineers	18	05
PHY1013S	Physics B for Engineers	18	05
EEE1000X	Practical Training	0	05
	Total credits per year	**148**	

Second Year Core Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
CSC2001F	Computer Science 2A	24	06
CSC2002S	Computer Science 2B	24	06
EEE2026S	Basic Electrical Engineering II	20	06
EEE2035F	Signals and Systems I	12	06
EEE2036S	Probability and Statistical Design in Engineering	12	06
EEE2040F	Basics Electrical Engineering I	24	06

MAM2083F	Vector Calculus for Engineers A	16	06
MAM2084S	Linear Algebra and DEs for Engineers	16	06
	Total credits per year	**148**	

Second Year Optional Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
AST1000F	Introduction to Astronomy (timetable permitting)	18	05
END1019L	Social Infrastructures: engaging with community for change	18	05

Third Year Core Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
CSC3023F	Computer Science 3023	24	07
EEE3044S	Energy Conversion & Utilization	8	07
EEE3064W	Digital Electronics & Microprocessors	16	07
EEE3073S	Professional Communication Studies	12	07
EEE3074W	Embedded Systems	20	07
EEE3081F	Control Engineering A	10	07
EEE3084W	Communication System & Network Design	24	07
EEE3086F	Signals & Systems II	12	07
MEC2026S	Project Management	8	06
EEE3000X	Practical Training	0	07

Third Year Optional Courses (EC)

Note: The pre-requisites for Fourth Year Elective Core Courses.

Number	Course	NQF Credits	HEQS-F Level
AST2002H	Astrophysics (timetable permitting)	24	06
*EEE3063F	Transmission Lines	10	07
**EEE3082S	Control Engineering	10	07
END1019L	Social Infrastructures: engaging with community for change	18	05
	Total credits per year	**144**	

* Pre-requisite for EEE4088F
** Pre-requisite for EEE4093F

Fourth Year Core Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
EEE4006F	Professional Communication Studies	8	08
EEE4022S/F	Final Year Project	40	08
EEE4036C/A	Electrical Engineering Design	8	08
EEE4051F	New Venture Planning	8	08
EEE4084F	Digital Systems	20	08
MEC4022Z	Industrial Law	8	08
MEC4063C	Industrial Ecology	8	08

Fourth Year Elective Core Courses (EC)

Choose two courses from the following:

Number	Course	NQF Credits	HEQS-F Level
EEE4001F	Digital Signal Processing	20	08
EEE4087F	Mobile Broadband Networks	20	08
*EEE4088F	Wireless Communication Systems Design	20	08
**EEE4093F	Process Control & Instrumentation	20	08
	Total credits per year	**140**	

* Requires EEE3063F as a pre-requisite
** Requires EEE3082S as a pre-requisite

Fourth Year Optional Courses (EC)

Number	Course	NQF Credits	HEQS-F Level
HUB4045F	Introduction to Medical Imaging & Image Processing 12		08
EEE4104C	Electrical Machines & Drives 10		08
EEE4105C	RF & Microwave Devices & Circuits 10		08
END1019L	Social Infrastructures: engaging with community for change 18		05
	Min total degree credits **576**		

Select other optional courses to bring the credit total to at least 576 credits.

Bachelor of Science in Engineering in Mechatronics
BSc(Engineering)(Mechatronics) [EB011EEE05]

Professor and Programme Convener:
E S Boje, PrEng BSc(Eng) *Wits* MSc(Eng) PhD *Natal* SMSAIMC MIEEE

Mechatronics is an interdisciplinary branch of engineering which combines a fundamental background in mechanical engineering with light-current electrical engineering. Many universities and other institutions world-wide are now offering courses or degrees in Mechatronics, and it is increasingly recognised that this combination of mechanical and electrical engineering studies equips graduates with an excellent basis upon which to build valuable engineering roles in modern industry.

Apart from receiving a thorough grounding in both electrical and mechanical engineering, the Mechatronics student at UCT will gain a foundation of understanding in physical science, advanced engineering mathematics, electro-mechanical control theory, microcomputer technology, systemic engineering design and some principles of engineering management. In addition, the Mechatronics Programme offers final-year optional courses in related fields, such as bio-medical engineering, power electronics and machines and industrial management.

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

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

First Year Core Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
AXL1200S	Culture, Identity & Globalization in Africa 8		05
CSC1017F	Computer Science for Engineers... 16		05
EEE1005W	Engineering I 24		05
MAM1020F	Mathematics 1A for Engineers 18		05
MAM1021S	Mathematics 1B for Engineers... 18		05
MAM1042S	Engineering Statics 16		05
MEC1003F	Engineering Drawing 8		05
PHY1012F	Physics A for Engineers... 18		05
PHY1013S	Physics B for Engineers... 18		05

| **EEE1000X** | Practical Training .... 0 | 05 |
| | Total credits per year .... **144** | |

Second Year Core Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
EEE2035F	Signals & Systems I.. 12		06
EEE2036S	Probability & Statistical Design in Engineering 12		06
EEE2038W	Fundamentals of Electrical Engineering 24		06
EEE2039W	Fundamentals of Electronic Engineering 36		06
MAM2083F	Vector Calculus for Engineers A 16		06
MAM2084S	Linear Algebra and DEs for Engineers 16		06
MEC2022S	Thermofluids I 16		06
MEC2043F	Electrical & Mechanical Materials 12		06
	Total credits per year **144**		

Second Year Optional Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
AST1000F	Introduction to Astronomy (timetable permitting) 18		05
END1019L	Social Infrastructures: engaging with community for change 18		05

Third Year Core Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
EEE3017W	Digital Electronics 16		07
EEE3031S	Energy Utilisation 10		07
EEE3061W	Mechatronics Design I 12		07
EEE3068F	Electronic Circuits 12		07
EEE3069W	Control Engineering 20		07
EEE3073S	Professional Communication Studies 12		07
MEC2023F	Dynamics 1 16		06
MEC2025F	Mechanics of Solids 12		06
MEC2026S	Project Management 8		06
MEC3031S	Dynamics II 16		07
MEC3035S	Computer Integrated Manufacture & Robotics 8		07
	Total credits per year **142**		
EEE3000X	Practical Training	0	07

Third Year Optional Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
AST2002H	Astrophysics (timetable permitting) 24		06
EEE3086F	Signals & Systems II 12		07
END1019L	Social Infrastructures: engaging with community for change 18		05

Fourth Year Core Courses (ME)

Number	Course	NQF Credits	HEQS-F Levels
EEE4006F	Professional Communication Studies 8		08
EEE4022S/F	Final Year Project...40		08
EEE4036C/A	Electrical Engineering Design 8		08
EEE4051F	New Venture Planning 8		08
EEE4093F	Process Control & Instrumentation 20		08
EEE4099F	Electrical Machines & Power Electronics....................20		08
MEC4022Z	Industrial Law...8		08
MEC4063C	Industrial Ecology...8		08
	Total credits per year **120**		

Fourth Year Optional Courses (ME)

Number	Course	NQF Credits	HEQS-F Level
EEE4001F	Digital Signal Processing	20	08
END1019L	Social Infrastructures: engaging with community for change	18	05
HUB2005F	Introduction to Medical Engineering	8	06
MEC3023F	Mechanics of Solids	12	07
EEE4104C	Electrical Machines & Drives	10	08
EEE4105C	RF & Microwave Devices & Drives	10	08
	Total minimum degree credits	**576**	

Select other optional courses to bring the credit total up to 576 credits.

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

MECHANICAL ENGINEERING

The Department offers the following Undergraduate Degree Programmes:

BSc(Eng) Degree Programmes in
Electro-Mechanical Engineering
Mechanical Engineering

The Department of Mechanical Engineering is situated in the Electrical & Mechanical Engineering, McMillan and Menzies Buildings on the Groote Schuur campus, fronting onto University Avenue. It can be accessed via University Avenue and Library Road.

Staff

Professor and Head of Department:
R D Knutsen, BSc PhD *Cape Town* MSAIMM MSAIMechE

Deputy Heads of Department:
Research: Professor G S Langdon, BEng PhD *Liverpool* MIMechE CEng
Teaching: Associate Professor C J von Klemperer, BSc(Eng) MSc(Eng) PhD *Natal*

Professors:
G N Nurick, PrEng MSc(Eng) *Natal* PhD *Cape Town* FSAIMechE MASME FSAAE
C Redelinghuys, BIng(Hons) *Stell* MS *Stanford* PhD *Stell* MSAIMechE MAIAA
R B Tait, PrEng BSc(Hons) *Rhodes* MA *Oxon* BSc(Eng) PhD *Cape Town* MSAIMechE
P G Rousseau, PrEng BEng (Mech) MEng (Mech) PhD *Pret* OPM *HBS*

Emeritus Professor:
J Gryzagoridis, PrEng BSc(Eng) *Lamar* MSc(Eng) *Texas A and M* PhD *Cape Town* MSAIMechE
   M(SA)IRAC M(SA)INT M(SAAM) M(N.YORK) ACAD.SCIENCES

Adjunct Professor:
L Jestin MSc(Eng) PhD *Marseille* HDR Provence
A D B Yates, BSc(Eng) MSc(Eng) PhD *Cape Town* MSAIMechE

Honorary Professor:
D Karagiozova, PhD *Ukrainian Academy of Science*

Associate Professors:
T. Bello-Ochende, PrEng; B.Eng, M.Eng *Ilorin*; PhD *Duk*e; MASME.
B I Collier-Reed, PrEng MSc(Eng) PhD *Cape Town* MSAIMechE
F J Kahlen, Dipl-Ing *RWTH Aachen* MSc *Tennessee* PhD *Central Florida* SMAIAA
R Kuppuswamy, BEng(Hons) MTech PhD *Singapore* SMSME
A G Malan, PrEng BEng (Mech) MEng (Mech) *Pret* PhD *Swansea*
H D Mouton, BSc Eng *Pret* BSc *Unisa* B Eng Hons M Eng *Pretoria* PhD Eng *NWU*

Senior Lecturers:
T J Cloete, MIng *Stell*
C Findeis, NHD (Mech Eng) *Pret*
D Findeis, MSc(Eng) *Cape Town* MSAIMechE
W F Fuls, PhD(Eng)*NWU*
S L George, BSc(Eng) MSc(Eng) PhD *Cape Town*
R Govender, BSc(Eng) MSc(Eng) PhD *Cape Town*

H T Pearce, BSc(Eng) *Cape Town* MS PhD *Illinois*
C B Shaw, BSc HDE MPhil(EngMan) PhD *Cape Town*
G Vicatos, PrEng BSc(MechElec)(Marine) *Newcastle* MSc(Aero) DIC *London* PhD *Cape Town*

Lecturers:
T Booysen, MSc(Eng) *Cape Town*
E B Ismail, BSc(Eng) MSc(Eng) *Cape Town*

Part-Time Lecturers:
Adv J Evans, BA LLB *Cape Town*
M Perumal, BSc(Eng) MSc(Eng) *Cape Town*

Academic Development Lecturer:
B C Kloot, MSc(Eng) PhD *Cape Town*

Honorary Research Associate
G Floweday, BSc(Eng) MSc(Eng) PhD *Cape Town*

Principal Technical Officers:
Mr J Mayer, NHD (Mech Eng) *Cape Town*
Mr G Newins
Mr H Emrich

Chief Technical Officers:
Mr P Smith
Mr H Tomlinson

Technical Officer:
Mr D Jacobs

Laboratory Attendants:
Mr G Doolings
Mr P Jacobs
Mr W Slaverse

Operations Support Coordinator
Ms F Bux, BSocSci *Cape Town*

Administrative Officer:
Mrs C A Bloomer, BA HDE *Cape Town*

Administrative Assistant (Undergraduate):
Ms S Walker

Administrative Assistant (Postgraduate):
Mrs S Batho

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 and robotics.

The undergraduate Bachelor of Science in Engineering degree programmes in Electro-Mechanical Engineering and Mechanical Engineering have a common first year curriculum.

Bachelor of Science in Engineering in Electro-Mechanical Engineering
BSc(Engineering)(Electro-Mechanical Engineering) [EB010MEC05]

The Programme in 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.

Programme Convener:
Associate Professor H D Mouton

A candidate shall complete approved courses of a value required to bring the total to a minimum of 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CEM1008F	Chemistry for Engineers	16	05
MAM1020F/S	Mathematics 1A for Engineers	18	05
MAM1021F/S	Mathematics 1B for Engineers	18	05
MAM1042S	Engineering Statics	16	05
MEC1005W	Introduction to Mechanical Engineering	24	05
MEC1006W	Mechanical Engineering Drawing	16	05
PHY1012F/S	Physics A for Engineers	18	05
PHY1013F/S	Physics B for Engineers	18	05
MEC1000X	Practical Training..	0	05
	Total credits per year...	**144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
EEE2041F	Electrical Circuits..	12	06
EEE2042S	Analogue Electronic Design & Labs	12	06
MAM2083F/S	Vector Calculus for Engineers	16	06
MAM2084F/S	Linear Algebra and DEs for Engineers.......................................	16	06
MEC2020W	Design I	32	06
MEC2022S	Thermofluids I	16	06

MEC2023S	Dynamics I	16	06
MEC2025F	Mechanics of Solids	12	06
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year	**144**	
MEC2000X	Practical Training	0	06

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
EEE3044S	Energy Conversion & Utilization	8	07
EEE3061W	Mechatronics Design I	12	07
EEE3062F	Digital Electronics	12	07
EEE3070S	Measurement & Microprocessors	8	07
MAM2082F	Computer Programming in Matlab	8	06
MEC2026S	Project Management	8	06
MEC3023F	Mechanics of Solids	12	07
MEC3031S	Dynamics II	16	07
MEC3033F	Thermofluids II	20	07
MEC3035F	Computer Integrated Manufacture & Robotics	8	07
MEC3037S	Professional Communication Studies	12	07
MEC3050W	Design II	24	07
MEC3000X	Practical Training		
	Total credits per year	**148**	

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
MEC4047F	Mechanical Vibrations	12	08
MEC4053Z	Measurement and Control in Engineering Systems	16	08
MEC4063C	Industrial Ecology	8	08
MEC4103F	Product Design	12	08
MEC4107S	Fundamentals of Control Systems	8	08
MEC4108S	System Design	12	08
MEC4109S	Engineering Professionalism	8	08
MEC4110W	Final-Year Project	46	08
	Total core credits per year	**122**	

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 courses which fulfil the requirements of category (b).

Number	Course	NQF Credits
	Complementary Studies (b)	18

Bachelor of Science in Engineering in Mechanical Engineering
BSc(Engineering)(Mechanical Engineering) [EB005MEC01]

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 discipline integrates content from other mechanical engineering courses with design philosophies and best practices and develops both team and individual skills.

Programme Convener:
Associate Professor T Bello-Ochende

A candidate shall complete approved courses of a value required to bring the total to a minimum of 576 credits and shall comply with all the prescribed curriculum requirements.

First Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
CEM1008F	Chemistry for Engineers	16	05
MAM1020F/S	Mathematics 1A for Engineers	18	05
MAM1021F/S	Mathematics 1B for Engineers	18	05
MAM1042S	Engineering Statics	16	05
MEC1005W	Introduction to Mechanical Engineering	24	05
MEC1006W	Mechanical Engineering Drawing	16	05
PHY1012F/S	Physics 1A for Engineers	18	05
PHY1013F/S	Physics 1B for Engineers	18	05
MEC1000X	Practical Training..	0	05
	Total credits per year...	**144**	

Second Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
EEE2030F	Electrical Engineering I...	12	06
EEE2031S	Electrical Engineering II	12	06
MAM2083F/S	Vector Calculus for Engineers	16	06
MAM2084F/S	Linear Algebra and DEs for Engineers..	16	06
MEC2020W	Design I	32	06
MEC2022S	Thermofluids I	16	06
MEC2023S	Dynamics I	16	06
MEC2025F	Mechanics of Solids	12	06
MEC2042F	Materials Science in Engineering	12	06
	Total credits per year...	**144**	
MEC2000X	Practical Training..	0	06

Third Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
EEE3044S	Energy Conversion & Utilisation...	8	07
MAM2082F	Computer Programming in Matlab	8	06
MEC2026S	Project Management	8	06
MEC3023F	Mechanics of Solids	12	07
MEC3031S	Dynamics II	16	07
MEC3033F	Thermofluids II	20	07
MEC3037S	Professional Communication Studies	12	07
MEC3044S	Thermofluids III	12	07
MEC3045F	Experimental Methods..	12	07
MEC3050W	Design II	24	07
	Total core credits per year	**132**	
MEC3000X	Practical Training	0	07

Elective Core Courses
A minimum of 12 credits must be chosen from the following:

Number	Course	HEQS-F Credits	HEQS-F Level
MAM3080F	Numerical Methods 12		07
MEC3060F	Materials Under Stress 8		07
MEC3069S	Production Processes 8		07

Fourth Year Core Courses

Number	Course	NQF Credits	HEQS-F Level
MEC4047F	Mechanical Vibrations 12		08
MEC4063C	Industrial Ecology.. 8		08
MEC4103F	Product Design 12		08
MEC4104F	Manufacturing and Nanotechnology 8		08
MEC4107S	Fundamentals of Control Systems 8		08
MEC4108S	System Design 12		08
MEC4109S	Engineering Professionalism.. 8		08
MEC4110W	Final-Year Project.. 46		08
	Total core credits per year.. **114**		

Elective Core Courses

Students must select one of the following courses:

Number	Course	NQF Credits	HEQS-F Level
MEC4045F	Numerical Methods in Heat and Fluid Flow 12		08
MEC4105F	Finite Element Analysis.. 12		08
MEC4106F	Resource Engineering 12		08

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 courses which fulfil the requirements of category (b).

Number	Course	NQF Credits
	Complementary Studies (b) 18	

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

ACADEMIC DEVELOPMENT IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

ASPECT Co-ordinator:
H T Pearce, BSc(Eng) *Cape Town* PhD *Illinois*

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

Senior Lecturer:
T S Craig, PhD *Cape Town*

Lecturers:
K Nathoo, BSc(Eng) MSc(EngMan) *Cape Town*
A Campbell, Bsc(Hons) Applied Maths HDE *Natal* MSc *UKZN*

Part Time Lecturer:
E Vicatos, BA(Hons) STD *Cape Town*

Administrative Staff:
Mrs L Nkomo

The ASPECT Programme (See codes below)

The Academic Support Programme for Engineering in Cape Town (ASPECT) is designed for students who obtained the National Senior Certificate endorsed for degree studies or a Senior Certificate with matriculation exemption from schools that have not prepared them adequately for tertiary study. The Programme provides a supportive environment that is sensitive to students' academic, social and emotional needs. The curriculum is planned so that the degree should take five years to complete.

In the first year, students register for three full credit-bearing courses all counting towards the degree. These are Mathematics I, Physics I and Chemistry I, or Engineering I. These are the same courses as are taken by students registered for the 4 year degree. The Mathematics course is taught by staff in ASPECT; the Physics lectures are conducted by ASPECT staff, while the laboratory sessions are offered by the Physics department. Chemistry is taught in the Chemistry Department. The Engineering I courses are taught in the departments. Students also take an Introduction to Communication course, run by ASPECT staff.

Students who continue with engineering at UCT will complete, in their second year, the remaining first year courses, 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. In the third year, students complete the remaining second year courses together with appropriate courses from the third year curriculum, while ASPECT continues to provide non-academic support and counselling. ASPECT staff will monitor and advise students while they complete the remaining degree requirements.

First Year Courses

Number	Course	NQF Credits	HEQS-F Level
END1008Z	Introduction to Communication 8		05
END1020F	Mathematics 1A for Engineers 18		05
END1021S	Mathematics 1B for Engineers... 18		05
PHY1014F	Physics A for ASPECT.. 18		05
PHY1015S	Physics B for ASPECT.. 18		05

CEM1000W	Chemistry 1000 (for Chemical Engineering EB801) 36		05
or			
CIV1005W	Engineering I (Civil) [EB802] 24		05
or			
EEE1005W	Engineering I (Electrical) [EB809, EB811, EB822] 24		05
or			
MEC1005W	Intro to Mechanical Engineering [EB805,EB810] 24		05

(The Engineering course to be selected will depend on the engineering discipline that the student chooses.)

Second Year Course

Number	Course	NQF Credits	HEQS-F Level
MAM2085F	Vector Calculus for ASPECT 16		06

Engineering I and programme codes:

CIV1005W	Civil Engineering [EB802]
EEE1005W	Electrical Engineering [EB809]
	Electrical & Computer [EB822]
	Mechatronics [EB811]
MEC1005W	Mechanical Engineering I [EB805]
	Electro-Mechanical Engineering [EB810]

Course descriptions are set out in the section Courses Offered. The course code abbreviation for ASPECT courses is END.

CENTRES, DEPARTMENTS, SCHOOLS AND UNITS ESTABLISHED IN OTHER FACULTIES

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

Departments Established in the Faculty of Commerce

Accounting
Associate Professor and Head of Department:
M Graham, BBusSc MCom *Cape Town* CA(SA) ACMA

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

Finance and Tax
Associate Professor and Head of Department:
C West, MCom PhD *Cape Town* CA(SA)

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

School of Economics
Director of the School:
E Muchapondwa, BSc MSc *Zimbabwe* PHL PhD *Göteborg*

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

School of Management Studies
Head of Department:
A Schlechter, BSc(Hons) MA PhD *Stell*

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

Centre and Department Established in the Faculty of Humanities

Centre for African Studies
Associate Professor and Director:
H Garuba, MA PhD *Ibadan*

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

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

Sociology

Associate Professor and Director:
D Cooper, BSc(Eng) *Cape Town* MSocSc PhD *Birmingham*

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

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

Philosophy

Professor and Head of Department:
D Benatar, BSocSc(Hons) PhD *Cape Town*

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

Department Established in the Faculty of Law

Commercial Law

Professor and Head of Department:
A Rycroft, BA *Rhodes* LLB *Natal* LLM *London* Attorney of the High Court

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

Department Established in the Faculty of Health Sciences

Human Biology

Associate Professor and Head of Department:
L A Kellaway, Bsc(Hons) MSc PhD *Cape Town*

The programme in Biomedical Engineering is offered in the Faculty of Health Sciences Its activities are concentrated at postgraduate level and students may pursue the following qualifications:
> Postgraduate Diploma in Health Care Technology Management
> MSc(Med) Biomedical Engineering
> MPhil
> PhD

The Department of Human Biology also collaborates at an undergraduate level with departments in the Faculty of Engineering & the Built Environment, particularly Electrical Engineering and Mechanical and Materials Engineering. Courses offered are listed in the section (Undergraduate Courses - HUB).

Departments and Unit Established in the Faculty of Science

Astronomy

Professor of Astronomy and Head of Department:
R C Kraan-Korteweg, Diploma PhD Phil II *Basle*

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

Chemistry

Professor and Head of Department:
S A Bourne, BSc(Hons) PhD *Cape Town* CChem MRSC MSACI
The courses offered by the department for students registered in the Faculty of Engineering & the Built Environment are described in the Courses Offered section of this Handbook under the course code CEM.

Computer Science

Associate Professor and Head of Department:
S Berman, BSc(Hons) *Rhodes* MSc PhD *Cape Town*

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

Electron Microscope Unit

Professor and Director:
B T Sewell, MSc *Witwatersrand* PhD *Lond*

The Electron Microscope Unit is housed in the RW James Building at 9 University Avenue and provides scanning and transmission electron microscopy facilities for staff and research students in all faculties. The Unit is equipped with two scanning and three transmission electron microscopes including a modern field emission TEM and SEM. Associated preparative, darkroom, light microscopy and library facilities are also provided. Enquiries regarding the use of these facilities are welcome.
Aspects of electron microscopy are offered to any University member who wishes to make use of the Unit's facilities for the purpose of research. The Unit is also able to provide information and advice on a wide range of microscopy related topics. More detailed information is available at http://sbio.uct.ac.za/webemu

Environmental and Geographical Science

Professor and Head of Department:
M E Meadows, BSc(Hons) *Sussex*, PhD *Cantab*, FSSAG

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

Geological Sciences

Associate Professor and Head of Department:
S H Richardson, BSc(Hons) *Cape* Town PhD *MIT*

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

Mathematics and Applied Mathematics

Professor and Head of Department:
H-P Kunzi, MSc PhD *Berne*

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

Physics

Professor and Head of Department:
A Buffler, MSc PhD HDE *Cape Town*

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

Statistical Sciences

Associate Professor and Head of Department:
F Little, MSc PhD *Cape Town*

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

COURSES OFFERED

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

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

Course Codes

ACC	Accounting
APG	Architecture, Planning and Geomatics
AST	Astronomy
BUS	Management Studies
CAS	Centre for African 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 Science
END	Faculty of Engineering & the Built Environment
GEO	Geological Sciences
HUB	Human Biology
MAM	Mathematics & Applied Mathematics
MEC	Mechanical Engineering
PBL	Public Law
PHI	Philosophy
PHY	Physics
SEA	Oceanography
SOC	Sociology
STA	Statistical Sciences

Every course described in this Handbook has a course name and a corresponding course code. The code structure is uniform, and it gives important information about the course. The course code is an eight character code in the format 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 (eg Humanities courses), and subject to timetable constraints.

Major Course: A major course refers to the Design & Theory Studio and Technology courses in the BAS curriculum.

Optional courses: Any approved courses other than the core courses and those selected as elective core or electives in the curriculum of the student concerned. Selection of these courses is made on the basis of interest, subject to course entry 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.

Course Entry Requirements: A course entry requirement is a course which a student must have completed in order to gain admission to a specific other course.

Undergraduate course: This is a course which is required for a first qualification, eg a Bachelor's degree.

Postgraduate course: This is a course which is required for a higher qualification, eg a Postgraduate Diploma, Honours or a Master's degree.

Credit System

The Faculty has adopted the Higher Education Qualifications sub-Framework course credit system with effect from 2004. The Faculty's course credit ratings which were in effect prior to 2004 have been converted to NQF course credits. This conversion involves multiplying the pre-2004 credit values by four. The NQF system is based on the guideline that 10 notional hours of learning is equal to one credit. The Faculty's previous credit system was based on the guideline that 40 notional hours of learning is equal to one credit.

Lecture timetable

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

ACC1006F/S   FINANCIAL ACCOUNTING

18 NQF credits at level 5
Convener: Ms J Kew
Course Entry Requirements: NSC Mathematics 4 (50%)
Course outline: This course introduces students to the objective of a business; various business decisions; IFRS and the conceptual framework; the flow of documentation in a business; recording business transactions (including Inventory, VAT and receivables); year-end accounting adjustments; reporting financial information (preparing financial statements; income statement and statement of financial position.
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%, final 3 hour examination 65%.

ACC1012S   BUSINESS ACCOUNTING

18 NQF credits at level 5
Convener: Mr D Macdonald
Course Entry Requirements: A minimum 40% final mark for ACC1106 or ACC1006 Financial Accounting or equivalent.
Course outline: This course introduces students to analysis and interpretation of company financial statements; costing; budgeting; and taxation.
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 a weighted average of 40% for assignments.
Assessment: Coursework 35%, final 3 hour examination 65%.

ACC2022F   MANAGEMENT ACCOUNTING I

18 NQF credits at level 6
Convener: Mr J Anthony/Mrs J Gevers
Course Entry Requirements: ACC1006 Financial Accounting (or approved equivalent).
Course outline: This course introduces the discipline of management accounting; the analysis of cost systems, cost classification and cost behaviour; product costing including job costing and process costing; the allocation of costs from service departments; absorption and variable costing; activity based costing; cost-volume-profit relationships; relevant costing and cost benefit analyses; budgeting systems; standard costing and flexible budgeting.
DP requirements: Attendance at and submission of a minimum of 75% of tutorials AND a weighted average of 40% for class tests (excluding objective tests)
Assessment: Course work 40%, final examination 3 hours 60%.

APG1003W   TECHNOLOGY I

24 NQF credits at level 5; 40 lectures, site visits, tutorials. First year undergraduate.

Convener: TBA

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.

DP requirements: 80% attendance and participation and 100% completion of all tutorials, assignments and projects.

Assessment: By written examination, *en-loge* test, and examination of portfolio of all tutorials, projects and assignments.

APG1004F   HISTORY & THEORY OF ARCHITECTURE I

12 NQF credits at level 5; 20 lectures, 16 tutorials. First year undergraduate.

Convener: TBA

Course Entry Requirements:

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.

DP requirements: 80% attendance and participation and 100% completion of all essays, tutorials and assignments.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG1005S   HISTORY & THEORY OF ARCHITECTURE II

12 NQF credits at level 5; 20 lectures, 16 tutorials. First year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This 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 assigned local case studies to the class. These case studies form the basis of research for the final essay.

DP requirements: 80% attendance and participation and 100% completion of all projects, tutorials and assignments.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG1016F   GEOMATICS I

18 NQF credits at level 5; 60 lectures, 10 practical/tutorial assignments. First year undergraduate.

Convener: Mr S Hull

Co-requisites: APG1017S or 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, surveying software, spreadsheets, introduction to fields of geomatics and integrated systems.

Lecture times: 3rd period Mon to Fri. Practicals: one per week Mon 14h00-17h00

DP requirements: Class tests must be written with a minimum average of 40% and all practical assignments attended and submitted.

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

APG1017F   ACADEMIC DEVELOPMENT CLASS
0 NQF credits at level 5; first semester, DP course. First year undergraduate.
Convener: TBA
Co-requisites: APG1003W, APG1020W.
Course outline: This seminar based practical class aims to support the development of visual and verbal literacy for students in need of academic support.
DP requirements: None.
Assessment: Portfolio review of all project work.

APG1018S   ACADEMIC DEVELOPMENT CLASS
0 NQF credits at level 5; June vacation, DP course. First year undergraduate.
Convener: TBA
Co-requisites: APG1003W, APG1020W or APG2039W, APG2021W.
Course outline: This tutorial based practical class is designed to respond to individual student learning difficulties, evident in the mid-year review, and provides academic support.
DP requirements: None.
Assessment: Portfolio review of all project work.

APG1020W   DESIGN & THEORY STUDIO I
72 NQF credits at level 5; 1 theory and 1 design lecture and studio - 12 hours per week. First year undergraduate.
Convener: TBA
Co-requisites: APG1003W.
Course outline: This course aims to initiate 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 on the development of productive working methods in design. The format of short experimental exercises, longer projects and *en loge* tests is used.
DP requirements: 80% attendance and participation. 100% completion of all projects and assignments.
Assessment: Theory of Design assignments and reports and/or *en-loge* design test, and examination of portfolio of all projects.

APG1021W   REPRESENTATION I
24 NQF credits at level 5; 80 lectures/tutorials. First year undergraduate.
Convener: TBA
Co-requisites: APG1003W, APG1020W.
Course outline: This drawing course aims to introduce techniques and disciplines to enhance creativity rather than conformity and is divided into freehand, geometric drawing and digital drawing. The freehand drawing tutorials address drawing elements such as line, tone, mass, texture, measure and proportion, in wet and dry media. The geometric drawing tutorials 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, reiterate the visual and graphic understanding developed through the course.
DP requirements: 80% attendance and participation and 100% completion of tutorials and assignments.
Assessment: By examination of portfolio of all projects and assignments.

APG2000F HISTORY & THEORY OF ARCHITECTURE III

8 NQF credits at level 6; 20 lectures, 10 tutorials. Second year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This course focuses on architectural modernism and urbanism and aims to give students an insight into the culture, tradition, programmes and movements of early modern architecture, as a global as well as local practice; and develop a critical understanding of the historical period.

DP requirements: 100% completion of: tutorial assignments: seminar presentation, examination and/or essay; 80% attendance and participation in lectures and tutorials.

Assessment: By written examination as well as tutorials, presentations and/or essay.

APG2003S HISTORY & THEORY OF ARCHITECTURE IV

8 NQF credits at level 6; 20 lectures, 10 tutorials. Second year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This course aims to introduce students to postmodern architectural theory and practice. It examines the various responses to modernism after WWII and starts a debate with critical contemporary architectural concerns. In so doing the course offers students a meaningful framework to assess contemporary architectural issues.

DP requirements: 100% completion of projects and assignments; seminar presentation on examination and an essay; 80% attendance and participation.

Assessment: By written examination and examination of all essays, presentations and assignments.

APG2009F THEORY OF STRUCTURES III

6 NQF credits at level 6; 20 lectures. Second year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This course aims to develop an in-depth understanding of the concepts of load, equilibrium, bending, shear, compression, tension and torsional forces and stresses. Students will 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) and how it connects to the vertical structure. The course also provides an introduction to structural materials. 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 and arches are developed into vaults and domes.

DP requirements: 80% attendance, participation and 100% completion of all essays, assignments and tests.

Assessment: By written class tests, tutorials and final examination.

APG2011S THEORY OF STRUCTURES IV

6 NQF credits at level 6; 20 lectures. Second year undergraduate.

Convener: TBA

Course Entry Requirements: APG2009F.

Course outline: This course aims to enable 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. 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.

DP requirements: 80% attendance, participation and 100% completion of all projects, assignments

and tests.
Assessment: By written class tests, tutorials and final examination.

APG2014S   GEOMATICS II

24 NQF credits at level 6; 60 lectures, 8 practical/tutorial assignments. Second year undergraduate.
Convener: Dr R Govind
Course Entry Requirements: APG1017F/S or CSC1015F or CSC1017F, APG1016F/S, DP for MAM2083F
Co-requisite: APG2016W
Course outline: This course builds on the introduction to 'co-ordinate systems' in Geomatics I, and extends to cover co-ordinate transformations, 3-D co-ordinate systems and time variations. Student are also introduced to the method of least squares as a means of solving over-determined systems of equations, with applications in co-ordinate transformations. Topics include: 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 Mon to Fri. Practicals: one per week, Friday 14h00-17h00
DP requirements: Completion of all assignments with a minimum average of 40% and to the satisfaction of the course convenor, and a minimum test average of 40%.
Assessment: Tests count 15%, practical assignments count 25%, examination 3 hours counts 60% (sub minimum 40%).

APG2015F   GEOGRAPHIC INFORMATION SYSTEMS I

24 NQF credits at level 6; 60 lectures; 8 practical sessions. Second year undergraduate.
Convener: Mr S Hull
Course Entry Requirements: CSC1015F or APG1015F/S, MAM1000W or MAM1017F/S or MAM1004F and STA1000S, APG1016F/S.
Co-requisites: APG2016W, APG2018X.
Course outline: This course aims to provide knowledge and skills in the fundamental concepts of geographic information systems and remote sensing. Topics include: GIS concepts, cartographic concepts and GIS map production, map projections and application in GIS, GIS data structures and analysis, spatial databases, GIS data input with special emphasis on remote sensing, and   GIS analysis and application.
Lecture times: 4th period Mon to Fri. Practicals: one per week, Fri 14h00-17h00
DP requirements: Completion of all practical assignments with a minimum average of 50% and to the satisfaction of the course convener, and a minimum test average of 40%.
Assessment: Tests count 20%, practical assignments 25%, 3 hour examination 55% (sub minimum 40%).

APG2016W   SURVEYING I

24 NQF credits at level 6; 50 lectures; 8 practical assignments; 5 tutorial assignments. Second year undergraduate.
Convener: Mr S Hull
Course Entry Requirements: MAM1000W or MAM1018S/F or MAM1004F and STA1000S; APG1016F/S.
Co-requisites: APG2017X.
Course outline: This course is designed for students of Geomatics and aims to provide an understanding of graphical and spatial concepts and skills in plane surveying measuring and calculation; develop problem solving skills in relation to practical surveying problems and equip students with group work skills and technical report writing skills. Topics include: basic instrumentation, calculations used in surveying to determine co-ordinates on a mapping plane:

theodolites, levels, electronic distance measuring equipment (EDM) and GPS; joins, polars, traversing, intersection, resection, triangulation, trilateration, triangulateration, error figures, eccentric reduction and reverse polars, levelling calculations, distance measurement, and tachaeometry and topographic mapping and surface fitting. In addition, the course builds competency in the solution of integrated survey calculation problems.

Lecture times: 5th period Mon to Fri. Practicals: one per week, Tues 14h00-17h00

DP requirements: Completion of all practical assignments with a minimum average of 50%, and completion of all tutorial assignments with a minimum average of 50%, and a minimum class test average of 40%, and subminimum of 40% in the examination.

Assessment: First semester: tests count 20%, practical assignments count 15%, second semester tutorial assignments 15%, final examination counts 50%.

APG2017X   BASIC SURVEY CAMP

4 NQF credits at level 6;1 Week practical project. Second year undergraduate.

Convener: Mr S Hull

Course Entry Requirements: APG1016F/S.

Co-requisites: APG2016W with a minimum of 40% in the June examination.

Course outline: This course aims to consolidate knowledge and skills learnt in APG2016W, develop problem solving skills in relation to practical surveying problems, equip students with group work skills, engender tolerance of diversity and equip students with simple technical report writing skills. This one-week camp in the field is intended for students studying towards the Geomatics degree. The camp is project based with the main emphasis on basic survey operations, including traverse, tacheometry and levelling with the preparation of a site plan. Other tasks may be performed in addition and will vary from year to year.

Lecture times: one week during the September short vacation

DP requirements: Completion of project with a minimum mark of 50%.

Assessment: Project 100%.

APG2018X   GEOGRAPHIC INFORMATION SYSTEMS CAMP

4 NQF credits at level 6; 1 Week practical project. Second year undergraduate.

Convener: Associate Professor J Smit

Course Entry Requirements: APG1016F/S.

Co-requisites: APG2015F.

Course outline: This course aims to consolidate knowledge and skills learnt in GIS I and extend the development of problem solving skills in relation to practical GIS problems, group work skills and tolerance of diversity. This one-week camp is structured to develop problem solving skills in relation to practical spatial data management challenges in the GIS environment. Students will work in groups in a simulated project environment. The camp covers the basic steps of GIS project planning with a focus on project layout, data acquisition, needs analysis, user requirements, and system implementation and maintenance. The successful team will present a GIS solution to a spatial project, showing the project layout, data acquisition, needs analysis and user requirements.

Lecture times: one week during the June vacation

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

Assessment: Project 100%.

APG2019X   PRACTICAL TRAINING I

0 NQF credits at level 6. Second year undergraduate.

Convener: Associate Professor J Whittal

Co-requisites: APG2016W.

Course outline: This course aims to consolidate knowledge and skills learnt in APG2016W and equip students 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 will entail practical work related to surveying approved by the course convener, of not less than five weeks duration, as well as practical tasks and computations set by the course convener, during the vacation. The student is required to submit a diary, signed by the employer, as well as a technical report according to the Geomatics document "Guidelines for the Preparation of Practical Reports" prior to registration as a third year student.

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

Assessment: Report 100%.

APG2021W   TECHNOLOGY II

24 NQF credits at level 6; 40 lectures, site visits, tutorials. Second year undergraduate.

Convener: TBA

Course Entry Requirements: APG1003W.

Co-requisites: APG2038W, APG2039W.

Course outline: This course aims to develop an understanding of materials, components, assembly systems, and generic details applicable to composite construction systems and small framed structures in reinforced concrete and steel. In addition the course aims to develop 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 student's own design development work, based on studiowork projects. An understanding of 2d and 3d graphic representation of building assembly is included.

DP requirements: 80% attendance and participation and 100% completion of all projects and assignments.

Assessment: By *en-loge* test and examination of portfolio of all tutorials, projects and assignments.

APG2026F   ELEMENTARY SURVEYING

16 NQF credits at level 6; 50 lectures, 8 practical/tutorial assignments. Second year undergraduate.

Convener: Mr S Hull

Course Entry Requirements: STA1001F or MAM1017F/S and STA1000S, or MAM1004F and STA1000S, or equivalents.

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, 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: 5th period Mon to Fri. Practicals: one per week Mon 08h00-12h45

DP requirements: Completion of practical assignments with a minimum average of 50% and to the satisfaction of the course convener and a test average of 40% or more.

Assessment: Tests 25%, practical assignments 25%, examination 3 hours counts 50% (sub minimum 40%).

APG2027X   WORK EXPERIENCE

0 NQF credits at level 6. Second year undergraduate. DP course.

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, NGO's, community based projects, building sites, etc.

Assessment: Submission of Work Experience Report.

APG2038W   ENVIRONMENT & SERVICES II

18 NQF credits at level 6; 40 lectures, 20 tutorials. Second year undergraduate.

Convener: TBA

Co-requisites: APG2021W, APG2039W.

Course outline: This course aims to develop a broad understanding of building design in the context of the micro- and macro-environment. Its focus is on building performance in relation to human comfort standards. The content is developed around building science approaches and different methods for servicing medium size buildings, with the incorporation of sustainable design principles as needed.

DP requirements: 80% attendance and participation, 100% completion and submission of tutorials, projects, tests and assignments.

Assessment: By examination of all tutorials, tests, projects and assignments.

APG2039W   DESIGN & THEORY STUDIO II

74 NQF credits at level 6; 240 hours studio. Second year undergraduate.

Convener: TBA

Course Entry Requirements: APG1020W.

Co-requisites: APG2021W, APG2038W.

Course outline: This course reiterates in more sophisticated form the issues explored in first year studio. These 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. 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 consists of experimental exercises, longer projects and en loge tests.

DP requirements: 80% attendance and participation; 100% submission of assignments and projects.

Assessment: By portfolio examination.

APG3000F   HISTORY & THEORY OF ARCHITECTURE V

8 NQF credits at level 7; 20 lectures, 5 tutorials. Third year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline:. This course aims to develop broad knowledge and a critical perspective of current practice and theory in architecture and urbanism. The subject matter varies from year to year.

DP requirements: 80% attendance and participation, 100% completion of all exercises and assignments.

Assessment: By examination of essays and assignments.

APG3001S   HISTORY & THEORY OF ARCHITECTURE VI

8 NQF credits at level 7; 20 lectures, 5 tutorials. Third year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This course aims to locate aspects of architectural design in relation to major theoretical and philosophical movements, and give students the means by which to locate

themselves within the contradictory conditions of contemporary cultural production. In so doing students will be able to articulate their own design positions.

DP requirements: 80% attendance and participation and 100% completion of all essays and assignments.

Assessment: By examination of essays and assignments.

APG3011S GEOGRAPHIC INFORMATION SYSTEMS II

24 NQF credits at level 7; 60 lectures; 12 practicals/tutorials. Third year undergraduate.

Convener: Associate Professor J Smit

Course Entry Requirements:

BSc Geomatics Students: MAM1000W OR MAM1018F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F, APG2018X, **BSc (Hons) in GIS students**: APG2018X, APG4007F

Course outline: This course aims to build on the theory developed in GIS I. Students will develop the knowledge and skills required to design and implement specialised GIS applications, and an understanding of the theory, capabilities and limitations of various spatial analysis and optimisation techniques. Awareness of graphic design, presentation methods, algorithms that are used in digital mapping and certain legal and management issues are covered. Topics include: multidimensional GIS and advanced data structures, spatial data infrastructures and metadata, distributed GIS, digital cartography, GIS application design and development using software engineering tools, GIS project management, spatial analysis, copyright and privacy issues.

Lecture times: 4th period Mon to Fri. Practicals: one per week, Mon 14h00-17h00

DP requirements: Satisfactory completion of practical assignments and a test average of 35% or more.

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

APG3012S GEOMATICS III

24 NQF credits at level 7; 60 lectures; 12 practicals/tutorials. Third year undergraduate.

Convener: Associate Professor J Smit

Course Entry Requirements:

BSc Geomatics Students: MAM1000W OR MAM1018F/S, STA1000S, CSC1015F or CSC1017F, APG2014S, APG2015F, APG2016W, APG2017X, APG2018X, **BSc (Hons) in GIS students**: APG2018X, APG4007F

Course outline: This course covers 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. Included is an introduction to 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: 1st period Mon to Fri. Practicals: one per week, Tues 14h00-17h00

DP requirements: Completion of practical assignments with a minimum of 50% and a test average of 35% or more.

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

APG3013F NUMERICAL METHODS IN GEOMATICS

16 NQF credits at level 7; 48 lectures; 8 practicals/tutorials. Third year undergraduate.

Convener: Dr G Sithole

Course Entry Requirements: MAM2083F/S or equivalent, APG2014S, APG2016W.

Course outline: This course aims to consolidate knowledge acquired in the introductory course on adjustment, and provide skills and knowledge required to solve all standard adjustment problems. Topics include: 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, S-transformation and programming of least squares applications.

Lecture times: 3rd period Mon-Fri. Practicals: one per week, Mon 14h00-17h00

DP requirements: Completion of practical assignments to the satisfaction of the course convener and a minimum average of 35% for all tests.

Assessment: Tests count 15%, practical assignments count 25%, examination 3 hours counts 60% (sub minimum 40%).

APG3014X   CONTROL SURVEY CAMP

4 NQF credits at level 7; 1 Week practical project. Third year undergraduate.

Convener: Dr R Govind

Course Entry Requirements: APG2016W and APG2017X.

Co-requisites: APG3017D and APG3016C.

Course outline: This course provides practical experience in carrying out control surveys. Topics include: GPS control survey measurements: network design, measurement, adjustment and analysis. Precise traversing. The camp will take place during a vacation, away from the UCT campus.

Lecture times: one week during April vacation

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

Assessment: Project counts 100%.

APG3015X   PRACTICAL TRAINING II

0 NQF credits at level 7. Third year undergraduate.

Convener: Associate Professor J Whittal

Course Entry Requirements: APG2019X, APG2016W.

Course outline: This course aims to equip students with skills related to the workplace, provide further insight into a career in one or more specialised fields of geomatics and consolidate knowledge and skills learnt in third year geomatics. This is via practical work related to geomatics, approved by the course convener, of not less than five weeks during the vacation, as well as practical tasks and computations set by the course convener. The student is required to submit a diary, signed by the employer, as well as a technical report according to the Geomatics document "Guidelines for the Preparation of Practical Reports" prior to registration as a final year student.

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

Assessment: Report counts 100%.

APG3016C   SURVEYING II

12 NQF credits at level 7; 30 lectures; 1 essay; 1 seminar, 1 site visit. Third year undergraduate.

Convener: Associate Professor J Whittal

Course Entry Requirements: APG1016F/S and APG2015F; for BSc Geomatics students APG2016W is also a requirement.

Course outline: This course aims to provide insight into the origins of the surveying discipline by introducing some specialised instruments and methods currently in use, equip students with a theoretical and working knowledge of satellite positioning methods, develop skills in group work, technical report writing, research, oral presentation, problem solving, and critical enquiry.

Topics include: the history of surveying in Southern Africa which is by own reading and assessed by essay, surveying with the global navigation satellite systems covered in detail (80% of the course),

and additional surveying instrumentation/methods not covered in pre-requisite courses. Students will research and present a 10-minute seminar on a surveying technique, interesting surveying equipment, or a surveying project.

Lecture times: Third quarter. 3rd period Mon-Fri. Practicals: one per week, Wed 14h00-17h00

DP requirements: Completion of all assignments with an average of 50%, and a minimum class test average of 35%.

Assessment: Tests count 20%, practical assignments/seminars count 20%, examination 1½ hours counts 60% (sub minimum 40%).

APG3017D SURVEYING III

12 NQF credits at level 7; 30 lectures; 6 practical/tutorial assignments. Third year undergraduate.

Convener: Associate Professor J Whittal

Course Entry Requirements: APG2016W and MAM1018S, APG2015F and APG2019X.

Co-requisites: APG3016C.

Course outline: This course aims to build on knowledge and skills in surveying principles, instrumentation, and calculation; equip the student with knowledge of various sources of error and its elimination or mitigation, provide further knowledge of specialised instruments and methods and introduce hydrographic surveying. The course develops skills in group work, technical report writing, research and oral presentation, problem solving and critical enquiry. This course continues from Surveying I and II and provides more depth on surveying principles, instrumentation, and calculation.

Lecture times: Fourth quarter. 3rd period Mon-Fri. Practicals: one per week, Wed 14h00-17h00

DP requirements: Completion of all assignments with an average of 50%, and a minimum class test average of 35%.

Assessment: Tests count 20%, practical assignments/seminars count 20%, and examination 1½ hours counts 60% (sub minimum 40%).

APG3023W TECHNOLOGY III

24 NQF credits at level 7; 40 lectures, site visits and tutorials. Third year undergraduate.

Convener: TBA

Course Entry Requirements: APG2021W.

Co-requisites: APG3034W, APG3037W.

Course outline: This course aims to integrate students' understanding of materials/construction with their design process, and to critically and strategically work with those who will reinforce individual designs. The course aims to extend knowledge and understanding of more advanced construction and specialised materials and services for larger and more complex buildings, and to raise awareness of the importance of specialist information. Case studies of international buildings which are considered milestones in innovative in terms of construction principles and processes, use of materials as well as environmental sustainability, will be presented. The course will revisit basic materials and investigate advanced techniques that extend its use to larger more complex structures, and introduce more recent materials and technology. Students' own Studio designs are used as assignments to develop construction details and material decisions to emphasise integration into the design process.

Lecture times: Tuesday 4th, 5th, 6th, 7th & 8th periods.

DP requirements: 80% attendance, participation and completion of all essays and assignments.

Assessment: By *en-loge* test and examination of portfolio of all tutorials, projects and assignments.

APG3027Z CADASTRAL SURVEY & REGISTRATION PROJECTS

24 NQF credits at level 7; 2 projects, assignments, and 1 week camp, project. Third year undergraduate.

Convener: Associate Professor J Whittal

Course Entry Requirements: APG2015F, APG2016W, APG2019X.

Co-requisites: CON2027F, for students of surveying stream also APG3033W.

Course outline: This course aims to enhance theoretical knowledge from course work with practical skills and understanding of cadastral surveying, land registration and spatial analysis. The course

covers urban and rural cadastral farm surveys: 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

DP requirements: Completion of all projects and assignments. Attendance at all scheduled events.

Assessment: Projects and assignments count 100%.

APG3028X   INDEPENDENT RESEARCH

0 NQF credits at level 7. Third year undergraduate.

Convener: TBA

Co-requisites: APG3037W.

Course outline: This course aims to develop 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, culminating in the development of a brief for the major design project in studio.

DP requirements: None.

Assessment: Submission of research report.

APG3033W   LAND & CADASTRAL SURVEY LAW

16 NQF credits at level 7; 23 lectures. Third year undergraduate.

Convener: Associate Professor J Whittal

Co-requisites: CON2027F.

Course outline: This course introduces students to case law and practical aspects of land tenure systems, ownership, fundamentals of Roman Dutch law, acquisition and cession of rights in land, land registration, cadastral systems and cadastral survey law. Included are statutes and case law relating to cadastral survey, registration, planning, property ownership and land information management in South Africa as well as International law and law of the sea; delimitation and delineation of offshore rights; post-apartheid land policies and legislation and land reform and delivery issues in the developing world.

Lecture times: First semester. Tues 09h00 to 10h00. Practical: First semester, Wed 14h00-17h00. Practical: Second semester Fri 14h00-17h00.

DP requirements: 50% minimum average for assignments; 40% minimum average for tests.

Assessment: Tests count 34% and assignments count 66%.

APG3034W   ENVIRONMENT & SERVICES III

6 NQF credits at level 7; 20 lectures, 10 tutorials. Third year undergraduate.

Convener: TBA

Course Entry Requirements: APG2038W.

Co-requisites: APG3023W, APG3037W.

Course outline: This course aims to introduce sophisticated architectural strategies for passive and hybrid environmental control systems and services for medium-scaled buildings. Best practice case studies and independent research in relation to students' own design work are included.

Lecture times: Friday 4th & 5th periods.

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

Assessment:

APG3035F   THEORY OF STRUCTURES V

6 NQF credits at level 7; 20 lectures. Third year undergraduate.

Convener: TBA

Course Entry Requirements: APG2009F and APG2011S.

Course outline: This course aims to enable students to 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, planar space frames, shells and girders.

Lecture times: Tuesday 1st & 2nd periods.

DP requirements: 80% attendance and participation and 100% submission of all projects, assignments and tests.

Assessment: Tutorials and class tests (20%), examination (80%).

APG3036S   MANAGEMENT PRACTICE LAW III

12 NQF credits at level 7; 20 lectures, 20 tutorials. Third year undergraduate.

Convener: TBA

Course Entry Requirements:

Course outline: This course aims to provide 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, sectorial, professional and ethical issues) and regulation of the built environment (providing an overview of multiple legislative frameworks and responsibilities, and documentation methods).

Lecture times: Wednesday1st, 2nd and 3rd periods.

DP requirements: 80% attendance, 100% submission of lectures and tutorials.

Assessment: Tutorials and reports (50%); written examination (50%).

APG3037W   DESIGN & THEORY STUDIO III

80 NQF credits at level 7; 1 theory and 1 design lecture and studio, 10 hours per week. Third year undergraduate.

Convener: TBA

Course Entry Requirements: APG2039W.

Co-requisites: APG3023W, APG3034W.

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: Monday & Thursday 1st, 2nd, 3rd, 4th & 5th periods.

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

Assessment: By portfolio examination.

APG4001S   GEODESY

24 NQF credits at level 8; 60 lectures, 12 practicals.

Convener: Dr R Govind

Course Entry Requirements: APG3013F, APG3016C, APG3017D.

Course outline: This course describes the objectives, concepts and methods of modern geodesy and aims to develop a good understanding of the use of satellite positioning techniques in geodesy and the ability to design and carry out high precision GPS surveys. This includes the ability to design,

adjust and analyse modern three-dimensional networks and transform data from one datum to another; understand the influence of the Earth's gravity field on geodetic methods and how to compute geoid models from gravity and satellite data. Topics include: introduction to geodesy, satellite positioning in geodesy, geodetic networks, datum transformations, and Earth's gravity field.
Lecture times: 2nd period Mon to Fri. Practicals: one per week, Wed 6th to 8th period.
DP requirements: Completion of practical assignments to the satisfaction of the course convener, and a minimum average of 35% for all tests.
Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4002Z   LAND USE PLANNING & TOWNSHIP DESIGN

16 NQF credits at level 8; 48 lectures, 8 practicals.
Convener: Dr R Govind
Course Entry Requirements: APG3016C, APG3027Z, CON2027F.
Course outline: This course aims to provide students with both a theoretical and a practical background in land use planning and the design of townships in the Southern African context. Topics include: 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, financial and economic considerations; institutional frameworks; property development and current development issues.
Lecture times: Mondays 13h00-17h00
DP requirements: Completion of practical assignments to the satisfaction of the course convener.
Assessment: Tests, practical assignments, class work, examination 3 hours (sub minimum 40%).

APG4003Z   RESEARCH PROJECT

40 NQF credits at level 8; 10 - 12 contact sessions, mid-year seminar.
Convener: Dr G Sithole
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, submit completed reports and posters at the end of the year, with an oral presentation of their project mid-year, as well as for the final assessment towards the end of the year. This will include presentation of the project plan, execution of the project, and presentation of the result in written, poster and oral form.
Lecture times: Fridays 6th to 8th period
DP requirements: None.
Assessment: Project report counts 70%, poster presentation counts 10%; final oral presentation counts 20%.

APG4005F   ENGINEERING SURVEYING & ADJUSTMENT

18 NQF credits at level 8; 45 lectures, 6 practical assignments.
Convener: Dr G Sithole
Course Entry Requirements: APG3013F, APG3017D.
Course outline: This course aims to provide knowledge of the design and optimisation of two- and three- dimensional engineering networks, precision survey techniques and deformation analysis methods. It aims to develop problem solving skills for practical applications in precise engineering surveying and general project management. Topics include statistical analysis, deformation and subsidence surveys, instrumentation and methods of precise engineering surveying; Kalman filters, engineering and industrial metrology, deformation analysis methods and case studies.
Lecture times: 2nd period Mon to Fri. Practicals: one per week, Wed 14h00-17h00
DP requirements: Completion of practical assignments to the satisfaction of the course convener

and a minimum average of 35% for all tests.
Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4010X   GEOINFORMATICS CAMP

4 NQF credits at level 8.
Convener: Associate Professor J Smit
Course Entry Requirement: APG3012S.
Co-requisite: APG4011F.
Course outline: This camp aims to consolidate knowledge and skills learnt in the course APG3012S and to extend the development of practical problem solving and production tasks in photogrammetry and remote sensing. In addition, to perform 3D data modelling of results achieved and the presentation of the output by means of suitable visualisation methods. The practical work will be conducted in groups and the outcomes reported as a critical evaluation of the processes and methods.
Lecture times: April vacation
DP requirements: None.
Assessment: Project work results and report (100%).

APG4011F   GEOMATICS IV

24 NQF credits at level 8; 60 lectures, 12 practical assignments.
Convener: Dr George Sithole
Course Entry Requirements: APG3012S, MAM2084F/S.
Course outline: This course aims to provide advanced knowledge of the nature and concept of satellite and airborne remote sensing. This includes 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.
DP requirements: Completion of the practical assignments to the satisfaction of the course convener (with a minimum average mark of 50%) and a test average of 35% or more.
Assessment: Tests, practical assignments, examination 3 hours (sub minimum 40%).

APG4012S   GEOMATICS MANAGEMENT & PROFESSIONALISM

24 NQF credits at level 8; 33 lectures, 20 seminars
Convener:. Associate Professor J Whittal
Course Entry Requirements: BSc Geomatics students: CON2027Z, APG3027Z; BSc Hon GIS students: none.
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, SA Council for Professional and Technical Surveyors (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: Thursdays Meridian to 9th period
DP requirements: Completion of all assignments, minimum assignment average of 40%, minimum test average of 35%

Assessment: 5 Assignments 40%, 1 exam in November 60% (3 hour)

AST1000F   INTRODUCTION TO ASTRONOMY

18 NQF credits at level 5; 5 lectures per week, 1 tutorial/practical session per week. Three sessions are held in the Planetarium of Iziko Museums of Cape Town, plus five tutorial sessions and five practical sessions.
Convener: Dr S-L Blyth
Course Entry Requirements:
Course outline: This course aims to provide an understanding of our place in the universe; early beliefs and historical development of astronomical knowledge; electromagnetic radiation; telescopes and instrumentation; the Earth-Sun-Moon system; planets of the solar system; stars; our galaxy and others; relativity and cosmology and life in the universe.
DP requirements: Satisfactory attendance at lectures and tutorials; class mark of at least 35%.
Assessment: Class record: 50%, June examination 2 hours: 50%.
Sub-minimum: 40% for final examination.

AST2002H ASTROPHYSICS

24 NQF credits at level 6; 5 lectures per week, 1 practical per week, 1 field-trip to Sutherland.
Convener: Dr V McBride
Course Entry Requirements: PHY1021F and PHY1022S (PHY1004W) or PHY1031F and PHY1032S (PHY1000W); MAM1000W.
Course outline: Radiation Laws, Black Body radiation. Planck function. Wien's Law. Stefan-Boltzmann Law. Hydrogen spectroscopy, stellar spectroscopy. Relativistic Doppler effect. Stellar distances, magnitudes, radii and masses. HR diagram. Hydrostatic equilibrium, stellar and planetary structure. Nuclear energy, p-p cycle, CNO cycle, 3-Â. The sun. Stellar evolution. White dwarfs, neutron stars, black holes. Our galaxy, 21-cm radiation, radio mapping, interstellar matter. Galaxies, dark matter. Hubble Law, expansion of the Universe, primordial nucleosynthesis, 2.726 K background radiation, the Big Bang model. Radio, infra-red, ultra-violet, x-ray and gamma-ray-astronomy.
DP requirements: Satisfactory attendance at lectures and tutorials; class mark of at least 35%.
Assessment: Class record: 50%, November examination 2 hours: 50%.
Sub-minimum: 40% for final examination.

AXL1200S   AFRICA: CULTURE, IDENTITY & GLOBALISATION

8 NQF credits at level 5. First-year, second-semester course, one lecture and one compulsory tutorial per week.
Convener: Associate Professor N Shepherd
Course Entry Requirements: This is for non-Humanities students only.
Course outline: This course designed specifically for non-Humanities students preparing themselves for 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 focussing on contexts and ideas which will be of direct benefit in professional practice, as well as on more abstract ideas which are generally enriching. The course takes a case-study approach, sampling a range of materials as a way of introducing students to some of the key words and concepts in Humanities-type study. Throughout, the emphasis is in finding readily accessible points of entry into sometimes complex issues and discourses, as well as providing "tools to think with": conceptual tools and an associated critical vocabulary. It does so specifically in the context of post-Apartheid South Africa and the intensified effects of globalisation.
Lecture times: Friday, 5th period.
DP requirements: None.
Assessment: Two assignments counting 15% each; one group project counts 20%; and one 2-hour

examination counts 50% of the final mark.

Note:

(1) Attendance at tutorials is compulsory, failing which students' papers may not be marked.

(2) This course does not count as a credit towards a Humanities degree.

BUS1036F/S EVIDENCE-BASED MANAGEMENT

18 NQF credits at level 5; 3 lectures per week, 1 one hour tutorial per week.

Convener: Mr J Rousseau

Course Entry Requirements: None.

Course outline: This course is intended to furnish students with the main intellectual skills required in the study and practice of business at all levels. The focus is on the development of critical reasoning skills, in particular the skills involved in assessing the quality of evidence available, and efficiently communicating justified conclusions reached on the basis of that evidence. More broadly, the course focuses on analysing and constructing logical arguments, researching problems, understanding and articulating competing viewpoints, and forming 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: Coursework: 50% (consisting of weekly assignments, 6 written tutorial assignments at 5% each, and 6 multiple choice questionnaires at 4% each

Final examination: 50%. A sub-minimum of 40% 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

Website: http://www.commerce.uct.ac.za/managementstudies/undergrad/

BUS2010F/S MARKETING I

18 NQF credits at level 6; 3 lectures per week, 1 one hour tutorial per week.

Convener: TBA

Course Entry Requirements: ECO1010F & ECO1011S OR ECO1011F/H & ECO1111F OR BUS1036F/S (or BUS1010F/S)

Course outline: The aim of this course is to provide an overview of the Marketing Process considering current trends in the South African context. Topics include: the marketing concept, the marketing environment, consumer markets and industrial markets, buyer behaviour, marketing research, the use and importance of differentiation, market segmentation and target marketing, the marketing mix, product policy, pricing policy, distribution policy, promotion policy, marketing strategy, marketing organisation and implementation, measurement and control of marketing effectiveness including the marketing audit.

DP requirements: 40% class mark and the completion of all required assignments, attendance is compulsory for all tutorials.

Assessment: Essays, case studies, project and test 50%, 2-hour June examination 50%.

CEM1000W CHEMISTRY 1000

36 NQF credits at level 5; 4 lectures per week, 1 practical per week, 1 tutorial per week.

Convener: Associate Professor G Smith

Course Entry Requirements: Physical Sciences at NSC level 5 (or senior certificate HG E/ SG C) and and Mathematics at NSC level 6 (or senior certificate HG D/ SG B)

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.

Lecture times: Mon to Wed and Fri, 2nd or 4th period. Tutorials Thurs 2nd or 4th period. Pracs Thur or Fri 6th to 8th period.

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: November examination 3 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM1008F   CHEMISTRY FOR ENGINEERS

16 NQF credits at level 5; 4 lectures per week, 1 practical and/or tutorial per week.

Convener: TBA

Course Entry Requirements: Physical Sciences at NSC level 5 (or senior certificate HG E/ SG C) and Mathematics at NSC level 6 (or senior certificate HG D/ SG B)

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 (particularly metal oxides), atomic structure and chemical bonding, with the emphasis on the structure of solids, chemical equilibrium and aqueous solution chemistry, acids and bases, thermochemistry, electrochemistry and corrosion of metals, polymers.

Lecture times: Mon to Wed & Fri 4th period. Tut/prac Mon 6th to 8th period.

DP requirements: Attendance and completion practicals, tests and tutorial exercises, and at least 35% for the class record.

Assessment: June examination 2 hours counts 60%, course record counts 40%.It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM2007F   PHYSICAL CHEMISTRY & SPECTROSCOPY

24 NQF credits at level 6; 5 lectures per week, 1 practical per week (Monday 96 students) or Thursday (25 students), 6 tutorials per semester.

Convener: Dr G A Venter

Course Entry Requirements: CEM1000W or equivalent, first-year full course in Physics, first-year full or semester course in Mathematics. Concurrent registration for STA1000F/S is strongly recommended.

Course outline: In this course the principles of physics are applied to the study of the macroscopic and atomic behaviour of chemical systems. The course begins with the application of thermodynamics to chemical systems, including consideration of phase equilibria and the thermodynamics of solutions and transport properties. Further topics covered include chemical kinetics, quantum chemistry and the fundamentals of rotational and vibrational spectroscopy. The final quarter of the course introduces students to analytical chemical techniques including ultraviolet, infrared and mass spectroscopy, nuclear magnetic resonance spectrometry and X-ray diffraction. The practical course covers the same material as that in the lectures.

Lecture times: Mon to Fri 3rd period. Tuts by arrangement. Pracs Mon or Thur 6th to 8th period

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: June examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM2008S   ORGANIC & INORGANIC CHEMISTRY

24 NQF credits at level 6; 5 lectures per week, 1 practical per week - Monday (96 students) or Thursday (25 students), 1 tutorial per week.

Convener: Dr A Jardine

Course Entry Requirements: CEM1000W or equivalent, first-year full course in Physics, first-year full or semester course in Mathematics. DP certificate forCEM2007F.

Course outline: This course aims to develop skills and understanding of chemical reactivity and synthesis, across the entire periodic table. Lectures and tutorials develop interpretive and synthetic skills built during CEM1000W (or equivalent). Topics covered include main-group chemistry and trends in the periodic table, the chemistry of the transition metals, coordination chemistry, structure elucidation of organic molecules, organic reactivity, reaction mechanisms and stereochemistry, elimination reactions and carbonyl group reactivity, substitution and addition reactions and chemical biology. The practical course covers the same topics and aims to improve manipulative and technical laboratory skills.

Lecture times: Mon to Fri 3rd period. Tuts by arrangement. Pracs 6th to 8th period

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: November examination 2 hours counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CEM3005W   CHEMISTRY 305

72 NQF credits at level 7; 5 lectures per week, 2 practicals per week.

Convener: Professor M R Caira

Course Entry Requirements: CEM2007F and CEM2008S, first-year full course in Mathematics.

Course outline: This final course for the Chemistry major aims to develop understanding and integrated knowledge of the core disciplines in Chemistry. Lecture material includes topics in wave mechanics and spectroscopy, adsorption and heterogeneous catalysis, solid state chemistry and X-ray crystallography, dynamics, inorganic reaction mechanisms, organometallic chemistry, further topics in organic structure and reactivity, organic synthesis and organic dynamic stereochemistry. The practical course covers the same topics and aims to develop integrative and interpretive skills. A further aim is to develop skills on writing within the discipline, as well as introducing students to modern research methods.

Lecture times: Mon to Fri 3rd period. Pracs Wed and Fri 6th to 8th period.

DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.

Assessment: November examination two 3 hour papers counts 50%, course record counts 50%. It is necessary to pass the theory examination and the whole course in order to secure a pass.

CHE1001Z   INTRODUCTION TO CHEMICAL ENGINEERING

For students transferring into Chemical Engineering.

22 NQF credits at level 5; 18 lectures, 18 tutorials/practicals.

Convener: TBA

Course Entry Requirements: None

Course outline: This course introduces: unit conversions, processes and design, chemical engineering calculations, graphical analysis, modelling using spreadsheets, design projects, natural foundations and professional development.

DP requirements: 80% in all 4 mastery and competency tests.40% in the class test. Submission of and satisfactory performance in all assignments and projects.

Assessment: Class Test (20%), 2 Projects (20%), Final examination (60%)

CHE1005W   ENGINEERING I
44 NQF credits at level 5; 96 lectures, 14 tutorials, 1 plant visit, 1 practical, 1 design project.
Convener: TBA
Course Entry Requirements:
Course outline: This course introduces the field of chemical engineering, unit conversions, processes and design, chemical engineering calculations, graphical analysis, modelling using spreadsheets and project design.
DP requirements: Satisfactory performance in tutorials, competency tests and projects; satisfactory attendance at tutorials and outings.
Assessment: Class tests, projects; November examination 3 hours.

CHE2031F   MATERIAL & ENERGY BALANCES
20 NQF credits at level 6; 60 lectures, 12 tutorials.
Convener: TBA
Course Entry Requirements: CHE1005W or CHE1000Z; CEM1000W, MAM1020F/S.
Course outline: This course covers: Material balances without reaction, including the law of conservation of mass and development of a systematic approach to problem solving. Material balances with chemical reaction including nomenclature and conventions, limiting and excess reactants, tie substances and element balances. Material balances with recycle. Material and energy balances involving chemical equilibrium. Energy balances involving heat and work, including basic thermodynamics, development of the conservation of energy equation, enthalpy, heat capacity, heats of transition and the use of steam tables. Energy balances with chemical reaction involving total enthalpy, standard heats of formation, combustion and reaction, isothermal and adiabatic reactors. Simultaneous material and energy balances.
DP requirements: Satisfactory performance in tutorials and journal tasks; minimum of 40% for class mark; satisfy the requirements of the exit level outcomes of the course.
Assessment: Class tests; project; June examination 3 hours.
Sub-minimum: 40% in the examination paper

CHE2032Z   DESIGN OF CHEMICAL PROCESSES
8 NQF credits at level 6; 24 lectures, 12 tutorials, 1 week field-trip.
Convener: TBA
Co-requisites: CHE2031F.
Course outline: This course aims to develop the skills for chemical engineering drawing and the design of chemical process flowsheets (including an introduction to process economics). The course also provides an introduction to health, safety and environment in the chemical process industry, the chemical process industry and an overview of South African chemical process industries. A field-trip to a South African chemical process plant is included.
DP requirements: Satisfactory performance in assignments; satisfactory attendance at tutorials, field trip and report back session; minimum of 40% for assignments.
Assessment: Assignments, field-trip report.

CHE2033W   CHEMICAL ENGINEERING LABORATORY I
4 NQF credits at level 6; 5 practicals.
Convener: TBA
Co-requisites: CHE2031F.
Course outline: This course aims to develop an understanding of steady state mass and energy balancing, fluid flow measurements, heat exchange and transport phenomena.

DP requirements: Satisfactory performance in all reports and presentations.
Assessment: Class test; reports; presentations.

CHE2035S   THERMODYNAMICS I

12 NQF credits at level 6; 36 lectures, 10 tutorials.
Convener: TBA
Course Entry Requirements: CHE2031F, MAM1021F/S.
Course outline: This course is an extension and application of first law of thermodynamics and second law of thermodynamics. Topics include: entropy balances, steam/refrigeration cycles, thermodynamic properties of real substances, equilibrium and stability of one-component systems and phase transitions.
DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.
Assessment: Class tests; November examination 3 hours.
Sub-minimum: 40% in the examination paper**:** satisfy the requirements of the exit level outcomes of the course

CHE2040S   FLUID FLOW & HEAT TRANSFER

20 NQF credits at level 6; 60 lectures, 9 tutorials, 5 assignments.
Convener: TBA
Course Entry Requirements: DP in CHE2031F, PHY1012F/S.
Co-requisites: MAM2084F/S.
Course outline: This course aims to develop an understanding of Fluid Flow. Topics include: Fluid statics; Flow of fluids: general energy and momentum relationships; Flow of Newtonian liquids in pipes: friction factors and pressure drop, velocity distribution for laminar flow using shell balances, turbulent flow, friction losses, flow over banks of tubes; Flow and pressure measurement: Fluid pressure, measurement of fluid flow; Pumping of liquids: centrifugal pump characteristics, matching of pump and system curves, power requirements. Heat Transfer: conduction: plane walls, cylinders, spheres, resistances in series, unsteady conduction; convection: natural and forced, internal and external, condensation and boiling; radiation: view factors, black bodies, grey bodies, gases; shell and tube heat exchanger hardware and design: mean temperature difference, overall heat transfer coefficients, pressure drops.
DP requirements: Satisfactory performance in tutorial tests; assignments; minimum of 40% average for class tests.
Assessment: Class tests; assignments; November examination, two 3 hour papers.
Sub-minimum: 40% in each of the two examination papers and satisfy the requirements of the exit level outcomes of the course.

CHE3000X   WORKPLACE EXPERIENCE

0 NQF credits at level 7
Convenor: TBA
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 an 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). Evidence of this work, in the form of a log book as well as a report to the satisfaction of the programme convener (or a letter of confirmation from a practising engineer 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: None.
Assessment: Final report. Submission of log book

CHE3035S   BIOPROCESS ENGINEERING I

8 NQF credits at level 7; 24 lectures, 2 tutorials, 2 practicals, 2 Plant visits.

Convener: TBA

Course Entry Requirements: All second year core courses.

Course outline: This course aims to develop an advanced understanding of the life sciences; the requirements of microbial processes; bioprocess design, including bioreactor design, bioprocess kinetics and sterilisation. The course includes selected case studies and visits to local bioprocess industries.

DP requirements: None.

Assessment: Assignments; November examination 2 hours.

CHE3039S   CATALYSIS

8 NQF credits at level 7; 24 lectures.

Convener: TBA

Course Entry Requirements: All second year core courses.

Course outline: This course aims to provide a general introduction to the chemistry and kinetics of catalysis; and includes the application of catalysts and reactor technology in processes such as petroleum refinery, methanol and Fischer-Tropsch synthesis and hydrocracking.

DP requirements: None.

Assessment: November examination 2 hours.

CHE3040S   SOLID-FLUID OPERATIONS

12 NQF credits at level 7; 36 lectures, 12 tutorials.

Convener: TBA

Course Entry Requirements: CHE2031F, CHE2040S.

Course outline: This course covers: solid-fluid operations; particle characterisation; motion of a particle in a fluid and fluid through a bed of particles; sedimentation, thickening hydrocyclones and centrifugation, mixing and agitation, rheology, flow through packed beds; fluidisation and filtration.

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests, November examination 3 hours.

CHE3044F   REACTOR DESIGN I

12 NQF credits at level 7; 36 lectures, 12 tutorials.

Convener: TBA

Course Entry Requirements: CHE2031F, CEM2007F, DP in CHE2035S.

Co-requisites: MAM3085F.

Course outline: This course covers Isothermal Homogeneous Reactor Design: Concepts of mole (mass) balances over reactions with ideal flow patterns (plug flow, mixed flow, batch, semi-batch, membrane, bio-chemical, reactors with recycle). Combining and sequencing reactor types. Reaction rate laws, reaction kinetics and elementary reactions. Designing reactors with ideal flow pattern for single and multiple reactions and bio-chemical reactions. Interpreting and analysing experimental reaction data.

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Tutorial Tests, Class tests; mini project; June examination 3 hours.

Sub-minimum: 40% in the final exam.

CHE3046F   THERMODYNAMICS II

12 NQF credits at level 7; 36 lectures, 11 tutorials.

Convener: TBA

Course Entry Requirements: CHE2031F, DP in CHE2035S.

Course outline: This course aims to develop an understanding of thermodynamics of multicomponent mixtures, estimation of Gibbs Free Energy and fugacity of species in mixtures; phase equilibrium in mixtures; chemical equilibrium; combined phase and chemical equilibrium and applications of computational methods to solve thermodynamic problems.

DP requirements: Satisfactory performance in tutorials; minimum of 40% average class mark.

Assessment: Class tests; computer examination; June examination 3 hours.

CHE3049W   CHEMICAL ENGINEERING LABORATORY II

16 NQF credits at level 7; 4 lectures, 4 presentations, 5 practicals, 1 class test

Convener: TBA

Course Entry Requirements: CHE2033W, CHE2031F, CHE2040S.

Course outline: The course requires students to design an experimental program, to perform the experiments and to analyse the subsequent data from a range of practicals relevant to typical processes/unit operations found in the process industries. These include classification, crystallisation, distillation, filtration, fluidization, heat transfer, mass transfer, milling, process control, reaction kinetics and thermodynamics. The focus is on comparing theoretical descriptions and empirical data with experimentally observed phenomena. Students are required to present findings, as individuals and in groups, both orally and in the form of concise technical reports.

DP requirements: Attend and contribute to all practicals and presentations. Attend and obtain a minimum of 40% for the competency test.

Assessment: Class tests, reports, presentations.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3050S   CHEMICAL PROCESS UNIT DESIGN

6 NQF credits at level 7; 24 lectures.

Convener: TBA

Co-requisites: CHE3053S, CHE3054S.

Course outline: This course combines elements of chemical engineering process design covered in 2nd and 3rd year courses within a dedicated design project around a chemical process unit. Special focus is on the design of reactor and separation units and how they integrate within a process unit. The project entails 4 stages:

- data collection, conceptual design, flowsheeting
- reactor design
- separation unit design
- overall process analysis

Each stage will be presented in an intermediate technical report, followed by a summary report.

DP requirements: None

Assessment: Project.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3053S   SEPARATION PROCESSES

13 NQF credits at level 7; 36 lectures, 10 tutorials.

Convener: TBA

Course Entry Requirements: CHE2031F, DP in CHE3046F, DP in CHE3063F.

Course outline: This course develops an understanding of the general principles of mass transfer operations in stage wise and continuous contact equipment, gas absorption, distillation, liquid-liquid extraction, adsorption and multi-component separation.

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class test; November examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3054S   REACTOR DESIGN II

13 NQF credits at level 7; 36 lectures, 10 tutorials.

Convener: TBA

Course Entry Requirements: DP in CHE3044F, DP in CHE3046F, DP in CHE3063F, DP in MAM2084F/S.

Course outline: This course aims to develop an understanding of non-isothermal reactor design; multiple steady states; heterogeneous catalysis and rate expressions; transport resistances in heterogeneous processes and non-catalytic solid-fluid reactions and reactor design.

DP requirements: Satisfactory performance in tutorials; minimum of 40% for class mark.

Assessment: Class tests; November examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE3062S   PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering and Geomatics students. *(NOTE:* **Second-year students may not register for CHE3062S**.)

12 NQF credits at level 7; 24 lectures.

Convener: Associate Professor J English

Co-requisites: CHE3049W.

Course outline: This course aims to develop an understanding of effective reporting. Students learn the requirements for written and oral reports in terms of planning, organisation and selection of information, as well as in terms of linguistic style and final presentation. Students will have to demonstrate proficiency in both formats.

DP requirements: Satisfactory attendance at all sessions; minimum of 50% for class mark.

Assessment: Class test, 2 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

Satisfy the requirements of the exit-level outcomes of the course.

CHE3063F   MASS TRANSFER

16 NQF credits at level 7; 48 lectures, 10 tutorials.

Convener: TBA

Course Entry Requirements: CHE2031F, CHE2040S, MAM2083F/S.

Course outline: This course covers types of diffusion, Fick's law, Maxwell-Stefan theory, molecular diffusion, single and multicomponent mass transfer analysis. Film coefficients, boundary conditions, macro-scopic balances using film coefficients. Boundary layer theory, turbulent flow. Overall coefficients, use of overall coefficients, interfacial mass transfer, analogies, practical analysis of mass transfer with simultaneous heat and momentum transfer.

DP requirements: Satisfactory performance and attendance in tutorials and project, class mark of 40%.

Assessment: Class test; project; tutorial tests; June examination 3 hours.

CHE3064S   MINERAL & METALLURGICAL PROCESSING I

8 NQF credits at level 7; 4 lectures, 5 practicals.

Convener: TBA

Course Entry Requirements: All second year core courses.

Course outline: The course begins with a multimedia-based introduction to the field of mineral and metallurgical processing, from the mining operation to environmental rehabilitation. The course then requires students to perform experiments and to analyse the subsequent data from a cone crusher, ball mill or HPGR, in-line pressure jig, hydrocyclones, flotation cell, leach cell, DC plasma-arc furnace and electrowinning cell. Here, the HPGR, ball mill, in-line pressure jig, flotation cell and

DC plasma-arc furnace are pilot-scale units. Finally, students are required to develop a simplified process simulation of one of the above unit operations using a spreadsheet-based method.

DP requirements: None.

Assessment: Projects; reports.

CHE3065S   NUMERICAL SIMULATION FOR CHEMICAL ENGINEERS

8 NQF credits at level 7; 24 lectures.

Convener: TBA

Course Entry Requirements: MAM2084F/S

Course outline: This course aims to develop computer arithmetic, application of similarity transforms to reaction-diffusion and rate based mass transfer; data fitting by linear least squares regression; application of non-linear equations techniques in mass and energy balances (VLE); application of ODE solvers, BVP solvers and the method of lines in reaction and mass transfer systems described by ODEs and PDEs; stiffness ratio; non-linear least squares estimation of model parameters with variance; formulate objective functions and minimisation/maximisation of process operating models and embedded systems.

DP requirements: None.

Assessment: Projects; assignments.

CHE3066S   CRYSTALLISATION & PRECIPITATION

8 NQF credits at level 7; 24 lectures.

Convener: TBA

Course Entry Requirements: All second year core courses.

Course outline: This course aims to develop an understanding of crystallisation methods, product characterisation, fundamental mechanisms, crystallisation and precipitation equipment, applications of industrial crystallisation, measurement techniques, recipitation: basic principles, chemistry particle processes in precipitation, mixing and hydrodynamics and scale up.

DP requirements: Satisfactory performance in all assignments and test.

Assessment: Combination of assignments, test, oral and practicals.

CHE4024F   PRINCIPLES OF ENVIRONMENTAL PROCESS ENGINEERING

8 NQF credits at level 8; 24 lectures, 5 tutorials. 1 afternoon field-trip.

Convener: TBA

Course Entry Requirements: All second year core courses.

Course outline: This course aims to develop an understanding of interaction of industrial processes with the natural environment; mechanisms of pollution; air pollution theory and examples (Cape Town, the Highveld, global issues); energy-related environmental issues; industrial water use and effluent treatment; acid mine drainage; municipal and industrial solid waste management; energy from waste and life cycle assessment.

DP requirements: Satisfactory performance in project.

Assessment: Project; June examination 2 hours.

CHE4029Z   PROFESSIONAL COMMUNICATION STUDIES

For Chemical Engineering students.

8 NQF credits at level 8; 24 lectures.

Convener: Associate Professor J English

Course Entry Requirements: CHE3062S or EEE3073S or MEC3037S.

Note: Any student who has failed or not taken CHE3062S and who wishes to register for CHE4029Z may apply through his/her Department for a special concession.

Co-requisites: CHE4048F

Course outline: This course develops the following aspects of communication: theory; professional writing including: business proposals; graphic communication; posters; readability; and group presentations using PowerPoint to an audience drawn from industry.
DP requirements: Satisfactory attendance at all sessions.
Assessment: Oral examination 50%, projects 50%.
Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4036Z   CHEMICAL ENGINEERING DESIGN

28 NQF credits at level 8.
Convener: Dr M Williamson
Course Entry Requirements: All core third year courses, CHE4048F, CHE4049F, DP in CHE4042F.
Co-requisites: Maximum number of credits taken concurrently is 16.
Students will not be given a concession to do CHE3054S or CHE3053S for the first time alongside CHE4036Z.
Course outline: This course brings together many of the elements previously covered in the chemical engineering degree and is intended to be the culmination of the previous years' study. The course is structured around an open ended design problem and includes: process evaluation, comparison and selection; material and energy balancing; hazard analysis and operability; economic evaluation; unit operation design; plant equipment selection and specification, materials selection and plant layout; 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: None.
Assessment: Individual and group submissions and oral presentations.
Sub-minimum: 40% for each of : individual feasibility study, group-based design contribution and specialist engineering assignment.

CHE4042F   PROCESS DYNAMICS & CONTROL

16 NQF credits at level 8; 21 lectures, 5 tutorials, 2 projects.
Convener: TBA
Course Entry Requirements: All core third year courses.
Course outline: This course aims to develop an advanced understanding of process dynamics: mathematical models, transfer functions, open-loop response of first, second and higher order systems. Feedback control systems; block diagrams, types of feedback controller. Stability analysis: Bode diagrams and stability, gain and phase margins, controller tuning. Feedforward and cascade control. Multi-input-multi-output systems: stability, interaction, relative gain array and decoupling.
DP requirements: Satisfactory attendance at and performance in tutorials, laboratory mark of 50% or more for the laboratory, a mark of 40% or more in the class test, and average of 50% or more in each of the projects.
Assessment: Projects; June examination, one 3 hour and one 2 hour paper.
Sub-minimum: 40% in each of the two examination papers.

CHE4045Z   CHEMICAL ENGINEERING PROJECT

32 NQF credits at level 8.
Convener: TBA
Course Entry Requirements: All core third year courses.
Co-requisites: Maximum number of credits taken concurrently is 16.
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: Satisfactory attendance at all sessions. Satisfactory performance in written proposal and specialist oral presentation.

Assessment: Oral presentations; project proposal; final written report; poster.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course and a minimum of 40% for the final report.

CHE4048F   BUSINESS, SOCIETY & ENVIRONMENT

20 NQF credits at level 8; 48 lectures, 8 tutorial sessions.

Convener: TBA

Course Entry Requirements: All core third year courses.

Co-requisites: CHE4049F, CHE4029Z.

Course outline: The course aims to provide a foundation for students to engage with their future roles as practising professionals or entrepreneurs relative to 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: Satisfactory performance in tutorials, project, class mark of 40%.

Assessment: Class test; projects; June examination 3 hours.

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4049F   PROCESS SYNTHESIS & EQUIPMENT DESIGN

20 NQF credits at level 8; 48 lectures, studio sessions, tutorials.

Convener: TBA

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: Average of 50% for projects. Maximum one project less than 50%. 100% for Aspen competency test. Satisfactory completion of all tutorials.

Assessment: Projects; tutorials; Aspen competency test; June examination 3 hours (subminimum: 50%).

Sub-minimum: Satisfy the requirements of the exit level outcomes of the course.

CHE4050F   MINERAL & METALLURGICAL PROCESSING II

8 NQF credits at level 8; 16 lectures, 4 projects, 2 tutorial sessions.

Convener: TBA

Course Entry Requirements: All third year core courses.

Course outline: The course begins with a multimedia-based overview of the theory and practice of milling and flotation process items and circuits (Metso CBT). The course then discusses laboratory techniques, sampling procedures and data reconciliation procedures applicable to the analysis of milling and flotation process devices and circuits. Introduction to mineralogy and liberation analysis methods are discussed. An introduction to hydrometallurgy containing the basic concepts and calculations encountered in this field is given. Students are required to demonstrate their

understanding of the course material through four projects. The course then presents selected theories/models used for the design, modelling and simulation of industrial milling and flotation process devices and circuits. The course concludes with an overview of the use of milling and flotation simulators (JKSimMet).

DP requirements: None.

Assessment: Projects.

CIV1005W   INTRODUCTION TO ENGINEERING

24 NQF credits at level 5; 26 lectures, 80 tutorials, 12 practicals

Convener: Prof M G Alexander

Course Entry Requirements: None

Course outline: This course forms the platform for the development of personal, academic and profession 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 minimum 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: Participate in and submit all tasks on time. Actively contribute to Group Work exercises. Attendance at all formal sessions. Submit Portfolio on time.

Assessment: Assignments (60%), Major projects (20%), Tests (20%).

CIV1006S   BUILDING SCIENCE I

16 NQF credits at level 5; 4 lectures per week.

Convener: Associate Professor H Beushausen

Course Entry Requirements:

Course outline: The course introduces students to the nature and properties of construction materials and how these affect their uses. It illustrates problems that might arise through injudicious choice of materials and the reasons behind the selection of materials for particular applications. It deals with soils, cement and concrete, stone, timber, metals (iron and steel, aluminium, copper, brass, bronze, zinc), corrosion, ceramics, glass, polymers, paints and bitumen, composites, thermal, acoustic and fire properties of building components.

Lecture times: Mon & Thurs, 4th period, Tutorials**:** 5th to 9th period

DP requirements: An average mark for the class tests that corresponds to at least 2/3 of the class average; satisfactory submissions of all assignments

Assessment: November examination 2 hours.

CIV2011F/P   MECHANICS OF MATERIALS

16 NQF credits at level 6; 48 lectures, 12 tutorials/practicals.

Convener: Ms N Wolmarans

Course Entry Requirements: MAM1042S, CIV2011F (DP) for CIV2011P

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.

Lecture times: Tues – Fri, 4th period

DP requirements: Student must achieve at least 66% of the class average for the two class tests. Student must achieve at least 40% in the final exam. Attempt all tests.

Assessment: June examination 3 hours.

CIV2020X   PRACTICAL EXPERIENCE

0 NQF credits at level 6

Convenor: TBA

Course outline: Civil Engineering students are required to gain at least 10 weeks of practical experience and insight into the practice of civil engineering by working during vacations. Students are encouraged to engage in a wide variety of civil engineering work, but must ensure that adequate experience in both site work and design office practice (a minimum of four weeks in each) is achieved. This course provides the framework for gaining practical experience to supplement academic study.

CIV2031S   STRUCTURAL ENGINEERING I

16 NQF credits at level 6; 48 lectures, 12 tutorials/practicals.

Convener: Professor M G Alexander

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, properties of structural timber; permissible-stress approach to design and design of timber structures.

Lecture times: Tues – Fri, 10h00 to 11h00

Tut Times: Fri, 14h00 to 17h00

DP requirements: An average mark for the class tests that corresponds to at least 2/3 of the class average; satisfactory submission of all assignments.

Assessment: November examination 3 hours.

CIV2034S   SPATIAL DATA ACQUISITION & MANAGEMENT

16 NQF credits at level 6; 48 lectures, 12 practicals.

Convener: Prof U K Rivett

Course Entry Requirements: CIV1004W, MAM1003W (DP).

Course outline: This course aims to develop spatial data acquisition. Topics include spatial data for civil engineering applications, distance measurement, co-ordinate systems, introduction to land surveying, determination of heights, levelling, theodolite measurement and calculations, traverse, tacheometry. Fundamentals of GPS, photogrammetry and remote sensing and their application in civil engineering are also included.

Spatial data management: Introduction to GIS; Georeferencing, Projections & Scale, Uncertainty, Error and Sensitivity in GIS, Spatial Query and Analysis; Data Models in GIS, GIS Applications in Civil Engineering.

Infrastructure planning and design project.

Lecture times: Mon – Thurs, 12h00 – 13h00

Tut times: Mon – Tues, 14h00 – 17h00

DP requirements: Tests – minimum of 33% of class average

Projects – minimum of 33% of class average

Practicals – minimum of 33% of class average and must submit 100%

Practicals test – 50% must be able to set up instrument in prescribed time period

Assessment: Group projects, class tests and practical work.

CIV2035X   CIVIL ENGINEERING CAMP

4 NQF credits at level 6; 2 weeks.
Convener: Associate Professor UK Rivett
Course Entry Requirements: CIV2034S
Course outline: This camp aims to develop skills in spatial data acquisition and includes: setting out, distance measurement, levelling traverse, tacheometry, GPS, error and accuracy; use of GIS for data integration of various spatial and non-spatial data, metadatabase design; spatial query and analysis.
Lecture times: None
DP requirements: Full attendance. The student must achieve a subminimum of 66% of the class average for the practical work. The student must achieve a subminimum of 66% of the class average for the group project.
Assessment: Group project and practical work.

CIV2037F   EXPERIMENTAL METHODS & STATISTICS

16 NQF credits at level 6; 48 lectures, 8 practicals.
Convener: Associate Professor M Vanderschuren
Course Entry Requirements: CIV1004W.
Course outline: This course aims to develop an understanding of the concepts of statistics, measures of central tendency, measures of dispersion, frequency distributions, introduction to probability, regression analysis and correlation, hypothesis testing and goodness of fit tests, analysis of variance, introduction to experimentation, instrumentation & data acquisition, measurement of strain, measurement of force, torque & pressure, measurement of vibration. Professional Communication Studies teaches a module in this course for a percentage of the final mark.
Lecture times: Tues – Fri, 09h00 – 10h00
Tut times: Mon, 14h00 – 17h00
DP requirements: The student must: attend all lectures and tutorials & practicals; achieve at least 60% of the class average for all the class tests; submit all written assignments, tutorials, practical and reports, and; submit folder for final examination. The folder should contain all notes, assignments, tutorials, practicals, test scripts and reports**.**
Assessment: Continuous assessment by projects, assignments and tests.

CIV2039S   GEOTECHNICAL ENGINEERING I

16 NQF credits at level 6; 48 lectures, 6 practicals, 9 tutorials.
Convener: Ms F Chebet
Course Entry Requirements: CIV2011F (DP), GEO1008F (DP).
Course outline: This course introduces an understanding of soil mechanics. Topics include: physical characteristics of soils: particles, texture, phases, soil structure, grain size, distribution, classification; water in soil: capillarity, shrinkage, heave, permeability, seepage, flow nets; compressibility and consolidation: effective stress, rate of consolidation, vertical stress and settlement; and shear strength of soils.
Lecture times: Tues – Fri, 09h00 – 10h00
Tut times: Wed, 14h00 – 17h00
DP requirements: Submission of all assignments and a lab report. A minimum mark of two thirds of the class average is required for tests.
Assessment: November examination 3 hours.

CIV2040S   FLUID MECHANICS

8 NQF credits at level 6; 25 lectures, 6 tutorials, 2 practicals
Convener: Professor J E van Zyl

Course Entry Requirements: MAM1003W (DP), PHY1010W (DP)

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.

Lecture times: Tues & Thurs, 11h00 – 12h00

Tut times: Alternate Fri, 11h00 – 13h00

DP requirements: 2/3 of class average for the semester mark (the weighted sum of the tests and practicals).

Assessment: November examination 2 hours.

CIV3031F   STRUCTURAL ENGINEERING II

16 NQF credits at level 7; 48 lectures, 12 tutorials/practicals.

Convener: Dr S Skatulla

Course Entry Requirements: CIV2031S and CIV2011F

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: trusses, beams and frames. Design loads for steel structures; ultimate limit-state design philosophy; design of structural steelwork: ties, struts, purlins, girts, columns, beams, trusses, frames and connections. The course includes an individual design project.

Lecture times: Tues – Fri, 10h00 – 11h00

Tut times: Tues, 14h00 – 17h00

DP requirements: 2/3 of class average. The student's mark will be the better of exam or 50% exam and 50% class work.

Assessment: June examination 3 hours.

CIV3035S   STRUCTURAL ENGINEERING III

16 NQF credits at level 7; 48 lectures, 12 tutorials/practicals.

Convener: A/Prof H Beushausen

Course Entry Requirements: CIV3031F (DP), CIV2011F, CIV2031S

Course outline: This course aims to develop the analysis of statically indeterminate structures by the displacement method; direct-stiffness method; and computer-oriented matrix formulation. Topics include: properties of structural concrete, reinforcing and prestressing steel; elastic design of concrete structures; serviceability limit-state design of reinforced and prestressed concrete elements (beams and slabs). The course includes laboratory and analysis projects.

Lecture times: Tues – Fri, 09h00 – 10h00

Tut times: Tues, 14h00 – 17h00

DP requirements: An average mark for the class tests that corresponds to at least 2/3 of the class average. A mark of 50% or more for the Concrete Project and the Assignment.

Assessment: Project, class test, November examination 3 hours.

CIV3042S   GEOTECHNICAL ENGINEERING II

16 NQF credits at level 7; 48 lectures, 12 tutorials.

Convener: Dr D Kalumba

Course Entry Requirements: CIV2039S, GEO1008F (DP).

Course outline: This course aims to develop an understanding of limit considerations, active and passive earth pressure, slope stability and bearing capacity failure; ground investigation; foundations of shallow and piled structures and gravity wall criteria.

Lecture times: Tues – Fri, 10h00 – 11h00

Tut times: Fri, 14h00 – 17h00

DP requirements: At least 2/3 of the class average for tests. Submission of all course assignments.

Assessment: June examination 3 hours.

CIV3043F   HYDRAULIC ENGINEERING
16 NQF credits at level 7; 48 lectures, 10 tutorials, 2 practicals
Convener: Professor J E van Zyl.
Course Entry Requirements: CIV2040S: Fluid Mechanics (DP)
Course outline: This course aims to develop an understanding of flow in pipelines: laminar & turbulent flow - Reynolds; head losses in pipelines & fittings; the design of pipe systems. Pump selection. Open channel flow: the steady flow equations; Froude; uniform, gradually & rapidly varied flow; hydraulic structures, e.g. flumes, weirs, spillways and control gates.
DP requirements: A minimum course mark of two thirds of the class average is required.
Assessment: June examination 3 hours. A sub-minimum of 40 % is required in the final exam paper.

CIV3044F   ENGINEERING HYDROLOGY
8 NQF credits at level 7; 22 lectures, 5 tutorials.
Convener: Professor J E van Zyl
Course Entry Requirements: CIV2034S (DP).
Course outline: This course aims to develop an understanding of flood hydrology. Topics include: factors affecting runoff; selected prediction methods; flood routing; drought hydrology: flow measurements, mass balances and storage-yield relationships for reservoirs.
Lecture times: Wed – Thurs, 09h00 – 10h00
Tut times: Selected Fri, 14h00 – 17h00
DP requirements: Submission of all assignments before the deadline and achieving at least 2/3 of the class average for the semester mark.
Assessment: Based on design calculation file reflecting all the work covered in the course.

CIV3045F   TRANSPORTATION PLANNING
16 NQF credits at level 7; 52 lectures, 13 tutorials.
Convener: Associate Professor M Vanderschuuren
Course Entry Requirements: CIV2037F (DP) and CIV2034S (DP).
Course outline: This course is an advanced introduction to the functioning of the city, transport in context, transport and land-use; transport and the economy; transport and the society; transport and sustainability. Modes of transport. Traffic engineering: traffic flow theory and traffic data collection. Transport policy and the decision maker. The transport planning process and transport modelling. The use of GIS in the transportation context. Professional communication (presentation skills) is also included.
Lecture times: Tues – Fri, 11h00 – 12h00
Tut times: Thurs, 14h00 – 17h00
DP requirements:
- at least 66% of the class average for the 2 class tests
- hand in the project
- hand in all assignments

Assessment: June examination 3 hours 50%, class mark 50%.

CIV3046F   WATER TREATMENT
12 NQF credits at level 7; 36 lectures, 12 tutorials.
Convener: Professor G A Ekama
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.

Lecture times: Mon, 12h00 -13h00; Tues & Fri, 09h00 – 10h00

Tut times: Mon, 14h00 – 17h00

DP requirements: Test average > 2/3 of class average for the two class tests. Submission of all completed assignments in professional style by due date.

Assessment: Two tests of 2 hours each. One 3 hour June examination. Tests count 1^{3rd} and exam counts 2^{3rds} of final mark. A minimum exam mark of 50% and a final mark =>50% is required to pass the course

CIV3047S   URBAN WATER SERVICES

12 NQF credits at level 7; 36 lectures.

Convener: Prof N P Armitage

Course Entry Requirements: 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, including: water supply and distribution; sanitation and urban drainage. An introduction to community participation is also included.

Lecture times: Tues – Thurs, 11h00 – 12h00

DP requirements: Complete all projects with a subminimum of 40% for each.

Assessment: Three design projects (60%). November examination 2 hours (40%).

CIV4031F   STRUCTURAL ENGINEERING IV

16 NQF credits at level 8; 48 lectures, 12 tutorials/practicals.

Convener: Professor P Moyo

Course Entry Requirements: CIV3031F, CIV3035S, MAM2080W.

Course outline: : This course aims to develop an understanding of ultimate limit-state design of structural steelwork; plastic analysis of steel beams and frames; ultimate limit-state design of reinforced concrete beams and columns; yield-line analysis of concrete slabs; ultimate limit-state design of prestressed concrete beams. The course also introduces the design of structures as integrated systems: the full design process; conceptualisation; and alternative schemes. A design project and a laboratory project are included.

Lecture times: Tues – Fri, 11h00 – 12h00

Tut times: Tues, 14h00 – 17h00

DP requirements: The student must achieve 66% of the class average for the 2 class tests and 2 projects

Assessment: June examination 4 hours.

CIV4035C   DESIGN PROJECT

24 NQF credits at level 8; 5 weeks full time duration.

Convener: Associate Professor M van Ryneveld

Course Entry Requirements: CIV4033Z (DP). No simultaneous registration of more than 1 other course.

Course outline: This design project covers the planning and design of a major civil engineering project involving a number of civil engineering and other closely related disciplines, and applying professional communication techniques.

Lecture times: Mon & Wed, 14h00 – 17h00

Tut times: Tues & Thurs, 11h00 – 13h00

DP requirements: An average of 50% is required in the year mark (the weighted sum of the tests, projects and tutorials).
Assessment: Assessment by prescribed submissions and contributions.

CIV4041F   PROFESSIONAL PRACTICE

16 NQF credits at level 8; 50 lectures; 1 tutorial.
Convener: Professor N P Armitage
Co-requisites: CIV4035C and CIV4044F/S.
Course outline: This course aims to develop an advanced understanding of the time-value of money, utility cost analysis, the project life cycle, project administration health & safety, ethics and codes of conduct, sustainability in civil engineering, the structure of the profession, and professional communication.
Lecture times: Fri, 09h00 – 11h00
Tut times: Thurs, 14h00 – 17h00
DP requirements: CIV4041F(DP) No simultaneous registration of more than 1 additional course (besides CIV4035C). A minimum of 50% for each of the two tests.
Assessment: Continuous assessment by class tests, essays, project and presentation.

CIV4042F   WASTEWATER TREATMENT

12 NQF credits at level 8; 36 lectures; 10 tutorials.
Convener: Professor G A Ekama
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.
Lecture times: Tues & Fri, 08h00 – 09h00; Fri, 12h00 – 13h00
Tut times: Fri, 14h00 – 17h00
DP requirements: Test average $>2/3^{rds}$ of class test average for two tests. Submission of all completed assignments in professional style by due date.
Assessment: Two tests of 2 hours each. One 3 hour June examination. Tests count $1/3^{rd}$ and exam counts 2/3rds of final mark. A minimum exam mark of 50% and a final mark =>50% is required to pass the course.

CIV4043F   URBAN DESIGN & MANAGEMENT

16 NQF credits at level 8; 48 lectures; 12 tutorials.
Convener:
Associate Professor M van Ryneveld
Course Entry Requirements: CIV3045F (DP) and CIV3047S (DP).
Course outline: This course aims to develop an advanced understanding of the South African city and includes the evolution and upgrading of informal settlements (physical, social and economic infrastructure); municipal infrastructure asset management and geometric and pavement design of roads.
Lecture times: Wed & Thurs, 08h00 – 10h00
Tut times: Wed, 14h00 – 17h00
DP requirements: A minimum of 50% for each of the two tests.
Assessment: Class mark 50%; June examination 50%.

CIV4044S/F RESEARCH PROJECT

48 NQF credits at level 8.

Convener: Dr D Kalumba

Course Entry Requirements: No simultaneous registration of more than 1 additional course (besides CIV4035C).

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 presentation.

DP requirements: Submission of all interim reports, final report and poster. Satisfy all the critical course outcomes for the course to the satisfaction of both the internal and external examiners.

Assessment:

CML1001F/S BUSINESS LAW I
CML1001L BUSINESS LAW 1 - THIRD TERM (see admission criteria below)

18 NQF credits at level 5; first or second semester course, 5 lectures per week.

Business Law 1 has one general course code (CML 1001F) for the first semester course and one general course code (CML 1001S) for the second semester. However, students are allocated to different groups on registration and to distinguish each group a class number is added to the general course code e.g. 74555. Under the University's General Rules (G16.1) students must attend the specific class in which they are registered. Only students registered for the BCom Accounting Programme streams and for the BBusSc Information Systems stream will be permitted to register for Business Law 1 in the second semester. Students who fail in the first semester are permitted to repeat Business Law 1 in the second semester.

Convener: Ms K Lehmann

Course Entry Requirements: None

Course outline: The aim of the course is to provide students with a general introduction to the South African legal system. The course includes an introduction to the South African court structure, the sources of South African law, the general principles of contract and the law governing certain select contracts including the law of sale, lease and agency.

DP requirements: A weighted average of 40% for the class test(s)

Assessment: Test(s) 40%; final examination 60%.

CML2001F COMPANY LAW
CML2001L COMPANY LAW - THIRD TERM (see admission criteria below)

18 NQF credits at level 6; 5 lectures per week.

Company Law has one general course code (CML 2001F) for the first semester. However, students are allocated to different groups on registration and to distinguish each group a class number is added to the general course code e.g. 74555. Under the University's General Rules (G16.1) students must attend the specific class in which they are registered.

Convener: Dr C Ncube

Course Entry Requirements: CML1001F. No undergraduate student in the first year of study may register for Company Law.

Course outline: The aim of this course is to provide students with an understanding of common law and statutory provisions relating to the nature, formation and management of partnerships, trusts, companies and close corporations.

DP requirements: A weighted average of 40% for the class test(s)

Assessment: Test(s) 40%; final examination 60%

CML2005F LABOUR LAW I
CML2005L LABOUR LAW - THIRD TERM (see admission criteria below)

18 NQF credits at level 6; 5 lectures per week.

Convener: E Fergus

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, eg. Business Law I.

Course outline: This course aims to provide students with an understanding of: The common law contract of employment; Legislative interventions and protections including the Basic Conditions of the Employment Act; the Skills Development Act, and the Unemployment Insurance Act; Discipline and dismissals under the Labour Relations Act of 1995; Unfair discrimination in employment and recruitment and selection; Employment equity legislation; Collective labour law as provided for under the Labour Relations Act and the Constitution; Freedom of association and organisational rights; Collective bargaining and dispute resolution; Strikes and lockouts; Industrial democracy and worker participation.

DP requirements: None

Assessment: Test(s) 40%; final examination 60%

CML2010S   BUSINESS LAW II
CML2010L   BUSINESS LAW II THIRD TERM (see admission criteria below)
18 NQF credits at level 6; 5 lectures per week.

Business Law II has one general course code (CML 2010S) for the second semester. However, students are allocated to different groups on registration and to distinguish each group a class number is added to the general course code e.g. 74555. Under the University's General Rules (G16.1) students must attend the specific class in which they are registered.

Convener: Ms J Franco

Course Entry Requirements: CML1001F or equivalent. No undergraduate student in the first year of study may register for Business Law II.

Course outline: This course aims to provide students with an understanding of negotiable instruments, insurance, insolvency, secured transactions and intellectual property.

DP requirements:. A weighted average of 40% for the class test(s)

Assessment: Test 40% and final examination 60%.

Admission Criteria for Law Courses on Offer During the Third Term (Winter Only):
CML1001L - BUSINESS LAW I
CML2001L - COMPANY LAW
CML 2005L - LABOUR LAW
CML2010L - BUSINESS LAW II

The above courses are on offer during the THIRD TERM, but only during the WINTER. Lectures are offered on a daily basis for three hours over a four week period. Course outlines, DP requirements and assessment are as above. Please note that Business Law 1 is a course entry requirement for Business Law II and for Company Law, and students cannot register for either of the latter courses unless they successfully completed Business Law 1 in the previous year of study.

Admission criteria:
1.   Courses will be limited to 70 students.
2.   Only students who are explicitly required by their programme to do the law course(s) in question are eligible. (In other words, students doing the course as an optional course will not be eligible.)
3.   A first year student may not do a law course during the third term.
4.   Students may not anticipate a course in order to lighten their standard work load.
5.   In addition to 2 and 3, only the following students are eligible to do the law courses and in the following order of preference:
(a)   Semester Study Abroad Students (from UCT) registered in the Commerce Faculty.

(b) Students who have failed the particular law course in a <u>previous</u> year (not students who have failed to obtain a DP).

(c) Students who, due to curriculum problems , cannot do the course in question in the normal way. (This is subject to written verification by their Faculty).

(d) Students who need the course (and no other) to graduate – in other words, if the student cannot do the course, he/she will be held back for another year (this is subject to written verification by their Faculty). This only applies to a student who has completed and passed all other courses for the degree before Winter School begins (in other words, students who have no further courses to complete in the second semester).

NB: Any advice given by student advisors or any others which is contrary to the above must be ignored.

Information on closing dates for application for admission to courses on offer during the THIRD TERM can be obtained from the Centre for Open Learning.

CON1004W   CONSTRUCTION TECHNOLOGY I

32 NQF credits at level 5; 4 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: U Ordor

Course Entry Requirements:

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.

Lecture times:

DP requirements: 50% sub-course work, 40% sub-exams.

Assessment: Year mark 65%, November examination3 hours 35%

CON1007X   PRACTICAL TRAINING

Convener: 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: Complete practical training and complete report.

CON1010S   CONSTRUCTION INFORMATION SYSTEMS

8 NQF credits at level 5; 2 lectures per week, tutorials, practicals.

Convener: K Le Jeune

Course Entry Requirements:

Course outline: This course aims to provide an introduction to computers, networks, data storage, manipulation/analysis and reporting using spreadsheets (MS Excel) and relational databases (MS Access). Solving problems using spreadsheets and databases is also covered.

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

Assessment: Year mark 50% (2 tests 10% each; 8 tutorials 30%); November examination 2 hours 50%.

CON1011F   PROPERTY STUDIES I A

16 NQF credits at level 5; 4 lectures per week, tutorials, practicals.

Convener: Mr S Durr

Course Entry Requirements:

Course outline: This course aims to develop an understanding of Property Development and includes: a study of the principles of property development including the relevant statutes and ordinances: urban development; control of land in South Africa; town planning; overview of property development; the establishment of townships; types of dwelling units and housing types; principles of medium and high density residential developments; sectional title and group housing; development of retirement centres; introduction to commercial property development; development of: office buildings, parking garages, shopping centres, industrial parks; and rehabilitation and conversion of buildings.

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

Assessment: Year mark 50%; June examination 2 hours 50%.

CON1012S   PROPERTY STUDIES I B

16 NQF credits at level 5; 4 lectures per week, tutorials.

Convener: Associate Professor F Viruly

Course Entry Requirements:

Course outline: This course aims to develop an understanding of welfare and economic efficiency and includes: economic efficiency through the price system. Real property: characteristics and functions of the real property market; pricing of land and resources. Development: the development process; timing and rate of development; finance for development; redevelopment; public sector development; economics of planning controls; the construction industry. Urban land use: land use and land values; pattern of urban land use; growth of urban areas; quality of urban environment; housing; regional policy. The government and land resources: impact of government economic policy on land resources; theory of urban public finance; taxation and land resources; and recent developments.

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

Assessment: Year mark 50%; November examination 2 hours 50%.

CON1015S   PROPERTY INFORMATION SYSTEMS

8 NQF credits at level 5; 2 lectures per week, tutorials, practicals.

Convener: S Nurick

Course Entry Requirements:

Course outline: This course is an introduction to computers, networks, data storage, manipulation/analysis and reporting using spreadsheets (MS Excel), relational databases (MS Access); and problem-solving with spreadsheets and databases.

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

Assessment: Year mark 50% (2 tests 10% each; 8 tutorials 30%); November examination 2 hours 50%.

CON1017S   PROPERTY INVESTMENT MATHEMATICS I

8 NQF credits at level 5; 1 lecture per week, 2 tutorials per week.

Convener: Emeritus Professor AJ Stevens

Course Entry Requirements:

Course outline: This course aims to develop an understanding of simple interest, equivalence, compound interest, present value, annuities, general annuities, sinking funds and amortization.

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

Assessment: Year mark 30%; November examination 2 hours 70%.

CON1018W   BUILDING TECHNOLOGY I T

16 NQF credits at level 5; 2 lectures per week, 1 studio session per week.

Convener: U Ordor

Course Entry Requirements:

Course outline: This course aims to develop and appreciation of the construction industry and its size and role in the economy. Topics include: an overview of the construction industry's structure; its participants and their roles and responsibilities; an understanding of the construction assembly process associated with simple buildings, together with an appreciation of the relationship between design, technology and assembly; basic architectural drawing directed to the understanding and transmission of graphic information and an introduction to site surveying including measurement, levelling, etc.

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (1 test 15%; group project 15%; 2 individual projects 10% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON1019F/S   PROFESSIONAL COMMUNICATION STUDIES

CON1019F for Property Studies students; CON1019S for Construction Studies students.

16 NQF credits at level 5; 4 lectures per week, tutorials.

Convener: Associate Professor J English

Course Entry Requirements:

Course outline: This course aims to equip students with practical skills to enable them to plan and present persuasive oral presentations and oral reports; to function effectively in small-group activities; and to prepare and write business and technical reports.

DP requirements: 100% attendance and 50% minimum class test average.

Assessment: Class test, 2 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

CON2006W   CONSTRUCTION TECHNOLOGY II

32 NQF credits at level 6; 4 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: A Ellmann

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: 40% subminimum in both course work and examinations.

Assessment: Year mark 65% (4 tests 20%; 9 assignments 45%); November examination 3 hours 35%.

CON2013X   PRACTICAL TRAINING

0 NQF credits at level 6

Convener: 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: Complete practical training and complete report.

CON2020S   CONSTRUCTION MANAGEMENT I

16 NQF credits at level 6; 4 lectures per week, tutorials.

Convener: Dr A Windapo

Course Entry Requirements: BUS1010F or 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: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (group assignment 20%; 2 tests 20%; individual assignment 5%); November examination 2 hours 50%.

CON2022W   MEASUREMENT & DESIGN APPRAISAL I

16 NQF credits at level 6; 2 lectures per week, 1 studio session per week.

Convener: E Edwardes

Course Entry Requirements: CON1004W, MEC1002W.

Course outline: This course aims to develop an 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: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (4 tests 10% each; assignment 10%); November examination 4 hours 50%.

CON2024S   PROPERTY STUDIES II A

16 NQF credits at level 6; 4 lectures per week, tutorials.

Convener: S Nurick

Course Entry Requirements: CON1011F, CON1012S, CON2030F, BUS2020F/FTX2020F.

Co-requisites: CON2029S.

Course outline: This course aims to develop an understanding of the nature and scope of investment. Topics include: the nature and scope of property investment, the investment decision process, the property development process, the decision making among alternatives, property evaluation: principles of feasibility studies, feasibility studies for residential, commercial and industrial developments; principles of economic viability studies: townships, sectional title, retirement villages, office, shopping centre, and industrial developments; whole life appraisal and risk management: the nature of risk; risk analysis; and risk management and control.

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

Assessment: Year mark 50% (2 tests 15% each; 1 assignment 20%); November examination 3 hours 50%.

CON2027F REAL PROPERTY LAW I

16 NQF credits at level 6; 4 lectures per week, tutorials.

Convener: T Boxall

Co-requisites: CML1001F (or equivalent).

Course outline: This course aims to develop an understanding of South African Law of Property and statutes relating to immovable and real rights; the acquisition of rights over land in South Africa; forms of land tenure; possession and occupation of immovable property; servitudes; mineral rights; real and personal securities; survey of land; registration of rights over immovable property; erection of buildings; subdivision of land; agricultural land; and fencing.

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

Assessment: Year mark 50% (2 tests 20% and 30%); June examination 2 hours 50%.

CON2029S MEASUREMENT

8 NQF credits at level 6; 2 lectures per week.

Convener: S van den Heever

Course Entry Requirements: CON1018W.

Course outline: This course is an introduction to measurement in the property and construction industry, including: the SAPOA method and the application thereof; the guide to elemental cost estimating and analysis for building works and the application thereof; an overview of the standard system of measuring building work; and the compilation and purpose of the Bills of Quantities.

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

Assessment: Year mark 50% (2 tests 25%; short assignments 0%); November examination 2 hours 50%.

CON2030F PROPERTY INVESTMENT MATHEMATICS II

8 NQF credits at level 6; 2 lectures per week, tutorials.

Convener: Emeritus Professor AJ Stevens

Course Entry Requirements: CON1017S.

Course outline: This course aims to develop evaluation techniques for property development and investment decisions: these include rate of return, simple payback, discounted payback and discounted cash flow (NPV and IRR).

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

Assessment: Year mark 30%. (test and tutorials); June examination 3 hours 70%.

CON2031S PROPERTY STUDIES II B

16 NQF credits at level 6; 4 lectures per week, tutorials.

Convener: S Nurick

Course Entry Requirements: CON1011F, CON1012S, STA1000S, ECO1010F.

Course outline: this course aims to develop an understanding of the Valuation Profession and includes: The Property Valuers Profession Act (47 of 2000). Functions and responsibilities of the Valuer. An Introduction to the Statutes and Ordinances (relevant sections) affecting valuation (all as amended): Transfer Duty Act 40 of 1949; Estate Duty Act 45 of 1955; Removal of Restrictions Act 84 of 1967; Immovable Property (Removal or Modification of Restriction) Act 94 of 1965; Administration of Estates Act 66 of 1965; Stamp Duties Act 77 of 1968; Expropriation Act 63 of 1975; Land Affairs Act 101 of 1987; Physical Planning Act 125 of 1991; Housing Act 107 of 1997; Environment Conservation Act 73 of 1989; National Environmental Management Act 107 of 1998; Development Facilitation Act 67 of 1995; Less Formal Township Establishment Act 113 of 1991; Land Survey Act 8 of 1997; Prevention of Illegal Eviction from and Unlawful Occupation of Land Act 19 of 1998; Water Act No 54 of 1956 / National Water Act 36 of 1998; Rental Housing Act 50 of 1999 / Rent Control Act 80 of 1976; Upgrading of Land Tenure Rights Act 112 of 1991; Value-Added Tax Act 89 of 1991; Municipal Ordinance 20 of 1974 (rating sections); Land Use Planning

Ordinance (WC) 15 of 1985; Western Cape Planning and Development Act 7 of 1999; Property Valuation Ordinance (WC)1993; Valuation Ordinances of all other provinces. Property Valuation: Purposes for which valuations are required; Concepts of value (personal, exchange and market value); Classification of value and accuracy of valuations; The Surveyor-General; The Registrar of Deeds; The Valuer's records; Factors influencing supply and demand in the property market; Types of fixed property; Factors influencing the value of property; Appreciation and depreciation; Relationship between land and improvements; Value of improvements; Valuation of Residential properties; and The Valuation Report.

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

Assessment: Year mark 50% (1 test 20%, 2 assignments 15% each) November examination 2 hours 50%.

CON3012W CONSTRUCTION TECHNOLOGY III

32 NQF credits at level 7; 2 lectures per week, seminars, 1 studio session per week, field trip(s).

Convener: A Ellman

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: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 10% each, 4 assignments 7.5%); June examination 2 hours 25%, November examination 2 hours 25%.

CON3023X PRACTICAL TRAINING

0 NQF credits at level 7

Convener: 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: Complete practical training and complete report.

CON3030S CONSTRUCTION COSTING

16 NQF credits at level 7; 2 lectures per week, 1 studio session per week.

Convener: S van den Heever

Course Entry Requirements: CON1010F or CON1015F, CON1004W or CON1018W, CON2022W or CON2029S and CON3043W.

Co-requisites: CON3040W.

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: 40% subminimum in both course work and examination.

Assessment: Year mark 80% (project 35%; peer review 5%; 3 individual assessments 10% each; journal 5%; plenary quiz 5%); November examination 2 hours 20%.

CON3031W MEASUREMENT & DESIGN APPRAISAL II

32 NQF credits at level 7; 4 lectures per week, 1 studio session as required.

Convener: 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: 40% subminimum in both course work and examination.
Assessment: Year mark 50% (4 tests 10% each, assignment 10%, 5 short assignments 10%); November examination 4 hours 50%.

CON3032W   APPLIED CONTRACT LAW I
12 NQF credits at level 7; 2 lectures per week, seminars.
Convener: T Boxall
Course Entry Requirements: CML1002F or CML1001F or CML1006S.
Course outline: This course aims to develop an understanding of the JBCC Principle Building Agreement; the Arbitration Act and includes case studies.
DP requirements: 40% subminimum in both course work and examination.
Assessment: November examination 2 hours 50%, year mark 50%.

CON3033F   PROPERTY STUDIES I
16 NQF credits at level 7; 4 lectures per week, 1 tutorial session per week.
Convener: S Nurick
Course Entry Requirements: STA1001F/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: 40% subminimum in both course work and examination.
Assessment: Year mark 50% (3 tests 35%; 1 assignment 15%); (June examination 2 hours 50%.

CON3034F   PROPERTY STUDIES III A
16 NQF credits at level 7; 4 lectures per week, tutorials.
Convener: K Evans
Course Entry Requirements: CON2024S, CON2030F, CON2031S, ECO1010F, ECO1011S.
Course outline: This course aims to develop an understanding of property economics. Topics include property values; supply and demand; the economics of developments. Property finance: personal portfolio planning; institutional portfolio planning; urban finances; sources and forms of property finance. Taxation: income taxation; property taxation; and Value Added Tax.
DP requirements: 40% subminimum in both course work and examination.
Assessment: Year mark 50% (2 tests 20%; project 20%, 2 assignments 10%); June examination 2 hours 50%.

CON3035S   PROPERTY STUDIES III B
16 NQF credits at level 7; 4 lectures per week, tutorials.

Convener: A Street

Course Entry Requirements: CON2024S, CON2031S, STA1001F, ACC1006F/S, ECO1010F, ECO1011S.

Course outline: This course aims to develop an understanding of the management of building design and construction. Topics include: general contracting; construction and project management; architectural design; specification of operating systems; upgrade programmes; estimating; preparation of contracts, drawings and specifications; preparation of tender packages; tendering processes and award. Value Management: the concept of value management. Property marketing: concept of marketing; marketing management; marketing management philosophies, marketing of residential properties; and marketing of commercial and industrial properties.

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

Assessment: Year mark 50%; November examination 2 hours 50%.

CON3036W   PROPERTY & CONTRACT LAW

16 NQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: T Boxall

Course Entry Requirements: CML1002F or CML1001F or CML1006S; CON2027F.

Course outline: This course develops an understanding of the JBCC Principal Building Agreement; Arbitration Act; Alternative dispute resolution; and Case law.

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

Assessment: Year mark 50% (2 tests 15% each; assignment 20%) November examination 2 hours 50%.

CON3038W   CONSTRUCTION MANAGEMENT II

32 NQF credits at level 7; 4 lectures per week, seminars, tutorials, field trip(s), Computer laboratory sessions.

Convener: M Massyn and Dr A Windapo

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: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (2 tests 10% each; 3 assignments 10% each); June examination 2 hours 25%, November examination 2 hours 25%.

CON3039S   CONSTRUCTION MANAGEMENT IT

16 NQF credits at level 7; 4 lectures per week, tutorials.

Convener: Dr A Windapo

Course Entry Requirements: BUS1010F or BUS1036F/S and CON1018W.

Course outline: This course aims to develop the 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: 40% subminimum in both course work and examination.

Assessment: Year mark 50% (group assignment 20%; 2 tests 20%; individual assignment 5%); November examination 2 hours 50%.

CON3040W   COST ENGINEERING I T

16 NQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: Associate Professor K Michell

Course Entry Requirements: CON1018W and CON2029S or CON2006W and CON2022W.

Course outline: This course aims to develop an appreciation of client/developer motivation and needs. Topics include: The client briefing process. An understanding of the theory of construction cost planning and cost control. An understanding of design economics, elemental cost analysis of buildings; cost studies/cost comparisons. Consideration of cost and price indices. Utilising the outputs of cost planning and cost control, and of approximate estimates. Communication applied to the cost planning and control environment. Consideration of current research being conducted on the practice of cost planning and cost control in South Africa.

DP requirements: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (Test 10%, Blog 5%, Peer Review 5%, Project 30%); June examination 2 hours 25%; November examination 2 hours 25%, November examination 2 hours 25%.

CON3041F   PROPERTY STUDIES III C

16 NQF credits at level 7; 4 lectures per week, tutorials.

Course Entry Requirements: CON2024S or CON2030F, CON2031S, CON1017S, CON1018W, STA1001F, ECO1010F.

Convener: Dr M Mooya

Course outline: This course is an introduction to case law relating to the valuation of fixed property; property valuation; highest and best use of property; influence of the 'wrong' development on market value; influences of leases on values; leases and rentals; theory of the income, residual, cost and accounts methods of valuation; valuation of leasehold interests; valuation for insurance purposes; valuation of income-producing properties; mass valuations; and the valuation report.

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

Assessment: Year mark 50% (2 tests 20% each, assignment 10%) June examination 2 hours 50%.

CON3043W   COST ENGINEERING UNDER UNCERTAINTY

16 NQF credits at level 7; 2 lectures per week, seminars, tutorials.

Convener: Associate Professor K Michell

Course Entry Requirements: CON1017S, CON2006W, CON2022W, CON2029W/S.

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: 40% subminimum in both course work and examinations.

Assessment: Year mark 50% (Test 10%, Blog 5%, Peer Review 5%, Project 30%); June examination 2 hours 25%; November examination 2 hours 25%.

CON3044F/S GLOBALISATION & THE BUILT ENVIRONMENT

not offered in 2014

18 NQF credits at level 7; 26 lectures.

Convener: TBA

Course outline: This course aims to develop an understanding of globalisation and the built environment. Topics include: the globalisation debate; globalisation and technology; globalisation and the information age; globalisation and American power; state power; international law; regionalist governance; the declining authority of nation states; national culture and global culture; cosmopolitan cities; media and consumer culture; culture and identity; global citizens; migration; global trade; information and the knowledge economy; inequality; and world orders. Globalisation is contextualised in the final project in terms of the property and construction industries.

DP requirements: Weekly submissions and attendance; 40% subminimum in course work.

Assessment: Year mark 100% (major project 50%; assignment 20%; essay 15%; presentation 15%).

CON3045S MANAGEMENT & ENTERPRISE

Not offered in 2014

18 NQF credits at level 7; 4 lectures per week, 12 tutorials.

Convener: TBA

Course Entry Requirements:

Course outline: Management and Enterprise is a foundational course for property and construction students. The course will focus on creating a common language and understanding related to business, management, enterprise and entrepreneurship within the context of the property and construction environment. Students will engage with the elements of business formation and management through an integrated project. Alignment with other courses will illustrate the role of business management in the property and construction process, and the importance of an enterprise mindset in developing and managing sustainable and viable projects.

DP requirements: 50% year mark.

Assessment: Year mark 100% (projects 35%; 2 assignments 10% each; individual assessment 15%; presentation 30%).

CSC1015F COMPUTER SCIENCE 1015

NQF credits: 18 NQF at level 5

Convener: Associate Professor H Suleman

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.

Lectures: 4th or 5th period daily. This includes one tutorial per week.

Practicals: One practical per week, Monday, Tuesday or Wednesday, 14h00-17h30.

DP requirements: Minimum of 45% aggregate in practical work.

Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 2-hour paper written in June counts 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1016S   COMPUTER SCIENCE 1016

NQF credits: 18 NQF at level 5

Convener: Associate Professor H Suleman

Course entry requirements: CSC1015F (or supp for CSC1015F)

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.

Lectures: 4th or 5th period daily. This includes one tutorial per week.

Practicals: One practical per week, Monday, Tuesday or Wednesday, 14h00-17h30.

DP requirements: Minimum of 45% aggregate in practical work.

Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 2-hour paper written in November counts 60%. Subminima: 45% for practicals and 45% on weighted

CSC1017F   COMPUTER SCIENCE FOR ENGINEERS

16 NQF credits at level 5; 48 lectures, 1 practical per week.

Convener: TBA

Course outline: This course is an introduction to programming and algorithms; 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, text files; recursion; and number systems.

DP requirements: 45% weighted average for practical work.

Assessment: Theory tests count for 15%, practicals count for 15%, practical tests count for 10%, June examination counts for 60% of the course mark.

Subminima: 45% weighted average for practical work, 45% weighted average of tests and exams.

CSC2001F   COMPUTER SCIENCE 2001

NQF credits: 24 NQF at level 6

Convener: Dr A Mbogho

Course entry requirements: CSC1016S or CSC1011H, MAM1000W or equivalent. It is STRONGLY recommended that students register concurrently for second-year courses in Mathematics, Applied Mathematics or Statistics.

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

Lectures: Mon-Fri 09h00, four or five lectures per week.

Practicals: One 4-hour practical per week, Monday to 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

NQF credits: 24 NQF at level 6

Convener: Dr A Mbogho

Course entry requirements: CSC2001F (or supp for CSC2001F), MAM1000W or equivalent. It is strongly recommended that students register concurrently for second-year courses in Mathematics, Applied Mathematics or Statistics.

Course outline: The goal of this course is to complete the basic education of a Computer Scientist. Mobile application development and interface design on the one hand, and an introduction to computer architecture on the other hand, are complemented by developing students' knowledge and skills in concurrent programming and multicore computers. Practical work in Java and in assembler programming are included.

Lectures: four lectures per week at 09h00

Practicals: One 4-hour practical per week, Monday to Friday, 14h00-18h00.

DP requirements: Minimum of 45% aggregate in practical work and minimum of 50% in practical test.

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.

CSC2003S COMPUTER GAMES

NQF credits: 24 NQF at level 6

Convener: Associate Professor P Marais

Course entry requirements: CSC2001F, MAM1000W or equivalent.

Course outline: This course introduces high-level game programming concepts and practical game construction. By the end of the course, students will be able to design and implement simple 2D games. The course begins with a basic introduction to games and game genres for students unfamiliar with gaming, before exploring the game development process. Appropriate terminology, methods, and tools for computer game development are introduced. Fundamentals algorithms for 2D game development and implementation are covered, including pathfinding algorithms suited to tile-based games. Text-based games are also briefly explored using Inform7. This is a practical course where students design and implement games using GameMaker for simple prototyping, before switching to a Java-based game engine which students can extend. The final deliverable is a fully functional 2D game which implements many of the techniques explored in lectures.

Lectures: 10h00, four lectures and 1 tutorial per week.

Practicals: One 4-hour practical per week, Monday to Friday, 14h00-18h00.

DP requirements: Minimum of 45% aggregate in practical work, minimum of 50% in practical test and minimum of 40% in theory tests.

Assessment: Tests count for 16.7%; practicals, practical test and projects count 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% on weighted average of theory tests and examination.

CSC3002F COMPUTER SCIENCE 3002

NQF credits: 36 NQF at level 7

Convener: Professor E Blake

Course entry requirements: CSC2001F and CSC2002S. It is strongly recommended that students should have completed a second-year course in Mathematics, Applied Mathematics or Statistics.

Course outline:

The course provides an introduction to the three topics (1) structure and organization of operating systems; (2) introduction to functional languages and their basis in the λ-calculus. The approach has new relevance with the rise of multiple processors in computing; (3) a basic knowledge of computer

networks. The course will take the student through the various logical layers of the Internet protocol suite.

Lectures: Mon-Fri, 09h00

Practicals: Two 4-hour practicals per week, Monday to 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

NQF credits: 36 NQF at level 7

Convener: Professor E Blake

Course entry requirements: CSC2001F and CSC2002S, and either INF2009F or permission from the Head of Department.

Course outline: This a course on three advanced topics (1) advanced software design is about turning requirements into effective and efficient implementations in a systematic manner; (2) the compliers module is aimed at exposing students to the theory and practice of parsing and translating high level programming languages into executable code; (3) 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.

Lectures: Mon-Fri, 09h00

Practicals: Two 4-hour practicals per week, Monday to 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 examination.

CSC3015D   THEORY OF ALGORITHMS

18 NQF credits at level 7; 30 lectures, 1 practical per week.

Convener: TBA

Course Entry Requirements: CSC2001F, CSC2002S.

Course outline: Algorithms are widely recognised as being central to computing. This course categorises algorithms according to their solution strategy and presents example problems and algorithmic solutions in each category. It also considers fundamental notions of algorithmic complexity and computability in a systematic way.

Lecture times:

DP requirements:

Assessment: Tests 15%, practicals 35%, 1.5 hour written November examination 50%.

Subminima: 45% for practicals; 45% for tests and examination.

CSC3020H   THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN

NQF credits: 36 NQF at level 7

Convener: Associate Professor P Marais

Course entry requirements: CSC2001F, CSC2002S and CSC2003S.

Course outline:

This course covers design and development of simple 3D and networked games. The course describes the game development processes and introduces key terminology, methods, and tools of computer gaming. It includes Game Design, 3D Computer Graphics and software agents that can adapt to uncertain and constantly changing gaming environments, as well as techniques for multi-user and distributed games. This is a practical course: students collaborate with designers and artists to produce a full 3D multi-play game which builds on concepts covered in lectures.

Lectures: CSC3020H and CSC3022H together occupy 3rd period daily
Practicals: 4 hours per week, by arrangement
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Tests count 16.7%; practical work counts 33.3%; examinations count 50%. Subminima: 45% for practicals, 45% weighted average of theory tests and examinations.

CSC3023F   COMPUTER SCIENCE 3023
24 NQF credits at level 7; 44 lectures, 1 practical per week.
Convener: TBA
Course Entry Requirements: CSC2001F, CSC2002S.
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.

ECO1007S   ECONOMICS FOR ENGINEERS
This course is designed specifically for engineering students. It is aimed at providing a broad perspective on the subject, and concentrates more on an understanding of theoretical concepts and their application in practise as may impact on the professional life of an engineer.
16 NQF credits at level 5; lectures, tutorials.
Convener: TBA
Course outline: The course covers the following areas: microeconomics, international trade and the balance of payments, macroeconomics, financial markets, the public sector, South African economic and environmental issues. The course focuses on the application of economic principles.
DP requirements: An average year mark of at least 35%.
Assessment: Tests, essays and tutorials 45%; November examination 55%.
Note: Credit will not be given for both ECO1007S and ECE1010F/S.

ECO1010F/S   MICROECONOMICS
18 NQF credits at level 5; 48 lectures, 12 tutorials.
Convener: Associate Professor A Leiman
Course Entry Requirements: Senior Certificate with at least a D on the Higher Grade for Mathematics; or NSC with at least a 5 for Mathematics. Senior students not fulfilling this requirement must have passed the equivalent of 6 semester courses.
Course outline: The course focuses on demand and supply analysis; consumer behaviour; production functions and production costs; market forms; income distribution and international trade.
DP requirements: All class tests and compulsory written assignments (essays and tutorials) have to be completed, and an average year mark of at least 35% has to be achieved.
Assessment: Tests, essays and tutorials 50%; June/November examination 50%.

ECO1011S   MACROECONOMICS
18 NQF credits at level 5; 48 lectures, 12 tutorials.
Convener: Associate Professor C Van Walbeek
Course Entry Requirements: ECO1010F/S.
Course outline: This course aims to develop an understanding of: the circular flow model; national

income accounting; Keynesian aggregate spending; aggregate demand and supply; money; interest rates and exchange rates; inflation, monetary, fiscal and balance of payments policy.

DP requirements: All class tests and compulsory written assignments (essays and tutorials) have to be completed, and an average year mark of at least 35% has to be achieved.

Assessment: Tests, essays and tutorials 50%; November examination 50%.

ECO2003F   MICROECONOMICS II

18 NQF credits at level 6; second year, first semester course, 4 lectures and 1 tutorial/workshops per week.

Convener: S Scordilis

Course Entry Requirements: ECO1010F/S Microeconomics.

Course outline: The course formalizes consumer and producer optimisation, and explores factor markets under perfect and imperfect competition before introducing general equilibrium theory, graphically and algebraically. The final section, on industrial organisation, looks at models that relax the critical assumptions of GE. All sections of the course incorporate applications. The sequence and number of lectures allocated to topics is variable.

DP requirements: An average year mark of at least 35%.

Assessment: Class work 50% (tests and essays), June examination 3 hours 50%.

Additional Information: Course information, such as the dates, times and venues of lectures, tutorials and tests, and of the prescribed and recommended books will be posted on the School of Economics notice board at the beginning of the semester.

ECO2004S   MACROECONOMICS II

18 NQF credits at level 6; second year, second semester, 5 lectures/workshops per week.

Convener: N Samouilhan

Course Entry Requirements: ECO110F/S Microeconomics and ECO111S Macroeconomics. A student will be permitted to take ECO204S without having passed ECO203F, although it is desirable to pass ECO203F prior to taking ECO204S.

Course outline: The course builds on ECO111S and includes: short run IS-CM, medium run AS-AD and long run Solow Swan treatment of the macroeconomy; analysis of the open economy, with reference to trade and exchange rate regimes.

DP requirements: An average year mark of at least 35%. Tutorial attendance and submission of assignments. Attendance at class tests.

Assessment: Class record 50% (tests and essays), November examination 3 hours 50%.

Additional Information: Course information, such as the dates, times and venues of lectures, tutorials and tests, and of the prescribed and recommended books will be posted on the School of Economics notice board at the beginning of the semester.

EEE1000X   PRACTICAL TRAINING

0 NQF credits at level 5

Convener: TBA

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: Not applicable.

EEE1005W   ENGINEERING I

24 NQF credits at level 5; 72 lectures, 4 tutorials, 20 laboratory/ sessions, 1 project.
Convener: Ms R Smit
Course Entry Requirements:
Course outline: This course aims to motivate and help students understand the nature and scope of electrical 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 will include: the engineering approach to electricity, basic practical electronics: applications of electronic components, transistors and simple integrated circuits, soldering and bread-board skills, use of measuring instruments, electricity in our everyday lives: heating, lighting and motive power, safety and earthing, generation of electrical power (fossil fuel, renewable energy & nuclear sources), three-phase power, AC and DC electricity, and an introduction to electrical engineering design.
Lecture times: Mon, Wed, Thurs, 3rd period
DP requirements: 90% Lab and tutorial attendance, attendance at all class tests.
Assessment: Project (10%), Class tests (20%), November examination (70%)

EEE2026S   BASIC ELECTRICAL ENGINEERING II

20 NQF credits at level 6.
Convener: Dr A Mishra
Course Entry Requirements: CSC1015F, CSC1017F, MAM1018F/S or PHY1013F/S

Course outline: Divided into Modules D, E and F of EEE2039W.

Module D: Introduction to Microprocessors

8 NQF credits at level 6, 24 lectures.
Lecturer:
Outline: This module aims to develop an understanding of microprocessors and includes: a history of computers and microprocessors; analog and digital systems; sampling and A to D conversion; simple microprocessor systems; introduction to a microcontroller; structured assembler programming; building from components to systems; connecting external devices to the microprocessor and simple control loops.
Lecture times: Tues, Wed, Thurs, Fri 3rd period
DP requirements: Satisfactory completion of coursework.
Assessment: Projects and Assignments (20%), Hands-on Computer Examination (20%), November Examination (60%).

Module E: Analog Electronic Design

8 NQF credits at level 6; 24 lectures, 4 tutorials and 1 practical.
Lecturer: Dr A Mishra
Outline: This module aims to develop an understanding of the operation of electronic devices such as bipolar junction transistors and field effect transistors. It exposes students to the design of common circuits incorporating these devices including, but not limited to amplifiers, current sources and mirrors and voltage regulators. In addition operation of operational amplifiers and other basic analog circuit building blocks; design of fundamental circuits based around simple integrated circuits such as inverting and non-inverting amplifiers and switching circuits; and basic parameters of the components used, will be demonstrated in the context of reliable circuit design.
Lecture times: Tues, Wed, Thurs, Fri 3rd period
DP requirements: Satisfactory completion of coursework.
Assessment: Assignments (20%), Project (15%), Class quiz (written) (5%), November Examination (60%)

Module F: Laboratories
4 NQF credits at level 6, 4 practicals.
Lecturer:
Outline: Projects on opamps/voltage regulators, filter, logic, transistors.
Lecture times: Tues and Thurs 6th to 9th period
DP requirements: Satisfactory completion of coursework for each and every module.
Assessment: On practical work.

EEE2030F ELECTRICAL ENGINEERING I

For students in Mechanical Engineering programme only.
12 NQF credits at level 6; 36 lectures, 8 tutorials.
Convener: Dr M Hanif
Course Entry Requirements: MAM1018S, PHY1013S
Course outline: This course aims to develop an understanding of electrical quantities, circuit components, network theorems, AC circuits including Phasor diagrams, resonance, RMS values, power and power factor; transducers and electronic devices.
Lecture times: Mon 2nd, Tues 5th, Wed 5th, Thurs 2nd
DP requirements: 30% for Class Test
Assessment: Class Test (30%), June examination (70%).

EEE2031S ELECTRICAL ENGINEERING II

For students in Mechanical Engineering programme only
12 NQF credits at level 6; 36 lectures, 8 tutorials, 1 practical.
Convener: Dr S Chowdhury
Course Entry Requirements: DP for EEE2030F.
Course outline: This course aims to develop an understanding of single phase series and parallel AC Circuits and phasor diagrams, 3-phase star and delta connected AC circuits, single-phase and 3-phase complex power, electromagnetism and simple magnetic circuits, single phase transforms and DC machines.
Lecture times: Mon, Tues, Wed, Thurs in 5th period
DP requirements: Completion and hand in of all tutorials.
Assessment: Tutorials & Laboratory work (10%), Class Test (20%), November examination 70%.

EEE2035F   SIGNALS & SYSTEMS I

12 NQF credits at level 6; 30 lectures and 6 tutorials.
Convener: Associate Professor F Nicolls
Course Entry Requirements: MAM1018F/S.
Co-requisites: MAM2083F/S.
Course outline: This course provides students with the basic tools required for understanding linear systems and the effect that such systems have on deterministic signals. Upon completion, students will be able to characterise and manipulate linear time-invariant systems in terms of input-output relationships, using both time and frequency domain methods. The course includes concepts related to signal representation, linear convolution, Fourier analysis, and sampling of continuous-time signals.
Lecture times: Mon, Thurs, Fri in 5th period
DP requirements: Satisfactory completion of coursework.
Assessment: Assignments (10%), Class Test (30%), June examination (60%).

EEE2036S   PROBABILITY & STATISTICAL DESIGN IN ENGINEERING
12 NQF credits at level 6; 36 lectures; 12 tutorials; 6 practicals.
Convener: Dr A Murgu
Course Entry Requirements MAM2083F/S.
Course outline: This course teaches fundamental concepts of set theory; events, sample spaces and randomness; counting methods, combinations and permutations; calculus, modelling and analysis of engineering systems using random variables; discrete/continuous events; functional calculus of random variables; conditioning and independence of random variables; probability distributions (discrete, continuous); expectation, variance; higher-order moments, moment generating function; joint random variables; least squares estimation; law of large numbers; central limit theorems; and Gaussian approximation.
Lecture times: Mon, Wed, Fri 3rd period.
DP requirements: 100% attendance of tutorials and laboratory sessions AND 100% submission of the assignments given in tutorials and laboratory.
Assessment: Tutorials and Laboratory (15%), Class Test (20%), November Examination (65%).

EEE2038W   FUNDAMENTALS OF ELECTRICAL ENGINEERING
24 NQF credits at level 6; 72 lectures; 20 tutorials, 3 practicals, 2 projects.
Convener: Associate Professor P Barendse
Course Entry Requirements: MAM1018F/S, PHY1013F/S
Course outline: Divided into Modules A and C.

Module A: Electrical Circuits
12 NQF credits at level 6; 36 lectures, 10 tutorials, 1 practical, 1 project.
Lecturers: Dr M Hanif, Associate Professor P Barendse.
Outline: This module covers electrical circuits and aims to develop an understanding of DC circuits, voltage, current and power network theorems, transient circuit analysis, single phase AC circuit theory; phasor diagrams for resistive, inductive and capacitive loads; complex power and power factor correction.
Lecture times: Mon, Wed, Fri 3rd period.
DP requirements: Satisfactory completion of coursework.
Assessment: Project (5%), Class Test (35%), June examination (60%).

Module C: Power Engineering
12 NQF credits at level 6; 36 lectures, 10 tutorials, 2 practicals, 1 project.
Lecturers: Associate Professor A Khan, Associate Professor P Barendse
Outline: This module covers power engineering and aims to develop an understanding of three phase AC circuits; Amperes circuit law; properties of magnetic circuits; features, characteristics, modelling and performance of single phase transformers; and features, characteristics, modelling and performance of d.c. machines.
Lecture times: Mon, Tues, Fri 5th period.
DP requirements: Satisfactory completion of coursework.
Assessment: Tutorial and Laboratory (2%), Projects (8%), Class Tests (30%), November Examination (60%).

EEE2039W   FUNDAMENTALS OF ELECTRONIC ENGINEERING
36 NQF credits at level 6; 96 lectures; 10 tutorials, 9 practicals, 3 programming assignments.
Convener: Dr A Mishra
Course Entry Requirements: CSC1015F, CSC1017F, MAM1018F/S or PHY1013F/S.
Course outline: Divided into Modules B, D, E, F and G.

Module B: Digital Electronics

12 NQF credits at level 6; 24 lectures, 4 tutorials, 5 laboratories, 1 project (equivalent to 2 tutorials and 1 project).

Lecturer: Associate Professor M Dlodlo.

Outline: This module on digital electronics aims to develop an understanding of digital systems and information representation, binary logic, Boolean algebra, combinational circuits, design concepts and procedures, arithmetic functions, sequential circuits, and state automata.

Lecture times: Tues, Thurs 3rd period.

DP requirements: Satisfactory completion of coursework (minimum 40%).

Assessment: Tutorials and Laboratories (13%), Projects (7%), Class Tests (20%), June Examination (60%).

Module D: Introduction to Microprocessors

8 NQF credits at level 6; 24 lectures.

Lecturer: TBA

Outline: This module aims to provide an introduction to microprocessors and includes: a history of computers and microprocessors; analog and digital systems; sampling and A to D conversion; simple microprocessor systems; introduction to a microcontroller; structured assembler programming; building from components to systems; connecting external devices to the microprocessor and simple control loops.

Lecture times: Tues, Wed, Thurs, Fri 3rd period.

DP requirements: Satisfactory completion of coursework.

Assessment: Projects & Assignments (20%), Hands-on Computer Examination (20%), November Examination (60%).

Module E: Analog Electronic Design

8 NQF credits at level 6; 24 lectures, 4 tutorials.

Lecturer: Dr A Mishra.

Outline: This module on analogue electronic design aims to build on the understanding of the operation of electronic devices like bipolar junction transistors and field effect transistors. Students will be exposed to the design of common circuits incorporating these devices including but not limited to amplifiers, current sources and mirrors and voltage regulators. The operation of operational amplifiers and other basic analog circuit building blocks; the design of fundamental circuits based around simple integrated circuits such as inverting and non-inverting amplifiers and switching circuits and basic parameters of the components used, will all be covered in the context of reliable circuit design.

Lecture times: Tues, Wed, Thurs, Fri 3rd period.

DP requirements: Satisfactory completion of coursework.

Assessment: Assignments (20%), Project (15%), Class quiz (written) (5%), November Examination (60%).

Module F: Laboratories

4 NQF credits at level 6; 4 practicals.

Lecturer: TBA

Outline: The aim of this project-based work is to allow students the opportunity to apply their knowledge in projects on opamps/voltage regulators, filter, logic, and transistors.

Lecture times: Tues and Thurs 6th period to 9th period.

DP requirements: Satisfactory completion of coursework for each and every module.

Assessment: Tutorials and Laboratory (100%).

Module G: Computing II for Electrical Engineers
4 NQF credits at level 6; 12 lectures, 3 programming assignments, 1 class test.
Lecturer: Dr S Winberg
Outline: The aim of this module is to develop the knowledge and skills required to write C++ programmes with application towards electrical engineering problems.
Lecture times:
DP requirements: Completion of every assignment.
Assessment: Programming Assignment (70%), Class Test (30%).

EEE2040F BASIC ELECTRICAL ENGINEERING I
for EC students only
24 NQF credits at level 6; 60 lectures; 16 tutorials, 6 practicals.
Convener: Associate Professor P Barendse
Course Entry Requirements: MAM1018F/S, PHY1013F/S.
Course outline: Divided into Modules A and B.

Module A: Electrical Circuits
12 credits, 36 lectures, 10 tutorials, 1 practical.
Lecturers: Associate Dr M Hanif, Associate Professor P Barendse
Outline: Module A of EEE 2038W. This module covers electrical circuits and aims to develop an understanding of DC circuits, voltage, current and power network theorems, transient circuit analysis, single phase AC circuit theory; phasor diagrams for resistive, inductive and capacitive loads; complex power and power factor correction.
Lecture times: Mon, Wed, Fri 3rd period.
DP requirements: Satisfactory completion of coursework.
Assessment: June examination (60%), Tests (20%), Projects (5%).

Module B: Digital Electronics
12 credits, 24 lectures, 4 tutorials, 5 laboratories, 1 project (equivalent to 2 tutorials and 1 project)
Lecturer: Associate Professor M Dlodlo
Outline: Module B of EEE2039W. This module on digital electronics aims to develop an understanding of digital systems and information representation, binary logic, Boolean algebra, combinational circuits, design concepts and procedures, arithmetic functions, sequential circuits, and state automata.
Lecture times: Tues, Thurs 3rd period.
DP requirements: A minimum of 40% in Continuous Assessment
Assessment: Tutorials and Laboratories (13%), Project (7%), Tests (20%), 2-hour June Examination (60%).

EEE2041F ELECTRICAL CIRCUITS
For students in the Electro-Mechanical Engineering programme.
12 NQF credits at level 6; 36 lectures; 10 tutorials, 1 practical.
Convener: Associate Professor P Barendse
Course Entry Requirements: MAM1018F/S, PHY1013F/S or equivalent.
Course outline: Module A of EEE2038W. This module covers electrical circuits and aims to develop an understanding of DC circuits, voltage, current and power network theorems, transient circuit analysis, single phase AC circuit theory; phasor diagrams for resistive, inductive and

capacitive loads; complex power and power factor correction.
Lecture times: Mon, Wed, Fri, 3rd Period
DP requirements: Satisfactory completion of coursework.
Assessment: Project (5%), Class Test (35%), June Examination (60%).

EEE2042S   ANALOG ELECTRONIC DESIGN & LABS
For students in the Electro-Mechanical Engineering programme.

12 NQF credits at level 6; 24 lectures; 4 tutorials, 4 practicals.
Convener: Dr A Mishra
Course Entry Requirements: MAM1018F/S, PHY1013F/S, DP for EEE2041F.
Course outline: Divided into Modules E and F of EEE 2039W.

Module E: Analog Electronic Design
8 NQF credits at level 6; 24 lectures, 4 tutorials.
Lecturer: Dr A Mishra
Outline: This module on analogue electronic design aims to build on the understanding of the operation of electronic devices like bipolar junction transistors and field effect transistors. Students will be exposed to the design of common circuits incorporating these devices including but not limited to amplifiers, current sources and mirrors and voltage regulators. The operation of operational amplifiers and other basic analog circuit building blocks; the design of fundamental circuits based around simple integrated circuits such as inverting and non-inverting amplifiers and switching circuits and basic parameters of the components used, will all be covered in the context of reliable circuit design.
Lecture times: Tues, Wed, Thurs, Fri 3rd period.
DP requirements: Satisfactory completion of coursework.
Assessment: Assignments (20%), Project (15%), Class quiz (written) (5%), November Examination (60%).

Module F: Laboratories
4 NQF credits at level 6; 4 practicals.
Lecturer: TBA
Outline: The aim of this project-based work is to allow students the opportunity to apply their knowledge in projects on opamps/voltage regulators, filter, logic, and transistors.
Lecture times: Tues and Thurs 6th period to 9th period.
DP requirements: Satisfactory completion of coursework for each and every module.
Assessment: Tutorials and Laboratory (100%).

EEE2043S : POWER ENGINEERING
For students in the electro-mechanical Engineering Programme. Not offered in 2014.
12 NQF credits at level 6; 36 lectures, 10 tutorials, 2 practicals, 1 project.
Lecturers: Associate Professor A Khan, Associate Professor P Barendse
Course Outline: Module C of EEE2038W This course aims to provide a foundation in power engineering by introducing students to: three phase AC circuits; Amperes circuit law, properties of magnetic circuits, features, characteristics, modelling and performance of single phase transformers and dc machines.
Lecture times: Mon, Tues, Fri 5th period.
DP requirements: Satisfactory completion of coursework.
Assessment: Tutorial and Laboratory (2%), Projects (8%), Class Tests (30%), November Examination (60%).

EEE3000X   PRACTICAL TRAINING
Convener: TBA
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: Not applicable.

EEE3017W   DIGITAL ELECTRONICS
Not for EC students.
16 NQF credits at level 7; 48 lectures, 10 practicals.
Convener: Ms R Verrinder
Course Entry Requirements: EEE2039W or equivalent.
Course outline: This course aims to build on the understanding of**:** logic design, algorithmic state machines, data converters, advanced micro controller usage, C application to micro controllers; popular interface standards; common digital devices, instrument busses automated instrumentation and process control.
Lecture times: Semester 1: Mon 2nd, Thurs 3rd period. Semester 2: Mon and Wed 5th period.
DP requirements: Submission of all practicals, 50% or more for at least 2 class tests.
Assessment: November examination 2 hours (55%), class tests (35%), practicals (10%).

EEE3031S   ENERGY UTILISATION
for ME students only
10 NQF credits at level 7; 24 lectures, 2 practicals, 1 project, 3 tutorials.
Convener: Associate Professor M A Khan
Course Entry Requirements: EEE2038W or equivalent.
Course outline: Module A of EEE3057S. This course on energy utilisation aims to provide an advanced introduction to the features, characteristics and operation of three phase AC induction and synchronous machines; and power electronics.
Lecture times: Tues 2nd period, Thurs 3rd period.
DP requirements: Completion of two laboratory experiments, submission of two laboratory reports and continuous assessment mark of at least 35%.
Assessment: Class Tests (35%), Project (5%), November Examination (60%).

EEE3044S   ENERGY CONVERSION & UTILISATION
For Electrical and Computing, Electro-Mechanical and Mechanical Engineering students only.
8 NQF credits at level 7; 24 lectures, 2 practicals.
Convener: Associate Professor K A Folly
Course Entry Requirements: EEE2031S or EEE2026S.
Course outline: This course builds on the understanding of AC power theory; three-phase systems, electrical loads and tariffs; DC machines; AC machines, heating and lighting.
Lecture times: Mon and Wed 4th period.
DP requirements: Satisfactory completion of course and laboratory work. Obtain an average of at least 35% for the class tests.
Assessment: Laboratory & Assignments (12%), Class Tests (28%), November Examination (60%).

EEE3055W ELECTROMAGNETIC ENGINEERING

20 NQF credits at level 7; 48 lectures, 12 tutorials, 2 practicals, 1 design project.
Convener: Associate Professor R Geschke
Course Entry Requirements: EEE2039W, MAM2083F, PHY2010S.
Course outline: Divided into Modules A and B.

Module A: Electromagnetic Field Theory
Lecturer: Associate Professor R Geschke
Outline: This module aims to develop an advanced understanding of electromagnetic field theory, giving the derivation and some applications of Maxwell's equations in an electrical engineering context. Time-varying electromagnetic fields; Maxwell's equations; continuity and displacement current; basis of Kirchhoff's laws; propagation of plane waves in lossless and lossy media; power density and Poynting vector; reflection and refraction of plane waves; and radiation from antennas.
Lecture times: 2nd Semester: Thurs and Fri 2nd period.
DP requirements: Satisfactory completion of coursework. Completion of laboratory session.
Assessment: Tutorial and Laboratories (4%), Class Tests (24%), November Examination (72%).

Module B:1st Semester Transmission Line Theory
Lecturer: Emeritus Professor B Downing
Outline: This module provides an advanced introduction to overhead 3-phase power transmission lines. Short, medium and long line models. RF and microwave transmission lines, coaxial lines, micro strip, wave guides and fibre optic transmission lines. Equivalent circuit and line constants, two port equations, propagation, attenuation and phase constant, characteristic impedance, incident and reflected waves, reflection coefficient, the Smith Chart, standing waves, high frequency loss-less lines, and line matching examples.
Lecture times:1st Semester: Tues 1st period, Thurs 1st period.
DP requirements: Satisfactory completion of coursework. Completion of laboratory session.
Assessment: Project (20%), June Examination (80%).

EEE3057S   POWER ENGINEERING

20 NQF credits at level 7; 48 lectures, 12 tutorials, 4 practicals, 1 field trip, 1 project.
Convener: Associate Professor M A Khan
Course Entry Requirements: EEE2038W or equivalent.

Module A: Energy Utilization
Lecturers: Associate Professor MA Khan and Associate Professor P Barendse
Course Outline: This module on energy utilisation aims to provide an advanced introduction to the features, characteristics and operation of three phase AC induction and synchronous machines; and power electronics.
Lecture times: Tues 2nd period, Thurs 3rd period.
DP requirements: Completion of two laboratory experiments, submission of two laboratory reports and continuous assessment mark of at least 35%.
Assessment: Class Test (35%), Project (5%), November Examination (60%).

Module B: Introduction to Power Systems
Lecturers: Mrs K Awodele and Associate Professor K Folly
Course Outline: This module aims to provide an advanced introduction to power systems engineering, power systems network models, load flow and balanced fault calculations, tranformers, protection principles, electrical loads and tariffs.

Lecture times: Mon and Wed 2nd period.

DP requirements: Satisfactory completion of coursework and continuous assessment mark of at least 35% based on laboratory assignments, one site visit and class tests.

Assessment: Laboratories (8%), Site Visit & Assignments (8%), Class Test (24%), November Examination (60%).

EEE3061W   MECHATRONICS DESIGN I

For Mechatronics and Electro-Mechanical Engineering students only.

12 NQF credits at level 7; 24 lectures, 24 practicals, 6 tutorials.

Convener: Professor E Boje

Course Entry Requirements: EEE2038W, EEE2039W, EEE2031S.

Course outline: This course aims to develop an advanced understanding of mechatronic design. Topics include: top-down and bottom-up design strategies; applications of electromechanical systems, sensors, power electronics, and actuators to mechatronic design. Computing platforms: embedded micro-controllers and programmable logic controllers (PLCs), and case histories in mechatronic design are also covered.

Lecture times: Semester 1: Tues meridian. Semester 2: Mon 3rd period.

DP requirements: Submission of all projects and class mark of 40% plus.

Assessment: Projects (40%), Class Test (10%), November Examination (50%).

EEE3062F   DIGITAL ELECTRONICS

For Electro-Mechanical Engineering students only.

12 NQF credits at level 6; 24 lectures, 4 tutorials, 5 laboratories, 1 project (equivalent to 2 tutorials and 1 project).

Convener: Associate Professor M Dlodlo

Course Entry Requirements: EEE2031S

Course outline: Module B of EEE2039W. This course aims to develop an advanced understanding of digital systems and information presentation, Binary Logic, Boolean Algebra, combinational circuits, design concepts and procedures, arithmetic functions, sequential circuits, and state automata.

Lecture times: Tues and Thurs 3rd period.

DP requirements: Satisfactory completion of coursework (minimum 40**%)** **Assessment:** Tutorials and Laboratories (13%), Projects (7%), Class Tests (20%), June Examination (60%).

EEE3063F   TRANSMISSION LINES

For EC students only

10 NQF credits at level 7; 24 lectures, 5 tutorials, 1 design project.

Convener: Emeritus Professor B J Downing

Course Entry Requirements: EEE2039W, MAM2083F.

Course outline: Module B of EEE3055W. This module provides an advanced introduction to overhead 3-phase power transmission lines. Short, medium and long line models. RF and microwave transmission lines, coaxial lines, micro strip, wave guides and fibre optic transmission lines. Equivalent circuit and line constants, two port equations, propagation, attenuation and phase constant, characteristic impedance, incident and reflected waves, reflection coefficient, the Smith Chart, standing waves, high frequency loss-less lines, and line matching examples.

Lecture times: Tues 1st period, Thurs 1st period.

DP requirements: Satisfactory completion of coursework.

Assessment: Project (20%), June Examination (80%).

EEE3064W   DIGITAL ELECTRONICS & MICROPROCESSORS

16 NQF credits at level 7; 48 lectures, 8 practicals.
Convener: Mr S Ginsberg
Course Entry Requirements: EEE2039W.
Course outline: This course aims to develop an advanced understanding of digital electronics with emphasis on VHDL, algorithmic state machine design methods and computer architecture.
Lecture times: Semester 1: Thurs and Fri 4th period. Semester 2: Mon 1st and Tues 3rd period.
DP requirements: Satisfactory completion of coursework.
Assessment: Tutorials and Laboratories (10%), Projects (24%), November Examination (66%).

EEE3067W   DIGITAL ELECTRONICS & MICROPROCESSORS

For Science students only. Please see the Science Faculty Handbook for further details.
Course outline: EEE3064W and EEE4096S.
Assessment: November Examination 3 hours.

EEE3068F   ELECTRONIC CIRCUITS

12 NQF credits at level 7; 30 lectures 5 laboratories.
Convener: Mr S Ginsberg
Course Entry Requirements: EEE2038W, EEE2039W.
Course outline: This course aims to develop an advanced understanding of frequency analysis of circuits. Topics include: manual Bode plot techniques for plotting magnitude and phase, breakpoints analysis. Operational amplifiers; design of circuits using opamps, practical limitations, frequency response, stability. Noise in circuits. Introduction to analogue filters. Oscillators. Use of Spice-based simulation software to simulate electronic circuits. Laboratory practicals in building and testing of circuits on bread-board, power supplies, switched mode circuits, and mixed signal systems.
Lecture times: Mon, Tues, Wed, 5th period.
DP requirements: Minimum of 40% for at least one class test.
Assessment: Tutorials and Laboratories (6%), Class Test (14%), June Examination (80%).

EEE3069W   CONTROL ENGINEERING

Electrical and Mechatronics Students only.
20 NQF credits at level 7; 48 lectures, tutorials as required, practicals as required, design project.
Convener: Professor M Braae
Course Entry Requirements: MAM2084S/F, EEE2035F, EEE2038W, EEE2039W.

Module A (1st Semester):
10 NQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.
Outline: This module aims to develop an advanced understanding of control engineering. Topics include: Terminology: open and closed loop configurations, block diagrams, dynamic system modelling, transient response, steady state error criterion. System stability: Routh Hurwitz criterion, Root Locus. Frequency response: Nyquist plots, Bode diagrams, Nichols Charts. Compensation: Lead-lag circuits, minor loops, feed forward and three-term controllers. Sensitivity analysis and identification techniques are also covered.
Lecture times: Mon, Wed, Fri 3rd period

Module B (2nd Semester):
10 NQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.
Outline: This module aims to develop an advanced understanding of sampled data systems: Topics include: z-transforms, hold circuits, pulse transfer functions, minimum prototype response controllers, bilinear transformation, frequency response methods. State variables, state space models

and design methods. Robustness, observability controllability, stability and performance.
Lecture times: Tues, Thurs 5th period.
DP requirements: Completion of course assignments.
Assessment: Year mark (10%), June Examination (45%), November Examination (45%).

EEE3070S   MEASUREMENT & MICROPROCESSORS

For Electro-Mechanical Engineering students.
8 NQF credits at level 6, 24 lectures.
Convener: TBA
Course Entry Requirements:
Course outline: Module D of EEE 2039W. This module aims to provide an introduction to microprocessors and includes: a history of computers and microprocessors; analog and digital systems; sampling and A to D conversion; simple microprocessor systems; introduction to a microcontroller; structured assembler programming; building from components to systems; connecting external devices to the microprocessor and simple control loops.
Lecture times: Thurs and Fri 3rd period.
DP requirements: Satisfactory completion of coursework.
Assessment: Projects & Assignments (20%), Hands-on Computer Examination (20%), November Examination (60%).

EEE3073S   PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students.
Second-year students may not register for EEE3073S.

12 NQF credits at level 7; 24 lectures.
Convener: Associate Professor J English
Course Entry Requirements: All first year courses plus 72 credits of second year courses completed.
Course outline: This course in professional communication aims to develop effective *Reporting* and covers the requirements for written and oral reports in terms of planning, organisation and selection of information, as well as linguistic style and final presentation. Students will need to demonstrate proficiency in both formats.
Lecture times: Fri 3rd and 4th period.
DP requirements: 100% attendance and 50% minimum class test average. Pass in Ethics assignment.
Assessment: Projects (37.5%), Class Test (12.5%), Oral Examination (25%), November Examination (25%).

EEE3074W   EMBEDDED SYSTEMS

20 NQF credits at level 7; 48 lectures, 6 practicals, projects.
Convener: Mr A Patel
Course Entry Requirements: CSC2001F, CSC2002S, EEE2039W or equivalent.
Course outline: this course aims to provide an advanced introduction to the design and programming of an embedded system, controlled, for example, by a RISC processor. After the initial embedded coding practice, the tool chains for loading, testing and debugging the code are introduced, followed by more advanced topics of hardware/software interfacing. By the end of the course embedded operating systems are used. The implications of multitasking, realtime operations, safety and maintenance are covered.
Lecture times: Semester 1: Tues and Thurs 6th period. Semester 2: Mon and Thur 3rd period.
DP requirements: Complete all practical assignments, achieve over 40% class mark to write the final examination.

Assessment: Laboratory & Practicals (10%), Projects (20%), June Examination (25%), November Examination (25%), Quizzes (17.5%), Other (2.5%).

EEE3077W   DIGITAL & EMBEDDED SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.
Course outline: EEE3064W and EEE3074W.
Assessment: November examination

EEE3078W   DIGITAL EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.
Course outline: EEE3064W, EEE3074W and EEE4096S.
Assessment: November examination

EEE3079W   EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.
Course outline: EEE3074W and EEE4096S.
Assessment: November examination

EEE3081F   CONTROL ENGINEERING A

For Electrical and Computer Engineering Students only.
10 NQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.
Convener: Professor M Braae
Course Entry Requirements: MAM2084S/F, EEE2035F, EEE2038W, EEE2039W.
Course outline: This course aims to develop an advanced understanding of: Terminology: open and closed loop configurations, block diagrams, dynamic system modelling, transient response, steady state error criterion. System stability: Routh Hurwitz criterion, Root Locus. Frequency response: Nyquist plots, Bode diagrams, Nicholas Charts. Compensation: Lead-lag circuits, minor loops, feed forward and three-term controllers. Sensitivity analysis. Identification techniques.
Lecture times: Mon, Wed, Fri 3rd period.
DP requirements: Completion of course assignments.
Assessment: Year Mark (10%), June Examination (90%).

EEE3082S   CONTROL ENGINEERING B

For Electrical and Computer Engineering Students only.
10 NQF credits at level 7; 24 lectures, tutorials as required, practicals as required, design project.
Convener: Professor M Braae
Course Entry Requirements: EEE3081F (DP).
Course outline: This course aims to develop an advanced understanding of sampled data systems: z-transforms, hold circuits, pulse transfer functions, minimum prototype response controllers, bilinear transformation, frequency response methods. Also included are: state variables, state space models and design methods. Robustness, observability controllability, stability and performance.
Lecture times: Tues and Thurs 5th period.
DP requirements: Completion of course assignments.
Assessment: Year Mark (10%), November Examination (90%).

EEE3083F   COMMUNICATION SYSTEM & NETWORK DESIGN I

12 NQF credits at level 7; 36 lectures, 10 tutorials, 3 practicals.
Convener: Dr O Falowo
Course Entry Requirements: EEE2039W.
Course outline: This course is an advanced introduction to Networks: Internet, protocol, network

edge, core network and access networks, circuit switching and packet switching, LAN topology, physical media, layered architecture, performance, protocol model. Application layer: service, client-server paradigm, network applications: web and http, ftp, email, ssh, DNS, p2p file sharing, socket programming. Transport layer: transport layer services, multiplexing/demultiplexing, Network layer: Introduction, virtual circuit and datagram networks, router, Internet Protocol datagram, fragmentation, IPv4, Physical layer: Digital information, Digital communication system, Sampling, Pulse modulation, Quantization, Pulse code modulation, Bandpass modulation schemes ASK, FSK, PSK, Phase-shift keying and amplitude phase keying in vector representation, Orthogonal frequency shift keying, and QPSK.

Lecture times: Mon, Wed, Fri 1st period.
DP requirements: Completion of laboratory assignments and tutorials, and at least 40% class mark.
Assessment: Tutorials & Laboratories (14%), Class Test (36%), June Examination (50%).

EEE3084W   COMMUNICATION SYSTEM & NETWORK DESIGN

24 NQF credits at level 7; 72 lectures, tutorials and practicals as required.
Convener: Dr O Falowo
Co-requisites/Course Entry Requirements: EEE2039W.
Course outline: Divided into Modules A and B.

Module A (First Semester): Communication system and network design I
12 NQF credits at level 7; 36 lectures; tutorials and practicals as required.
Outline: This module is an advanced introduction to Networks: Internet, protocol, network edge, core network and access networks, circuit switching and packet switching, LAN topology, physical media, layered architecture, performance, protocol model. Application layer: service, client-server paradigm, network applications: web and http, ftp, email, ssh, DNS, p2p file sharing, socket programming. Transport layer: transport layer services, multiplexing/demultiplexing. Network layer: Introduction, virtual circuit and datagram networks, router, Internet Protocol datagram, fragmentation, IPv4, IPv6,Physical layer: Digital information, Digital communication system, Sampling, Pulse modulation, Quantization, Pulse code modulation, Bandpass modulation schemes ASK, FSK, PSK, Phase-shift keying and amplitude phase keying in vector representation, Orthogonal frequency shift keying, and QPSK.
Lecture times: Mon, Wed, Fri 1st period.
DP requirements: Completion of laboratory assignments and tutorials, and at least 40% class mark.
Assessment: Tutorials and Laboratories (14%), Class Test (36%), June Examination (50%).

Module B (Second Semester): Communication system and network design II
12 NQF credits at level 7; 36 lectures; tutorials and practicals as required.
Outline: This module aims to develop an advanced understanding of the Transport layer: UDP, reliable data transfer, TCP, connection management, congestion and congestion control. Network layer : ICPM, IPv6, link-state algorithm, distance vector routing algorithm, routing in internet, broadcast and multicast routing. Data link layer: link layer services, error detection and correction. Multiple access : TDMA, Aloha, CSMA, LAN technologies: IEEE 802 family, MAC, LAN addressing, ARP, Ethernet, Token Rings, hubs and switches, PPP, ATM, MPLS, all IP networks. Physical layer : Information theory and entropy, Channel capacity, source coding, probability of error, Eb/n performance, matched filter detection, ISI and pulse shaping, equalisation, bandpass demodulation / detection schemes with ASK, FSK, PSK, probability or error with bandpass detection, and MSK.
Lecture times: Wed, Thurs, Fri 1st period.
DP requirements: Completion of laboratory assignments and tutorials, and at least 40% class mark.
Assessment: Tutorials and Laboratories (14%), Class Test (36%), November Examination (50%).

EEE3085S COMMUNICATION SYSTEM & NETWORK DESIGN II

12 NQF credits at level 7; 36 lectures, tutorials and practical work as required.

Convener: Dr O Falowo

Telecommunication Stream: This fundamental course in telecommunication is pre-requisite to all 4th year telecommunication courses.

Course Entry Requirements: EEE2039W, EEE3083F.

Course outline: This course aims to develop an advanced understanding of the Transport layer: UDP, reliable data transfer, TCP, connection management, congestion and congestion control. Network layer : ICPM, IPv6, link-state algorithm, distance vector routing algorithm, routing in internet, broadcast and multicast routing. Data link layer: link layer services, error detection and correction. Multiple access : TDMA, Aloha, CSMA, LAN technologies: IEEE 802 family, MAC, LAN addressing, ARP, Ethernet, Token Rings, hubs and switches, PPP, ATM, MPLS, all IP networks. Physical layer : Information theory and entropy, Channel capacity, source coding, probability of error, Eb/n performance, matched filter detection, ISI and pulse shaping, equalisation, bandpass demodulation / detection schemes with ASK, FSK, PSK, probability or error with bandpass detection, and MSK.

Lecture times: Wed, Thurs, Fri 1st period.

DP requirements: Completion of laboratory assignments and tutorials, and at least 40% class mark.

Assessment: Tutorials & Laboratories (14%), Class Test (36%), Written examination (50%).

EEE3086F SIGNALS & SYSTEMS II

12 NQF credits at level 7; 36 lectures, 6 tutorials, 2 practicals.

Convener: Associate Professor A Wilkinson

Course Entry Requirements: EEE2035F, EEE2036S.

Course outline: This course aims to develop and advanced understanding of signals and systems. Topics include: time domain and fourier domain analysis of linear systems. Power spectral density. Propagation of signals through linear systems. Filter concepts. Noise in linear systems. Calculation of signal to noise ratio. Decibel calculations. Amplitude modulation and demodulation. Frequency division multiplexing. Heterodyning (shifting in frequency). Angle Modulation Applications: telecommunications transmitters and receivers; instrumentation. Some examples of non-linear systems will also be discussed; for example the generation of harmonics at the output of a non-linear time-invariant system.

Lecture times: Mon 4th period, Thurs, Fri 5th period.

DP requirements: Submission of all assignments and drill problems, attendance at laboratory sessions.

Assessment: Tutorials and laboratories (10%), Class Test (20%), June Examination (70%).

EEE4001F DIGITAL SIGNAL PROCESSING

20 NQF credits at level 8; 48 lectures, tutorials as required, practicals as required.

Convener: Associate Professor F Nicolls

Course Entry Requirements: EEE3086F or EEE3069W or equivalent.

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; and basics of image processing, radar and sonar signal processing.

Lecture times: Wed 3rd and 4th period, Thurs 4th period, Fri 4th period.

DP requirements: Satisfactory completion of coursework.

Assessment: Project & Assignments (20%), Class Test (20%), June Examination (60%).

EEE4006F   PROFESSIONAL COMMUNICATION STUDIES

For Electrical Engineering, Electrical and Computer Engineering and Mechatronics students.
8 NQF credits at level 8; 24 lectures.
Convener: Associate Professor J English
Course Entry Requirements: EEE3073S.
Co-requisites: EEE4051F.
Course outline: This advanced course in professional communication aims to develop an understanding of: professional writing including business proposals, graphic communication, CVs, posters, readability, and group presentations using PowerPoint, to an audience drawn from industry.
Lecture times: Tues 4th and 5th period.
DP requirements: 100% attendance and 50% minimum class test average.
Assessment: Tutorials & Group Work (6%), Projects (50%), Class Test (4%), Presentation Examination (40%).

EEE4022F/S   FINAL YEAR PROJECT

40 NQF credits at level 8.
Conveners: Associate Professor P Barendse and Dr M Hanif
Course Entry Requirements: All 1st, 2nd, 3rd year core courses and specific, individual, requirements depending on the topic selected. A maximum of 32 credits of coursework can be taken at the same time as the final year project.
Course outline: The final year 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: Satisfactory action plan to meet course outcomes, and progress as assessed by supervisor. Oral Presentation and Open Day Exhibition.
Assessment: Project Report.

EEE4036C/A   ELECTRICAL ENGINEERING DESIGN

8 NQF credits at level 8; 12 lectures, project.
Convener: Professor A Baghai-Wadji
Course Entry Requirements:EEE3083F, EEE3069W or EEE3086F, or EEE3057S.
Course outline: This course aims to synthesis the prior material in the EE, CE and ME degrees, in the context of professional project and design work. Topics include: The design environment - Project, production and manufacturing processes. The pessimistic mind view - worst-case design, tolerances, reliability and statistical yield. Standards and codes. STEEP analysis - social, technical, environmental, economic and political context. EDA and CAD. Design methods - Synthesis of candidate concepts and selection of an optimum concept; development of specifications and user requirements; modelling, simulation, reality checks; design work; qualification and acceptance tests; documentation. Case histories. A Formal Design Methodology - Common features of formal design methodologies. IBM's Rational Unified Process. Phases and iterations - inception, elaboration, construction, transition. Disciplines - business modelling, requirements gathering, analysis and design, implementation, testing, deployment, project management, configuration and change

management, environment. History of Engineering Design and Synthesis (EDS); Conceptual changes in EDS in 1990's and 2000's; Predictive analysis of future development. Students working individually will tackle a design topic, leading to the submission of design projects.

Lecture times: Mon, Wed, Thurs, Fri, 3rd period.

DP requirements: A minimum mark (25%) in the design assignments I and II (combined).

Assessment: Assignment I (25%), Assignment II (25%), Poster preparation and presentation (50%).

EEE4051F   NEW VENTURE PLANNING

8 NQF credits at level 8; 24 lectures.

Convener: Professor E Boje

Course Entry Requirements: EEE2038W, EE2039W or equivalent, EEE3073S, MAM2084S.

Co-requisites: EEE4006F.

Course outline: This advanced course in new venture planning aims to develop an understanding of: the entrepreneurial perspective; developing a new venture; feasibility studies; product concept and description; market assessment; industrial analysis; marketing plans; operations, development plans and management; staffing and labour issues; financial projections; and intellectual property.

Lecture times: Tues 6th period, Wed 7th period.

DP requirements: Pass all individually submitted assignments

Assessment: Individual Assignment (10%), Business Plan (60%). 2 hour exam (30%).

EEE4084F   DIGITAL SYSTEMS

20 NQF credits at level 8; 48 lectures, 2 projects.

Convener: Dr S Winberg

Course Entry Requirements: CSC3021F, EEE3064W or EEE3017W (>70%).

Course outline: This advanced course in digital systems aims to develop an understanding of the design of high performance and special-purpose digital computing systems. Topics include: design and programming of parallel processors, reconfigurable computing, and application-specific parallel processing accelerators with consideration of intellectual property and VLSI aspects of these products. The course is divided into two parts, one part per term. Part 1 covers parallel computing principles and techniques; part 2 involves designing and prototyping application accelerators using Hardware Description Languages (HDLs) and FPGA platform. This course has a significant portion of project-based learning, together with theory delivered in lectures. There are four practicals: Part 1 practicals cover Pthreads, OpenMP and Cloud Computing, and using the Linux kernel with processor emulators. Part 2 has one practical involving the Verilog HDL and familiarizing students with an FPGA platform. There are two projects in this course: Part 1 has a smaller project concerning the design of a special-purpose processor architecture. The Part 2 is a larger project and involves the design and prototyping of an FPGA-based accelerator. The lecture sessions include presentations by lecturers, seminars and workshops during which students learn fundamental theories, brainstorm ideas, and discuss influential and recent publications in the field.

Lecture times: Tues 2nd and 7th period, Thurs 6th and 7th period.

DP requirements: Coursework assessment mark of at least 40%.

Assessment: Tutorials & Laboratories (10%), Projects (20%), Class Test (20%), Other (10%), June Examination (40%).

Website: http://www.rrsg.uct.ac.za/EEE4084F.

EEE4087F   MOBILE BROADBAND NETWORKS

20 NQF credits at level 8; 48 lectures, 6 practicals, 6 tutorials.

Convener: Dr O Falowo

Course Entry Requirements: EEE3055W or EEE3063F; EEE3085S, EE3083F, EEE3084W, EEE3086F or equivalent.

Course outline: This advanced course aims to develop an understanding of mobile broadband

networks and includes selected topics in (1) wireless and fixed access networks (16 lectures), (2) mobile broadband transport and services (16 lectures), and (3) broadband networks (16 lectures).

Wireless and Fixed Access Networks: Wireless network Fundamentals (architecture and components, protocols and standards, cellular concept and cellular system fundamentals, call splitting and sectoring). Wireless Access Technologies (GSM and General Packet Radio Service 2.5G Wireless, 3G Wireless, UMTS and CDMA2000 3.5G and 4G wireless networks. Wireless LAN, Bluetooth Ad hoc networks and Sensor area networks. Heterogeneous wireless networks). Fixed Access Networks, Radio Resource Management, Mobility Management.

Broadband Networks: TCP Traffic Control, Traffic and Congestion control in ATM Networks, Performance Evaluation of Communication Networks, Mathematical Analysis, Computer Simulations and Markov Analysis, Networks on Queues, Traffic Characterisation for Broadband Services, QoS in Packet Networks, Basic Mathematics for Quality of Service, QoS Metrics, IP QoS Functional Requirements, IP Integrated Services and Differentiated Services, QoS in ATM networks; IP Traffic Engineering, Routing and Traffic Engineering with MPLS; Router Architectures and IP Address Lookup Algorithms; Quality of Service Routings; Deploying Quality of Service.

Mobile Broadband Services and Transport: Network Convergence; Network Trends; Evolution and Market Internetworking; Hierarchical TDM networks, Internet, LAN/SOHO and Access Networks, WAN application requirements; QoS; Service Platforms, AAA, VoIP, API (Parlay, JAIN); Next Generation Networks; Multiservice platforms, Soft-switch, Data Plane Technology, multiplexing, routing, MPLS, L2/L3/L4, switching; Control Plane Technology, signalling, Call Set Up and connection control (SS7, H.323, SIP, MGCP); Applications : telephony, packet voice, streaming.

Lecture times: Tues 1st and 3rd period, Thurs 3rd period, Fri 3rd period.

DP requirements: At least 40% class marks in completion of coursework.

Assessment: Tutorials and Laboratory (30%), Class Test (20%), June Examination (50%).

EEE4088F   WIRELESS COMMUNICATION SYSTEMS DESIGN

20 NQF credits at level 8; 48 lectures, practical exercises and tutorials as required, and design projects.

Convener: Associate Professor M Dlodlo

Course Entry Requirements/Co requisites: EEE3055F/W or EEE3063F; EEE3085S or EEE3083F or EEE3084W, EEE3086F or equivalent.

Course outline: Divided into modules A and B.

Module A: Wireless Communication Systems Content.

10 NQF credits at level 8, 24 lectures, practical, tutorials and a mini-design project.

Lecturer: Associate Professor M Dlodlo.

Course outline: This module in wireless communication systems covers topics from digital modulation, highlights; formatting and source coding synchronisation; reducing signal degradation; signals, spectra and noise, communications link analysis, coding and interleaving to mitigate fading effects, main parameters and fading channel models, applications. modulation and coding trade-offs, error performance of communication systems corrupted by noise. Software-defined radio. Cognitive radio, and intelligent communication systems.

Module B: RF and Microwave Wireless Communication Systems.

10 NQF credits at level 8, 24 lectures, practicals, tutorials and laboratory report.

Lecturer: Associate Professor R Geschke

Course outline: This module in RF and microwave wireless communication systems covers topics from microwave and RF components and transmission lines; mobile communication systems, radar systems; noise and distortion in microwave systems; frequency planning, regulatory aspects of spectrum usage; antenna technology, satellite communication systems; global positioning systems

(GPS); and the use of microwave test equipment.
Lecture times: Mon, Wed, Thur, Fri, 5th period
DP requirements: Minimum 40% class marks in completion of coursework.
Assessment: Semester mark (40%), June Examination (60%).

EEE4089F   POWER DISTRIBUTION & TRANSMISSION NETWORKS
20 NQF credits at level 8; 48 lectures, 12 tutorials, 3 practicals, 2 field trips.
Convener: Mrs K Awodele
Course Entry Requirements: EEE3057S.
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, electrification, delivery process and pricing, substations, distributed generation, power system protection, high voltage engineering, and power system reliability and power quality.
Lecture times: Wed 3rd and 4th period, Thurs 4th and Fri 4th period.
DP requirements: Satisfactory completion of coursework and continuous assessment mark of at least 35%.
Assessment: Laboratory Assignments (10%), Project and Site Visits (10%), Class Test (20%), June Examination (60%).

EEE4090F   POWER SYSTEMS ANALYSIS, OPERATION & CONTROL
20 NQF credits at level 8; 48 lectures, 2 practicals, 2 field trips.
Convener: Associate Professor K Folly
Course Entry Requirements: EEE3057S.
Course outline: This course aims to develop an advanced understanding of power systems analysis, operation and control. Topics include: Load flow studies, fault calculation, power system operations, power system stability and control, and grid connections of distributed generator (DG) high voltage DC transmissions systems.
Lecture times: Mon 2nd and 8th period, Tues 1st and 3rd period.
DP requirements: Satisfactory completion of coursework and continuous assessment mark of at least 35%.
Assessment: Projects (16%), Class Test (24%), June Examination (60%).

EEE4093F   PROCESS CONTROL & INSTRUMENTATION
20 NQF credits at level 8; 48 lectures, tutorials and practicals as required, design project.
Convener: Mr M Tsoeu
Course Entry Requirements: EEE3069W or equivalent.
Course outline: This course aims to provide an integrated view of the principles and practice of modern industrial control and its applications. Topics include: measurement of physical variables, industrial transducers, integration of programmable logic controllers (PLCS), supervisory control and data acquisition (SCADA) systems and management information systems (MIS), signal transmission and conditioning, micro controllers, computer interfacing, realtime multitasking in computer control, nonlinear and advanced control methods.
Lecture times: Mon 6th, Wed 6th, Fri 6th and 7th period.
DP requirements: Attendance at all laboratory sessions and class mark of 40% plus.
Assessment: Project (20%), Class Test (10%), June Examination (70%).

EEE4096S   NEURAL, FUZZY & EVOLVING SYSTEMS
8 NQF credits at level 8; 24 lectures, project(s).
Convener: Emeritus Professor J Greene
Course Entry Requirements: All third year core courses.

Course outline: This advanced course aims to develop an understanding of neural, fuzzy and evolving systems. Topics include: an introduction to pattern recognition, machine learning and stochastic optimisation. In addition the course provides practical hands-on introduction to programming in Matlab with additional introductory tutorials for those unfamiliar with Matlab.
Lecture times: Tues and Thurs 6th period.
DP requirements: 80% submission of all assignments, satisfactory completion of hands-on proficiency test.
Assessment: November examination 2 hours.

EEE4099F   ELECTRICAL MACHINES & POWER ELECTRONICS
20 NQF credits at level 8; 48 lectures, 2 labs, 6 tutorials, 1 project
Convener: Associate Professor M A Khan
Course Entry Requirements: EEE3031S or EEE3057S or equivalent.
Course outline: This advanced course aims to develop an understanding of electrical machines and power electronics. Topics include: Switching and conduction losses of power semi-conductor devices. Uncontrolled and controlled naturally commutated/converters. DC to DC converters; buck, boost, CÛK, flyback, and full bridge. Unipolar and bipolar pulse width modulated schemes. Space vector modulation, Half-bridge and full-bridge configurations for single and three phase converters. The analytical models of DC and AC machines are analysed and methods of achieving speed control discussed. The characteristics of each machine under variable speed operation are studied. Modern four-quadrant DC and AC Drive topologies are discussed together with their control objectives and performance. Topics on specialised electrical machines are also presented.
Lecture times: Mon 3rd and 4th period, Thurs and Fri 5th period.
DP requirements: Satisfactory completion of tutorials and laboratory and at least 40% for class mark.
Assessment: Tutorials and Labs (5%), Project (5%), Class Test (30%), June Examination (60%).

EEE4101F   NUCLEAR POWER ENGINEERING
20 NQF credits at level 8; 48 lectures, 4 tutorials, 2 site visits and 3 laboratories.
Convener: Associate Professor M A Khan
Course Entry Requirements: EEE3057S or EEE3044S.
Course outline: Common discipline component (24 lectures)
This advanced course aims to develop an understanding of nuclear power engineering. Topics include: Development of nuclear engineering: atomic models, relativity, x-rays, nuclear reactions Introduction to nuclear engineering: radioactivity, nuclear and neutron physics, radiation protection, fission and fusion reactor concepts. Nuclear fuel cycle: production, handling and use of nuclear fuel and the safe disposal of waste Nuclear reactor theory: introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors, heat extraction, reactor statics and dynamics, shut down and restart. Materials in nuclear engineering: interaction of radiation with matter Radiation protection: theory and practice of radiation dosimetry Reactor engineering and design. Environmental aspects: evaluation of effects of radioactivity added to the environment by human activities Regulatory: reactor operator licensing, nuclear safety, and reactor operations
Electrical engineering component (24 lectures) Nuclear energy: global and national energy requirements, integration of nuclear power with other sources. Nuclear power plant systems: conventional and advanced generation power reactors, coupling of reactor and power plant, nuclear simulators; electrical systems in nuclear engineering: design methodology, problem formulation, criteria, trade-off decisions and design optimization; case studies. Instrumentation: behaviour of various nuclear radiation detectors; design and application of radiation dosimeter systems for personnel monitoring, area radiation monitoring and accident situation, nuclear reactor flux distributions, temperatures and transients. Control systems: measurement and control of fundamental parameters for nuclear plant operation and safety.
Lecture times: Tues, Wed, Thurs, Fri 2nd period.

DP requirements: 30% on CAM and attendance of both visits.

Assessment: Tutorials and Lab (7%), Projects and Report (3%), Class Test (15%), June Examination (75%).

EEE4103F NUCLEAR POWER SOURCES

For Mechanical, Electro-mechanical and Chemical Engineering students only.

12 NQF credits at level 8; 24 lectures, 3 labs and 2 site visits.

Convener: Associate Professor M A Khan

Course Entry Requirements: EEE3044S or 3rd year Chemical Engineering.

Course outline: Module A of EEE4101F

This advanced course aims to develop an understanding of nuclear power sources. Topics include: Development of nuclear engineering: atomic models, relativity, x-rays, nuclear reactions Introduction to nuclear engineering: radioactivity, nuclear and neutron physics, radiation protection, fission and fusion reactor concepts. Nuclear fuel cycle: production, handling and use of nuclear fuel and the safe disposal of waste Nuclear reactor theory: introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors, heat extraction, reactor statics and dynamics, shut down and restart. Materials in nuclear engineering: interaction of radiation with matter Radiation protection: theory and practice of radiation dosimetry Reactor engineering and design. Environmental aspects: evaluation of effects of radioactivity added to the environment by human activities. Regulatory: reactor operator licensing, nuclear safety, and reactor operations.

Lecture times: Tues and Fri 2nd period.

DP requirements: 30% attendance on CAM and both site visits.

Assessment: Tutorials and Labs (7%), Projects (6%), Class Test (15%), Examination (72%).

EEE4104C ELECTRICAL MACHINES & DRIVES

10 NQF credits at level 8; 24 lectures, 3 tutorials, 1 project.

Convener: Associate Professor P Barendse

Course Entry Requirements: EEE3069W, EEE3031S or EEE3057S.

Course outline: This course is an advanced 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.

Lecture times: Mon, Tues, Thurs, Fri 2nd period.

DP requirements: Submission of two tutorials, writing of two class tests and achieve a class mark of at least 40%.

Assessment: Tutorial and Lab (10%), Projects (10%), Class Tests (20%), September Examination (60%).

EEE4105C RF & MICROWAVE DEVICES & CIRCUITS

10 NQF credits at level 8; 24 lectures, 4 tutorials, 1 project.

Convener: Emeritus Professor B J Downing

Course Entry Requirements: All 1st, 2nd and 3rd year core courses in EB009, or EB011 or EB022.

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.

Lecture times: Mon, Tues, Wed, Thurs 5th period.

DP requirements: 30% for year mark.

Assessment: Year mark (30%), September Examination (70%).

EGS1005F   INTRODUCTION TO ENVIRONMENTAL ASSESSMENT & MANAGEMENT

12 NQF credits at level 5; 48 lectures, 8 practicals, 3 field trips.

Convener: TBA

Co-requisites: Any one of CIV4031F, CIV4034F, CIV4040F, CIV4041F.

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.

DP requirements:

Assessment: June examination 2½ hours, 50%.

END0007F   FOUNDATIONS OF ENGINEERING MATHEMATICS

Administered by the ASPECT co-ordinator.

0 NQF credits at level 5. First-year first semester course.

Convener: TBA

Course Entry Requirements:

Course outline: Fundamentals of algebra: inequalities; absolute values, logarithms and exponents; functions and graphs: polynomial, rational, exponential, logarithmic, trigonometric; trigonometry; analytic geometry; an introduction to limits, continuity, and differentiability; an introduction to derivatives and integrals; vector analysis using graphical techniques.

Lecture times: Monday 1st period; Wednesday & Thursday 1st& 2nd periods; Friday 4th& 5th periods.

Workshops: Wednesday 6th - 8th periods.

DP requirements: 40% in class tests and weekly tests.

Assessment: June examination 30%, year mark 70%.

END1008Z   INTRODUCTION TO COMMUNICATION

Administered by the ASPECT coordinator.

8 NQF credits at level 5. First-year semester course.

Convener: E Vicatos

Course Entry Requirements:

Course outline: The course develops content-specific academic literacy skills for engineering students. It concentrates on academic reading, academic writing, listening skills, research skills and oral communication skills. Students are prepared for communication in engineering courses, as well as for the demands of the engineering profession.

Lecture times: Tuesday 3rd & 4th periods or Thursday 1st& 2nd periods.

DP requirements: Completion of assignments.

Assessment: June or November examination 3 hours counts 50%, class assignments count 50%.

END1020F/S   MATHEMATICS 1A FOR ENGINEERS

Administered by the ASPECT coordinator.

18 NQF credits at level 5. First-year single semester course; run in both first and second semester.

Convener: K Nathoo

Course Entry Requirements:

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: 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%.

END1021F/S   MATHEMATICS 1B FOR ENGINEERS

Administered by the ASPECT coordinator.
18 NQF credits at level 5. First-year second semester course.
Convener: K Nathoo
Course Entry Requirements: END1020F/S or MAM1020F/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, Wednesday & Friday 1st& 2ndperiods; Tuesday 3rd or 4th period.
Workshops: Wednesday 6th – 8th periods.
DP requirements: 35% in class record
Assessment: Class record (tests, problem sets) 50%, Final examination 50%.

END1019L   SOCIAL INFRASTRUCTURES: ENGAGING WITH COMMUNITY FOR CHANGE

Located in Professional Communications Studies (PCS) and delivered by CHED.
18 NQF credits at level 5. Winter Term
Convener: Dr J McMillan
Course Entry Requirements: None
Lecture times: Winter term (normally first three weeks of mid-year vacation)
Course outline: This is an elective offering open to students from all departments and faculties, and can contribute to the Complementary Studies B requirement of engineering students. 'Social infrastructures' recognises that development is a socio-technical process, giving rise to particular relationships between households and communities, and materials and technologies, shaped by the institutional and political context. Drawing on this understanding, this course provides for classroom-based learning together with community-engaged learning as a means to engage communities long denied access to aspects of social infrastructures. We focus on engaging the issues of 'service', community and change, in the context of development and social justice. We look particularly at how we, as students and emerging professionals, might engage with and learn from communities in our local context.
DP Requirements: 80% attendance at all sessions
Assessment: Coursework 50%, Final examination 50%.
Enrolment capacity: Entrance is limited to 60 full-time students (50 EBE, 10 other faculties)

FTX2020F   BUSINESS FINANCE

18 NQF credits at level 6.
NOTE: This course is NOT for students intending to major in Finance in the BBusSc degree and is not a substitute for FTX2024S as a course entry requirement for further studies in Finance .
Convener: D Chotee
Course Entry Requirements: A pass in STA1001F/S/H or equivalent, a pass in MAM1010F or equivalent

Co-requisites: ACC1006F Financial Accounting.

Course outline: This course aims to provide students with a broad introduction to financial markets, corporate finance and financial management. 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 entrepreneur with some of the quantitative decision making tools required for a successful business venture.

DP requirements: 40% for classwork, completion of all required assignments and tests, attendance at 80% of the tutorials.

Assessment: Tests and assignments 40%, final examination 60%.

GEO1006S   INTRODUCTION TO MINERALS, ROCKS & STRUCTURE

18 NQF credits at level 5

Convener: Professor C Harris

Course entry requirements: A minimum of 45% in GEO1009F or a pass in EGS1004S or AGE1004H

Course outline: This course introduces students to the Geology major and covers the essentials of the discipline as follows: crystals and minerals; igneous and metamorphic rocks; structural geology; mineral deposits and economic geology; palaeontology.

Lectures: Mon-Fri, 12h00

Practicals: One practical per week, Thursday or Friday, 14h00-17h00.

Fieldwork: Students are required to attend a one-day excursion in the Cape Peninsula and a four-day excursion through the southwestern Cape during the September vacation.

DP requirements: An average of 30% in all marked classwork and tests. Compulsory attendance at one tutorial session per week for all students who fail any class test, until such time as a subsequent test is passed.

Assessment: Class tests count 35%; field reports count 15%; one 2-hour theory examination written in November counts 50%. A subminimum of 40% is required in the theory examination paper.

GEO1008F   INTRODUCTION TO GEOLOGY FOR CIVIL ENGINEERS

12 NQF credits at level 5; 48 lectures, 12 practicals.

Convener: TBA

Course Entry Requirements:

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:

Assessment: June examination 3 hours 60%, year mark 40%.

GEO1009F   INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 NQF credits at level 5; 5 lectures per week, 1 practical per week.

This course is presented jointly by the Departments of Archaeology, Environmental and Geographical Science and Geological Sciences, but administered by Geological Sciences.

Convener: TBA

Course Entry Requirements: Physical Sciences, Life Sciences or Geography at NSC level 5 or AGE1003H. Preference will be given to students registered in the Science Faculty.

Course outline: This course introduces students to the structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; and humans and the environment.

Practicals: One practical per week, Monday or Tuesday or Thursday or Friday, 14h00-17h00.

Fieldwork: Students are required to attend three half day excursions in the Cape Peninsula.

DP requirements: An average of 30% on all marked classwork and tests.

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 examination will be written in November.

HUB2005F   INTRODUCTION TO MEDICAL ENGINEERING

8 NQF credits at level 6; 24 lectures.

Convener: Associate Professor T Douglas

Course Entry Requirements:

Course outline: This course is intended as an introduction to the field of Biomedical Engineering and for students with an interest in applying their engineering skills to the solution of problems in health care. Students are exposed to some basic aspects of human physiology and medical instrumentation, while they receive an overview of health care, biomechanics and medical imaging.

Topics include: an introduction to the human body; overview of health-care technology; the circulation system; the electrical activity of the heart and ECG; biomechanics of the musculoskeletal system; medical imaging physics and applications.

DP requirements:

Assessment: Two class tests 40% (each test worth 20%), June examination 3 hours 60%.

HUB4007F   BIOMECHANICS OF THE MUSCULOSKELETAL SYSTEM

8 NQF credits at level 8; 24 lectures, 4 practical sessions.

Convener: Dr S Sirarasu

Course Entry Requirements: Mathematics 2, Physics 2 or Applied Mathematics 2 or equivalent.

Co-requisites: HUB2022F Anatomy for Biomedical Engineering.

Course outline: This advanced course aims to develop an understanding of the biomechanics of the musculoskeletal system. Topics include: Body segment parameters; joint forces and torques; kinematic and kinetic data collection; computer techniques of data acquisition and analysis; aspects of electromyography; introduction to muscle, joint, and bone force optimisation techniques; rheology of bones, cartilage and collagenous tissues; fracture mechanics; joint lubrication and wear; properties of biomaterials; stress analysis; design of artificial joints; tissue response to implanted materials; implant failure analysis; biomechanics of human gait (walking and running) in health and disease.

DP requirements:

Assessment: Written examination at the end of the first semester. Work during the semester may contribute to the overall mark.

HUB4045F   INTRODUCTION TO MEDICAL IMAGING & IMAGE PROCESSING

12 NQF credits at level 8; 26 lectures, 4 practical sessions.

Conveners: Associate Professors T Douglas and E Meintjes

Course Entry Requirements: Students must be in their fourth year of study.

Course outline: This course provides an introduction to the physics and engineering principles involved in the acquisition and processing of medical images. Topics include: mathematical tools of image processing; computed tomography, ultrasound, and magnetic resonance imaging.

DP requirements:

Assessment: Assignments, written assessment or a final project.

MAM1020F/S   MATHEMATICS 1A FOR ENGINEERS

18 NQF credits at level 5; 5 lectures per week, 1 double-period tutorial per week, offered in each semester.

Conveners: Dr J Frith (MAM1020F) and Dr H Skokos (MAM1020S)

Course Entry Requirements: None

Course outline: This course provides an introduction to differential and integral calculus, and 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.

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/S   MATHEMATICS 1B FOR ENGINEERS

18 NQF credits at level 5; 5 lectures per week, 1 double-period tutorial per week, offered in each semester.

Conveners: Mr T van Heerden (MAM1021S) and TBA (MAM1021F)

Course Entry Requirements: MAM1020F/S.

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.

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%.

MAM1042S   ENGINEERING STATICS

16 NQF credits at level 5; 4 lectures per week, 1 two hour tutorial per week.

Convener: TBA

Course Entry Requirements:

Course outline: This course introduces students to engineering statics. Topics include: review of vectors, position, displacement and force vectors, line of action and transmissibility, addition of forces at a point, normal reaction and friction, equilibrium for a particle, connected particles, limiting equilibrium, free body diagrams. Parallel and non-parallel coplanar forces, moment of a force, couples, principle of moments, addition of a force and a couple, resultant and equilibrium for a rigid body, internal forces, toppling and sliding, two-force and three-force systems, compound systems, trusses. Centre of mass of many particles, centre of mass of extended bodies, composite bodies. Distributed forces, pressure distributions. Moments of inertia for areas and masses, parallel axis theorem.

DP requirements: 35% for class record and high tutorial attendance.

Assessment: November examination 2.5 hours: 67%, year mark: 33%.

MAM2000W, MAM2001H, MAM2002S, MAM2003Z, MAM2004H
MATHEMATICS II, 2001, 2002, 2003, 2004

Modules under these codes may be taken. Refer to the Handbook of the Faculty of Science for

details.

MAM2044F NONLINEAR DYNAMICS

This course is identical to module 2ND of MAM2046W for Science students.
18 NQF credits at level 6; 2½ lectures per week, 1 tutorial per week.
Convener: TBA
Course Entry Requirements: MAM2080W or equivalent.
Course outline: The aim of this course is to introduce a selection of fundamental topics in Applied Mathematics. Topics include: fixed points, bifurcations, phase portraits, conservative and reversible systems. Index theory, Poincaré-Bendixson theorem, Lienard systems, relaxation oscillators. Hopf bifurcations, quasi periodicity and Poincaré maps, applications to oscillating chemical reactions and Josephson junctions. Chaos on a strange attractor, Lorentz map, logistic map, Hénon map, Lyapunov exponents. Fractals.
DP requirements:
Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MAM2050S BOUNDARY-VALUE PROBLEMS

This course is identical to module 2BP of MAM2046W for Science students.
12 NQF credits at level 6, 2½ lectures per week, 1 tutorial per week.
Convener: TBA
Course Entry Requirements: At least 40% in MAM2080W.
Course outline: The aim of this course is to introduce a selection of fundamental topics in Applied Mathematics. Topics include: boundary-value problems. Sturm-Liouville problems. Diffusion, Laplace's and wave equation. Solution by separation of variables. Green's function.
DP requirements:
Assessment: November examination no longer than 2 hours: 70%, year mark: 30%.

MAM2053S NUMERICAL ANALYSIS & SCIENTIFIC COMPUTING

This course is identical to module 2NA of MAM2046W for Science students.
12 NQF credits at level 6; 2½ lectures per week, 1 tutorial per week.
Note: Credit cannot be obtained for both MAM2053S and MAM3080F.
Convener: TBA
Course Entry Requirements: MAM2080W or MAM2083 and MAM2084
Course outline: The aim of this course is to introduce a selection of fundamental topics in Applied Mathematics. Topics include: Solutions to non-linear equations and rates of convergence. Direct and iterative methods for solving linear systems, pivoting strategies, matrix factorization, norms, conditioning. Solutions to initial value problems including higher order ordinary differential equations. Interpolation and approximation theory, splines, discrete and continuous least squares. Numerical differentiation and integration. Error analysis and control.
DP requirements:
Assessment: November examination no longer than 2 hours: 70%, year mark: 30%.

MAM2082F COMPUTER PROGRAMMING IN MATLAB

8 NQF credits at level 6; 1 lecture and 1 tutorial per week.
Convener: TBA
Course Entry Requirements: MAM1003Wor MAM1020F/S and MAM1021F/S.
Course outline: The aim of this course is to introduce basic scientific programming in MATLAB. Topics include: expressions, basic operations, script files, vector and matrix handling, loops, decisions, function files, reading and writing data, basic graphics, strings, basic numerical methods (e.g. applied to systems of linear equations, and roots of nonlinear equations), numerical solution

IVP's (Euler's method & Runge-Kutta methods), numerical solution of BVP's(finite difference methods), further examples of interest to engineers (simulation, chaos, mechanical systems, fluid flow, heat transfer).

DP requirements: 30% Class record and high tutorial attendance.

Assessment: June examination no longer than 2 hours: 60%, year mark: 40%.

MAM2083F/S   VECTOR CALCULUS FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 NQF credits at level 6; 4 lectures per week, 1 double-period tutorial per week.

Convener: TBA

Course Entry Requirements: MAM1003W or 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:

Assessment: One paper written in June or November no longer than 2.5 hours: 60%, year mark: 40%.

MAM2084F/S   LINEAR ALGEBRA & DEs FOR ENGINEERS

This course is designed specifically for students in the Faculty of Engineering & the Built Environment.

16 NQF credits at level 6; 4 lectures per week, 1 double-period tutorial per week.

Convener: TBA

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. Brief introduction to partial differential equations and the method of separation of variables.

DP requirements:

Assessment: One paper written in June or November no longer than 2.5 hours:60%, year mark: 40%.

MAM2085F/S   VECTOR CALCULUS FOR ASPECT

16 NQF credits at level 6; 5 lectures per week, 1 afternoon tutorial, optional additional mini-tutorials

Convener: Dr T Craig

Course Entry Requirements: END1020 (was END1018)

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

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%.

MAM3000W, MAM3001W, MAM3002H, MAM3003S, MAM3004Z
MATHEMATICS III, 3001, 3002, 3003, 3004

Modules under these codes may be taken. Refer to the Handbook of the Faculty of Science for details.

72 NQF credits at level 7, 72 NQF credits at level xxx, 36 NQF credits at level xxx, 36 NQF credits at level 7 and 18 NQF credits at level xxx respectively.

MAM3043S   METHODS OF MATHEMATICAL PHYSICS

This course is identical to module 3MP of MAM3040W for Science students.

18 NQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener: TBA

Course Entry Requirements: MAM2080W or equivalent courses.

Course outline: The aim of this course is to introduce a selection of advanced topics in Applied Mathematics. Topics include: The Fourier-transform solution of linear PDEs on the line. The long-term asymptotic behaviour of solutions: the methods of Laplace, stationary phase and steepest descents. Nonlinear waves: the method of characteristics; the effect of dissipation; the Cole-Hopf transform for the Burgers equation; travelling fronts for the KPP equation. The effect of dispersion: KdV and nonlinear Schroedinger equation. Elliptic integrals and elliptic functions; dark and bright solitons; kinks and breathers for the sine-Gordon equation. Multisoliton solutions: the Hirota method and Baecklund transformations.

DP requirements:

Assessment: November examination no longer than 2 hours: 75%, year mark: 25%.

MAM3049S   INTRODUCTION TO GENERAL RELATIVITY

This course is identical to module 3GR of MAM3040W for Science students.

18 NQF credits at level 7; 2½ lectures per week, 1 tutorial per week.

Convener: TBA

Course Entry Requirements: MAM2080W or equivalent courses.

Course outline: The aim of this course is to introduce a selection of advanced topics in Applied Mathematics. Topics include: Christoffel relations, geodesics, curvature, the Riemann tensor. The energy momentum tensor in electrodynamics and fluid dynamics. Principle of equivalence, Einstein's field equations. Black Holes. Gravitational Waves.

DP requirements:

Assessment: November examination no longer than 3 hours: 75%, year mark: 25%.

MAM3050F   NUMERICAL MODELLING

This course is identical to module 3AN of MAM3040W for Science students.
18 NQF credits at level 7; 2½ lectures per week, 1 tutorial per week.
Convener: TBA
Course Entry Requirements: MAM2080W or equivalent courses.
Course outline: The aim of this course is to introduce a selection of advanced topics in Applied Mathematics. Topics include: Boundary-value problems. Numerical solutions of PDEs by the method of finite differences, finite elements and spectral methods.
DP requirements:
Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MAM3054S   FLUID DYNAMICS

This course is identical to module 3FD of MAM3040W for Science students.
18 NQF credits at level 7; 2½ lectures per week, 1 tutorial per week.
Convener: TBA
Course Entry Requirements: MAM2080W or equivalent courses.
Course outline: The aim of this course is to introduce a selection of advanced topics in Applied Mathematics. Topics include: Description of fluids, equations of fluid flow for simple fluids, analytic techniques. Applications.
DP requirements:
Assessment: November examination no longer than 2 hours: 75%, year mark 25%.

MAM3080F   NUMERICAL METHODS

12 NQF credits at level 7; 3 lectures per week, 1 double tutorial per week.
Convener: TBA
Course Entry Requirements: At least 40% in MAM2080W or equivalent courses.
Course outline: The aim of this course is to introduce a selection of advanced topics in numerical methods. Topics include: Computational issues: finite precision, speed of algorithm, Matlab Polynomial interpolation: Lagrange form, Newton Form, error formulae, splines. Solutions to non-linear equations: bisection method, inverse interpolation, Newton's method in one dimension, error formulae, rates of convergence, Newton's method for systems. Solutions to linear equations: Gaussian elimination, pivoting, LU factorisation, QR factorisation, iterative methods. Numerical differentiation: derivation of finite difference formulae. Numerical integration: derivation of Newton-Cotes formulae, adaptive composite trapezium rule, Gaussian integration. Solutions to systems of explicit first-order ODEs: Euler, modified Euler, Runge-Kutta. Stiffness: stability, backward Euler. Conversion of higher order explicit equations to first-order systems. Solution to PDE BVP on a rectangular domain by finite differences on a regular mesh.
DP requirements:
Assessment: June examination no longer than 2 hours: 65%, year mark: 35%.

MAM3085F   COMPUTING FOR CHEMICAL ENGINEERS

8 NQF credits at level 7; 24 lectures, 10 tutorials
Convener: Dr T Chinyoka
Course Entry Requirements: MAM1020F/S, MAM1021F/S, MAM2084F/S
Co-requisites: CHE3044F, CHE3046F, CHE3063F
Course outline: The aim of this course is to introduce engineering computing applied within the context of the chemical engineering curriculum using the SCILAB computing environment. Topics include: Expressions, basic operations, script files, vector and matrix handling, loops, decisions, function files, reading and writing data, basic graphics, strings, finite precision arithmetic. Developing and using the following techniques to solve chemical engineering problems: linear

equations (LU, QR, SVD), linear leasts squares regression (ATA,QR), systems of first order linear ODEs (similarity transforms and Eigen systems), integration and interpolation (trapezoidal, spline), single and systems of non-linear equations, roots of polynomials (newton methods), systems of non-linear ODEs (stiff, non-stiff), dynamic systems using Laplace transforms (laplace to time conversions)

DP requirements: attendance at all class tests, submission of all assignments, 40% average for class tests and assignments.

Assessment: 6 computer class tests (40%), 2 assignments(10%), computer final examination (50%)

MEC1000X PRACTICAL TRAINING

0 NQF credits at level 5.

Convener: Dr B Kloot and Dr S L George

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 the basic workshop processes during the period of at least six weeks in an approved industrial workshop, either before registration or during the long vacation following the year of first registration in the Faculty. Such evidence must be produced by 31 March of the year following such training. Alternatively students may produce a certificate showing evidence of completion of an approved structured intensive practical training course (e.g. at a Technikon/University of Technology).

Assessment: Submission of a confidential report form to the department from the employer confirming the students exposure to certain processes stipulated by the convener.

MEC1002W ENGINEERING DRAWING

16 NQF credits at level 5; 18 lectures, 20 tutorials, 5 CAD practical sessions, 5 lectures related to the specific EBE discipline. First year course.

Convener: Mrs C Findeis

Course outline: This course aims to develop the knowledge and skills for engineering drawing. Topics include: use of drawing instruments, plane geometry; principles of: orthographic projection; pictorial projection; auxiliary projection ; sections; intersection of solids; development; engineering drawing conventions; dimensioning; the measurement of areas; graphical integration; descriptive geometry of points, lines and planes in space; and provides an introduction to the basics of CAD.

Lecture times: Wed 5th period, Tutorial Thurs 6th -8th period

DP requirements: Completed portfolio.

Assessment: CAD (10%); 3 hour practical drawing examination in November (50%); Portfolio submissions and weekly tests (25%); Discipline Specific Module (15%). A minimum of 50% is required to pass this course. There is no supplementary examination for this course.

MEC1003F ENGINEERING DRAWING

8 NQF credits at level 5; 12 lectures, 12 tutorials, 5 CAD practical sessions.

Convener: Mrs C Findeis

Course outline: This course aims to develop the knowledge and skills for engineering drawing. Topics include: Use of drawing instruments, plane geometry; principles of: orthographic projection; pictorial projection; auxiliary projection; sections; the measurement of areas; descriptive geometry of points, lines and planes in space; and provides an introduction to the basics of CAD.

Lecture times: Thur 5th period, Tutorial Fri 6th -8th period

DP requirements: Completed portfolio

Assessment: 3 Hour practical drawing examination in June (50%); CAD (10%); Discipline Specific Module (20%); weekly portfolio submissions (20%). A minimum of 50% is required to pass this course. There is no supplementary examination for this course.

MEC1005W   INTRODUCTION TO MECHANICAL ENGINEERING

24 NQF credits at level 5; 3 lectures per week, 1 afternoon session every two weeks.

Convener: Associate Professor B Collier-Reed

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; and materials and stresses.

Lecture times: Mon, Wed & Fri 3rd period & Thurs 6th-8th period

DP requirements: Students must write all three class tests. Assignments, project, and report must be submitted for assessment. Attendance and satisfactory performance at all laboratory sessions.

Assessment: Tests (20%), Oral presentation (5%), Project (12%), Technical report (8%), Assignments (25%), 3-hour examination (30%).

MEC1006W MECHANICAL ENGINEERING DRAWING

16 NQF credits at level 5; 24 lectures, 24 tutorials

Convener: Mrs C Findeis

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: Tues 5th period– theory lecture. Wed 6th-8th period- Practical

DP requirements: A student must pass the June test or mastery test with a minimum of 50%, and the second semester CAD test with a minimum of 40%.

Assessment: : June Drawing Test 40%; 1st Sem Drawing portfolio 10%; 2nd Sem CAD Test and Assignments 10% November Exam 40%. An overall mark of 50% is required for successful completion of this course.

MEC2000X   PRACTICAL TRAINING

0 NQF credits at level 6.

Convener: Dr G Vicatos

Course outline: This second opportunity for practical experience for Electro-Mechanical and Mechanical Engineering students, culminates in a certified employers report showing regular time-keeping and evidence of completion of suitable work in mechanical, or electro-mechanical engineering practice for a minimum period of six weeks at the end of the second year. The student engineer is expected to be involved with operation and maintenance of plant, under regular supervision and guidance. The student's report to the department is to be submitted by the end of the week preceding the mid-semester break of the term immediately following the period of employment. Reports of practical training carried out more than 12 months prior to the time of report submission, will not be accepted. Selection of employment and acceptance of the report require approval by the head of department.

Assessment: Students must submit a report to the Head of Department or his / her designee, which shall include a description of the engineering task assigned to the student, the engineering approach taken, and the learning experience of the student.

MEC2020W   DESIGN I

32 NQF credits at level 6; 2 lectures and 2 studio sessions per week. Second year, whole year course.

Convener: Dr R Govender

Course Entry Requirements: MEC1002W, MEC1004W, MEC1000X.

Co-requisites: All second year core courses.

Course outline: This course introduces machine drawing and foundations of graduate level engineering design. Specific knowledge areas are computer assisted machine drawing; the selection of machine elements; machine assembly design; production, fits, surface texture and geometric tolerancing; stresses in components, design for static strength and simple failure theories; and the design process.

Lecture times: : *Sem1*- Tues & Thurs 3rd period / *Sem2*- Tues 4th period, Fri 5th period Tutorial: *Sem1*- Mon & Tues 6th-8th period / *Sem2*- Tues & Fri 6th-8th period.

DP requirements: All design assignments submitted and a sub-minimum of 50% for the class mark.

Assessment: The class mark will be a weighted average of all class test and all formally marked assignments from both semesters. The final mark equals the average of the class mark and the exam mark if the exam mark is equal to or greater than 50%; else the final mark equals the exam mark. A sub-minimum of 50% for the final mark is required.

MEC2022S   THERMOFLUIDS I

16 NQF credits at level 6. Second year, second semester course.

Convener: Mr D Findeis

Course Entry Requirements: None.

Course outline: This course aims to develop an understanding of thermofluids. Topics include: fluids and their properties; basic concepts of thermodynamics; pressure and head; hydrostatics; buoyancy; properties of pure substances; the first law of thermodynamics; closed systems; control volumes; introduction to heat transfer; motion of fluid particles; momentum equation and applications.

Lecture times: Monday, Tuesday, Wednesday, Thursday 2nd period.

Tutorial Time: Friday 2nd period.

Practicals: 3 practicals, by arrangement.

DP requirements: At least 80% submission of pop quizzes, a minimum aggregate of 50% for laboratory reports and 40% for class tests.

Assessment: Pop quizzes count 10%; 3 laboratory reports collectively count 10%; 2 class tests collectively count 10%; the 3 hour November exam counts 70%. A subminimum of 40% is required in each section of the November exam.

MEC2023F   DYNAMICS I

16 NQF credits at level 6; 48 lectures, 12 tutorials. Second year, first semester course.

Convener: Professor R Tait

Course Entry Requirements: MAM1021F/S (or equivalent), MAM1042S, PHY1012F/S, PHY1013F/S.

Course outline: This course aims to develop an understanding of dynamics. Topics include: particle kinematics; coordinate systems; particle kinetics, Newton's laws, work and energy, impulse momentum and impact; rigid body dynamics; plane kinematics and plane kinetics.

Lecture times: Tues, Wed, Thurs, Fri 4th period and Tutorial Tues 6th&7th period

DP requirements: 40% Class test average; Attendance of class & tutorial tests

Assessment: Class tests 30%, tutorial tests 10%, June examination 3 hours 60%.

MEC2023S DYNAMICS I

16 NQF credits at level 6; 48 lectures, 12 tutorials. Second year, second semester course.

Convener: Mr T J Cloete

Course Entry Requirements: MAM1021F/S (or equivalent), MAM1042S, PHY1012F/S, PHY1013F/S.

Course outline: This course aims to develop an understanding of dynamics. Topics include: particle kinematics; coordinate systems; particle kinetics, Newton's laws, work and energy, impulse momentum and impact; rigid body dynamics; plane kinematics, and plane kinetics.

Lecture times: Mon, Wed, Thurs, Fri 4th period. Tutorial: Mon 6th&7th period

DP requirements: 40% Class test average; Attendance of class & tutorial tests.

Assessment: Class tests-30% tutorial tests-10% and November examination 3 hours-60%.

MEC2025F MECHANICS OF SOLIDS I

12 NQF credits at level 6; 36 lectures, 10 tutorials. Second year, first semester course.

Convener: Professor R B Tait

Course Entry Requirements: MAM1042S, MAM1020 (or equivalent) and PHY1012S, or DP for MAM1003W and PHY1010W.

Course outline: This course aims to develop an understanding of the mechanics of solids. Topics include: statically determinate force systems, free body diagrams; Stress-strain relations, elastic constants; statically determinate stress systems, direct stress, shear stress, bending stress, torsional stress; bending moment diagrams, shear force diagrams, deflection of beams; torsion, and struts. Stress and strain transformations, compound stress in 2 dimensions, and Mohr's circle are also covered.

Lecture times: Tuesday, Wednesday, Friday 2nd period, 1 afternoon tutorial.

DP requirements: +35% class record made of class tests, assignments and participation in all class tests, tutorials.

Assessment: Class Tests 25%, Examination 75%, June examination 3 hours.

MEC2026S PROJECT MANAGEMENT

8 NQF credits at level 6; 2 lectures per week, second semester course.

Convener: Dr C Shaw

Course Entry Requirements:3rd Year equivalent course or concession

Course outline: This course aims to develop the understanding that project management can be practiced as a stand-alone professional discipline or as an integral part of the delivery mechanism for engineering services. The course introduces student engineers to the discipline of project management and knowledge of the discipline, to participate meaningfully in project work. Topics include: project management theory, principles, practices, tools and techniques; project life cycles, body of knowledge, initiation, planning, scope management, human resource management, quality, cost management, specifications and standards, procurement, risk management and project safety, and completion and close out.

Lecture times: Monday7thand 8thperiods. Tutorials: Wed or Thurs 6th -8th period.

DP requirements: A weighted average of at least 40% for all marked assignments and the class test.

Assessment: Assignments count 30%; class test counts 20%; theory examination written in November counts 50%.

MEC2042F MATERIALS SCIENCE IN ENGINEERING

12 NQF credits at level 6; 36 lectures, 4 tutorials, 2 assignments.

Convener: Professor R D Knusten

Course Entry Requirements: CEM1008F or CEM1000W.

Course outline: This course is an introduction to the science of engineering materials and the

relationships between structure and properties. Topics include: Testing for strength, hardness, toughness, fatigue and creep. Interpretation of data. Elastic and plastic deformation of solids. Fracture. Visco-elastic and time dependent behaviour. The structure of crystalline, semi-crystalline and amorphous materials. Phase equilibrium diagrams, equilibrium and non-equilibrium structures. Heat treatment. Models of electrical conduction-development of band theory in metals, semi-conductors and insulators. Elements of corrosion science, deterioration and degradation of materials. The principles of reinforcement and design on the properties of composites. The selection of materials; and Case studies.

Lecture times: Tues, Thurs, Fri 4th period. Tutorials: Fri 6th – 8th period.

DP requirements: 35% minimum of class record

Assessment: Class record (30%), June examination 3 hours (70%).

MEC2043F   ELECTRICAL & MECHANICAL MATERIALS

12 NQF credits at level 6; 36 lectures, 6 tutorials.

Convener: Professor R D Knusten

Course Entry Requirements: PHY1010W.

Course outline: This course aims to develop an understanding of electrical and mechanical materials. Topics include: models of electrical conduction - development of band theory in metals, semi-conductors and insulators. Semi-conductors - importance of impurities. Operation of the p-n junction with reference to materials parameters. Utilisation of the band structure of a semi-conductor to produce novel devices. An introduction to engineering materials and the relations of mechanical, electrical and chemical properties to the structure.

Lecture times: Mon 1st period, Tues & Fri 2nd period.

DP requirements: Write 6 out of 10 class tests

Assessment: Class tests, June examination 3 hours.

MEC3000X   PRACTICAL TRAINING

Convener: Dr G Vicatos

Course outline: This third opportunity for practical experience for electro-mechanical and mechanical engineering students, culminates in a certified employers report showing regular time-keeping and evidence of completion of suitable work in mechanical, or electro-mechanical engineering practice, for a minimum period of six weeks at the end of the third year. The student engineer is expected to work on a design project and to apply the knowledge gained in academic study, to the project under reduced supervision (compared to MEC2000X). The student's report to the department is to be submitted by the end of the week preceding the mid-semester break of the term immediately following the period of employment. Reports of practical training carried out more than 12 months prior to the time of report submission will not be accepted. The selection of employment and acceptance of report require approval by head of department or designee.

Assessment: Students must submit a report to the Head of Department or his / her designee, which shall include a description of the engineering task assigned to the student, the engineering approach taken by the student, and the learning experience of the student.

MEC3023F   MECHANICS OF SOLIDS II

12 NQF credits at level 7; 36 lectures, 2 practicals.

Convener: Professor G Nurick

Course Entry Requirements: MEC2025F, MAM2083S, MAM2084S (DP).

Course outline: This course aims to develop a more advanced understanding of the mechanics of solids. Topics include: compound stresses and theories of failure; elastic strain energy; combined loading of shafts and beams; thin and thick cylinders; compound cylinders and shrink fits; elementary plasticity; rotating discs and shafts.

Lecture times: Mon, Wed, Thurs & Fri 5th period.

DP requirements: Satisfactory progress in class tests & laboratory reports
Assessment: Class tests, laboratory reports, June examination 3 hours.

MEC3031S DYNAMICS II

16 NQF credits at level 7; 48 lectures, 2 practicals.
Convener: Professor G Langdon
Course Entry Requirements: MEC2020W, MEC2023F/S, MEC2025F.
Course outline: This course aims to develop a more advanced understanding of dynamics. Topics include: kinematics and efficiency of gears and gear trains; balancing of rotating machines; crank-effort diagrams, balancing of reciprocating machinery; flywheels; vibration including single degree of freedom systems. Natural frequencies and Gyroscopic motion are also covered.
Lecture times: Mon, Wed, Thurs, Fri 2nd period.
DP requirements:
Assessment: Class tests, take home assignment, lab classes, November examination 3 hours.

MEC3033F THERMOFLUIDS II

20 NQF credits at level 7; 60 lectures, 4 laboratory sessions, 1 tutorial per week.
Convener: Dr G Vicatos
Course Entry Requirements: MEC2022S.
Course outline: This course on thermofluids aims to develop a more advanced understanding of different types of flow. Topics include: application of the conservation of mass, momentum and energy in fluid flow. Benoulli's equation and the one-dimensional energy equation. Reaction forces due to fluid flow. Buckingham's π-theorem and the application of dimensional analysis and similarity for reduced experimentation and scaling. The velocity of pressure waves in pipes. Laminar and turbulent flows in pipes, the Moody diagram. The Pelton wheel, venture meter and orifices. Losses in pipes. Thermodynamics: Second Law of Thermodynamics; heat source and sink; thermal efficiency; reversible and irreversible processes; Carnot efficiency; Carnot heat engine; Carnot refrigeration cycle; entropy; isentropic processes; efficiency of compressors; steady flow devices; isothermal; polytropic and isentropic processes; isentropic efficiencies for turbines, compressors, pumps and nozzles; Gas cycles: Otto; Diesel; Stirling; Ericsson; Brayton; jet-propulsion; vapour and combined cycles; rankine; and refrigeration.
Lecture times: Mon to Fri 4th period.
DP requirements: Attendance on all laboratory sessions; obtain minimum average of 50% for the report writing. Participation in all tests and obtaining a minimum average class mark of 40%.
Assessment: Class tests, homework tutorials, laboratory assignments, June examination 2 papers: 3 hours for Thermodynamics and 2 hours for Fluids . A subminimum of 40% required for both exams.

MEC3035F COMPUTER INTEGRATED MANUFACTURE & ROBOTICS

For Electro-Mechanical Engineering students only.
8 NQF credits at level 7; 24 lectures.
Convener: Ms T Booysen
Co-requisite: MAM2082F Computer Programming in Matlab.
Course outline: This course aims to develop an advanced understanding of computer integrated manufacture and robotics. Topics include: computer integrated manufacturing, computer numerical control (CNC) of machine tools; flexible manufacturing systems (FMS); materials handling and robot directed transfer systems; robot kinematics; low cost automation; software control systems; and hardware interfacing.
Lecture times: Monday & Wednesday 2nd period.
Practical: One practical that is an exit level outcome (ELO) for the Electro-mechanical degree. The practical will run in the afternoon for one hour, with a written submission one week later. The date for the practical will be scheduled as per the availability of the class.

Tutorials: Two, non-compulsory, tutorials will be run to assist students with their programming project. The date for the tutorial will be scheduled as per the availability of the class.

DP requirements: 1) Attendance of the practical and submission of the report for the practical. A minimum of 50% for the report and a minimum of "Satisfactory" for the ELO must obtain. 2) Demonstration of the programming project to the external examiner. 3) A minimum of 40% class mark.

Assessment: One 2 hour June examination. This exam is divided into two sections held on the same day. The first hour counting 60% is on the written theory. The second hour is a practical examination and counting 40% of the exam. Class mark is made up of homework and projects. The main programming project counts 20% of the class mark. The final mark 50% class mark, 50% examination mark.

MEC3035S   COMPUTER INTEGRATED MANUFACTURE & ROBOTICS

For Mechatronics students in their third year of study only.

8 NQF credits at level 7; 24 lectures.

Convener: Ms T Booysen

Course Entry Requirements: MAM2082F Computer Programming in Matlab.

Course outline: This course aims to develop an advanced understanding of computer integrated manufacture and robotics. Topics include: computer integrated manufacturing, computer numerical control (CNC) of machine tools; flexible manufacturing systems (FMS); materials handling and robot directed transfer systems; robot kinematics; low cost automation; software control systems; and hardware interfacing.

Lecture times: Monday & Wednesday 4th period.

Practical: One practical will run in the afternoon for one hour. The date for the practical will be scheduled as per the availability of the class.

Tutorials: Two, non-compulsory, tutorials will be run to assist students with their programming project. The date for the tutorial will be scheduled as per the availability of the class.

DP requirements: 1) Attendance of the practical. 2) Demonstration of the programming project to the external examiner. 3) A minimum of 40% class mark.

Assessment: One 2 hour June examination. This exam is divided into two sections held on the same day. The first hour counting 60% is on the written theory. The second hour is a practical examination and counting 40% of the exam. Class mark is made up of homework and projects. The main programming project counts 20% of the class mark. The final mark = 50% class mark + 50% exam mark.

MEC3037S   PROFESSIONAL COMMUNICATION STUDIES

For Electro-Mechanical and Mechanical Engineering students. (Second-year students may not register)

12 NQF credits at level 7; 24 lectures.

Convener: Associate Professor J English

Course Entry Requirements:

Course outline: This course equips students with the skills required for the preparation and writing of technical reports with reference to design reports. It also covers effective delivery of technical material through presentations and visual aids. Students will be assessed in terms of their ability to plan, organise and select information; write and speak in a clear and appropriate style; and present technical information in a highly readable way.

Lecture times: Tues 2nd-4th period.

DP requirements:

Assessment: Class test, 3 hour written examination, presentation examination. (Written examination 25%, Oral examination 25%, projects and class test 50%.).

MEC3044S   THERMOFLUIDS III

12 NQF credits at level 7; 36 lectures, 2 practicals.
Convener: Associate Professor T Bello-Ochende
Course Entry Requirements: MEC3033F (DP).
Course outline: This course aims to develop an advanced understanding of thermofluids. Topics include: Boundary layer theory. Forced and natural convection (laminar and turbulent flow along plates and tubes). Pressure transients in pipes and compressible flow in pipes. Rotodynamics machines and positive displacement machines. Gas power cycles, engine cycles and measures of performance. Properties of gas and vapour mixtures. Air-conditioning. Combustion chemistry, air/fuel ratio and stoichiometry. Fuel sources and composition. Energy of reacting systems, heat of combustion, adiabatic flame temperature; and heat exchangers.
Lecture times: Mon, Wed, Fri 3rd period.
DP requirements: Participation in all laboratory sessions, tests and completion of all homework. A minimum class mark of 40%.
Assessment: November examination, 3 hours. A sub-minimum of 40% required in each module. Final mark = 0.7 x Examination mark + 0.3 x Class mark.

MEC3045F   EXPERIMENTAL METHODS

12 NQF credits at level 7; 36 lectures, practical sessions.
Convener: Dr S L George
Course Entry Requirements: None
Course outline: This course aims to develop an advanced understanding of experimental methods. Topics include: Terminology, standards, data analysis, uncertainty. Dimensional Analysis. Displacement, strain, pressure, flow and temperature measurements. Classical flow visualization techniques using electrical measurement techniques; and non- destructive evaluation techniques.
Lecture times: Mon, Wed, and Fri 2nd period.
DP requirements: Attend all practical sessions and submit, within seven days of the session, if required, a written report; write the class test; pass the final examination; satisfactorily achieve each of the ECSA ELO's associated with the course.
Assessment: Class test 10%; Laboratory/practical reports 20%; Examination 70%.

MEC3050W   DESIGN II

24 NQF credits at level 7; 3rd year, full-year course.
Convener: Associate Professor C J von Klemperer.
Course Entry Requirements: A pass in MEC2020W, and co-registration with all third year core courses. This course is only available to Mechanical and Electro-mechanical engineering students.
Co-requisites: All third year core courses.
Course outline: This course aims to develop an advanced understanding of design in the mechanical and electro-mechanical domain. Topics include: Detailed machine component design and basic machine system design. Specific knowledge areas are static and fatigue failure theories; fracture mechanics; Hertzian stresses; standard machine components such as shafts, gears, hydrodynamic bearings, springs, clutches, brakes and bolts; statistical considerations for design; and includes design projects on the machine level.
Lecture times: 2 lectures a week, venues and times TBA.
Tutorial session: One full afternoon tutorial session per week, Tuesday, 14h00-17h00.
DP requirements: A final class mark $\geq$ 40%, with each class test $\geq$ 30%, and satisfactory completion as outlined in the handouts of all assignments. Attendance at the Tuesday afternoon tutorial sessions and at all class tests is compulsory.
Assessment: The final mark is made up 50% from the Class mark and 50% from the Exam mark. The exam has a Sub-minimum mark of 40%. The class mark is made up 50% from the class tests (all to count) and 50% from the design projects and assignments.

- 3 or 4 class tests will take place during the year. Should a test be missed for medical reasons, students must produce a medical certificate within one week of returning to University. In the event of an excused missed test, students will not write a make-up test, but will be given the class average for the missed test.
- Projects and assignments will be evaluated on the basis of submitted technical reports, calculations and designs and CAD drawings.
- Students will also complete and submit an ECSA ELO statistics assignment. Each student will submit an Excel Spreadsheet with their analysis / results and a mini report detailing their findings and explaining their results.

The final exam is three hours long and takes place in October/November examination period.

MEC3060F MATERIALS UNDER STRESS
8 NQF credits at level 7; 24 lectures, 3 tutorials, 4 practicals.
Convener: Dr S L George
Course Entry Requirements: MEC2042F.
Course outline: This course in materials under stress aims to develop an advanced understanding of Elasticity and the importance of modulus in engineering design. Topics include: The influence of bond strength and crystal structure. Plastic flow in crystals and polycrystals by dislocation movement. Strengthening mechanism in metals and alloys. Annealing and heat treatment procedures. Design for safety, stress concentration and residual stress considerations. Failure in metals. Ductile and brittle fractures. Critical flaw size for crack propagation. Fracture toughness of materials. Stress conditions for fatigue and creep deformation. Fracture mechanics; and failure analysis and failure case studies.
Lecture times: Tues & Thurs 3rd period
DP requirements: 35% minimum for class record (2 class tests). Students must attend both class tests. Practical must be attended, completed and handed in on time and a minimum of 50% must be achieved.
Assessment: Coursework (30%), Examination (70%)

MEC3069S PRODUCTION PROCESSES
8 NQF credits at level 7; 24 lectures, 2 tutorials. Third-year, second-semester course.
Convener: Mr D Findeis
Course Entry Requirements: MEC2042F
Course outline: In this course students are introduced to a range of manufacturing processes. Typically, there are several manufacturing processes available to perform a certain operation. This course equips the students to select a manufacturing process from a number of available processes, based on the machine set-up, process complexity and reliability, lot size as well as the ability to automate a manufacturing process. The course will also highlight the degree of precision machining achievable by the individual manufacturing process.
Lecture times: Monday & Wednesday 5th Period
DP requirements: All assignments must be submitted . An average of 50% or more must be achieved for the assignments and a minimum of 40% must be obtained for the test.
Assessment: Marked homework counts 15%; marked class test counts 25%; one 2-hour theory examination counts 60%. A subminimum of 50% is required for the theory examination.

MEC3070F MECHANICAL BEHAVIOUR OF MATERIALS
Not offered in 2014
12 NQF credits at level 7; 36 lectures, 1 prac/ tutorial. Third-year, first-semester course.
Convener: Dr S George
Course Entry Requirements: MEC2042F
Course outline: This course aims to provide an understanding of the relationships between the

structure of materials and its response to applied stress. This understanding is then used in order to solve problems related to appropriate materials selection for design and in failure analysis case studies. Topics will include: elasticity and the importance of modulus in engineering design; the influence of bond strength and crystal structure, plastic flow in crystals and polycrystals by dislocation movement; strengthening mechanism in metals and alloys; annealing and heat treatment procedures; design for safety, stress concentration and residual stress considerations; failure in metals; ductile and brittle fractures; critical flaw size for crack propagation; fracture toughness of materials; stress conditions for fatigue and creep deformation; fracture mechanics; failure analysis and failure case studies.

Lecture times:

DP requirements:

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

MEC3071S   MEASUREMENT AND CONTROL OF ELECTROMECHANICAL SYSTEMS I

Not offered in 2014

16 NQF credits at level 7; 24 lectures, 12 tutorials/practicals. Third-year, second-semester course.

Convener: TBA

Course Entry Requirements: EEE3062F Digital Electronics

Course outline: This course aims to enable students to take measurements and capture the data of signals from electro-mechanical systems; process these measurements, and understand the control of electro-mechanical systems. The ability of an Electro-Mechanical engineer to take measurements and use these measurements to control an electro-mechanical system is one of the pillars of the degree. This course is the first part of a two part course (MEC3071S and MEC4112F) that will develop the knowledge and introduce the basic techniques for selecting appropriate sensors to take measurements and design and build the supporting electronics to interface with a microcontroller. The microcontrollers will be used for low level control and the interface block between the signal from the electro-mechanical system and the PC performing the high level control along with the data storage.

DP requirements:

Assessment: Coursework (40%), Examination (60%)

MEC4022Z   INDUSTRIAL LAW

8 NQF credits at level

Convener: Dr C Shaw

Course Entry Requirements: None

Course Outline: This course aims to develop an understanding of elements of the law of contract; agency; partnership; companies; patents; and Labour law.

Lecture times: Mon-Thurs, 1st period

Assessment: September examination (2 hours)

MEC4045F   NUMERICAL METHODS IN HEAT & FLUID FLOW

12 NQF credits at level 8; 36 lectures.

Convener: Associate Professor A G Malan

Course Entry Requirements: MEC3033F, MEC3044S and MAM2082F.

Course outline: The course is primarily an introduction to the finite volume method for problems of heat conduction, potential and convection-diffusion type flows. The latter will be extended to the full Navier-Stokes equations in two dimensions. An emphasis is placed on the implementation of the theory covered during the course. The student will be required to write a number of computer programs in a computer language of his/her choice. Topics include: discretisation, interpolation, boundary conditions, solution procedures, and complex geometries.

Lecture times: Mon, Wed & Fri 1st period.
DP requirements:
Assessment: June examination 3 hours.

MEC4047F   MECHANICAL VIBRATIONS

12 NQF credits at level 8; 36 lectures.
Convener: Professor C Redelinghuys
Course Entry Requirements: MEC3031S.
Corequisite: MAM2082F.
Course outline: This course aims to introduce students to the modelling of vibration in machines and structures. This will include single- and multi-degree of freedom models; analytical and numerical solution techniques; and practical applications. Formulation of equations of motion for single- and multi-degrees of freedom by Newton's laws and energy methods; solution techniques for equations of motion via analytical and numerical methods; modal analysis; application of techniques to analysis and design; and continuous systems.
Lecture times: Mon, Wed & Fri 2nd period & Tues 6th-8th period.
Practical: One major practical is run, potentially over multiple sessions.
DP requirements: Attendance at all Laboratory sessions, submission of all Project and Laboratory reports.
Assessment: Laboratory report 5%, Computational Projects 15%, Class Tests 20%, 3-hour written examination 60%.

MEC4053Z   MEASUREMENT & CONTROL IN ENGINEERING SYSTEMS

16 NQF credits at level 8.
Convener: Associate Professor H Mouton
Course Entry Requirements: EEE3062F, EEE3070S, MEC3050W.
Course outline: This course aims to bring together elements of engineering previously covered in electrical and mechanical courses in a way that is as close to what is expected in industrial practice; and to ensure that each student is equipped with the necessary skills to deal with the complexity that this integration brings. Skills include designing and building measurement and control systems using sensors, micro-processors, PCs, PLCs, electric motors, heater elements, etc. Students on this course will have gained the knowledge to: program a micro-processor, use this micro-processor to monitor and obtain information from various kinds of sensors, (for example: temperature, shaft speed, angular position of shafts, torque, power, and strain gauges); output this information and retrieve processed information from a host PC; control speed, torque, and the angular position of the shafts on AC and DC electric motors, and control heaters, valves, and flow rates etc.
Lecture times: Wednesday & Friday, 3rd period.
Tutorial times: Friday, 4th -5th periods.
DP requirements: 1) Attendance of the 80% of the practicals.2)Submission of the reports for the two mandatory practical. 3) Submission of the solution for the two take-home tutorials. 4) A minimum of 40% class mark.
Assessment: Reports for the two mandatory practical. A solution set for the two take-home tutorials. One class test held midway through the term. One 2 hour written examination and one 2 hour practical examination held in June. Class mark is made up of tutorials and practicals and the class test. The final mark = 30% class mark + 70% exam mark.

MEC4063C   INDUSTRIAL ECOLOGY

8 NQF credits at level 8; 18 lectures/seminars.
Convener: Dr H Pearce
Course Entry Requirements: Completion of 3rd Year
Course outline: The discipline of industrial ecology is becoming increasingly important as industry

recognizes the growing need to reduce energy and materials consumption as well as the emission of waste in an attempt to minimize environmental impacts. The course situates industrial ecology within the broader framework of sustainability and deals with matters of broad principle rather than great detail. Issues discussed include: the current state of the environment and the impact industry has on it; industrial metabolism and ecosystem; life cycle assessment; design for environment; and ecological economics.

Lecture times: Mon & Wed 3rd period.

DP requirements:

Assessment: Project, essays, assignments.

MEC4103F   PRODUCT DESIGN

12 NQF credits at level 8, 12 lectures,12 practicals.

Convener: Professor C Redelinghuys

Course Entry Requirements: MEC3050W.

Course outline: This course will facilitate the development of knowledge and skills that will allow candidates to design a conventional mechanical or electro-mechanical device, working individually and in a team. The design is to be performed holistically, duly considering user needs, planning and managing the process, evaluating alternatives, analysing techno-economic performance, and communicating the design solution.

Lecture times: Wed & Fri 3rd period & Thurs 6th-8th period.

DP requirements:

Assessment: Coursework 100%, Examination 0%

MEC4104F   MANUFACTURING & NANOTECHNOLOGY

8 NQF credits at level 8, 24 lectures

Convener: Associate Professor R Kuppuswamy

Course Entry Requirements: None

Course outline: This course will impart scientific knowledge on: material removing processes, additive manufacturing, metrology in manufacturing and micro/nano manufacturing. After completing the course, students will understand the criteria for process selection based on part complexity, lot size, economic considerations and materials.

Lecture times: Tues & Thurs 2nd period.

DP requirements:

Assessment: Coursework 30%, Examination 70%

MEC4105F   FINITE ELEMENT ANALYSIS

12 NQF credits at level 8, 36 lectures, 12 tutorials

Convener: TBA

Course Entry Requirements: MEC3023F

Course outline: This course introduces the formulation and application of the finite element method (FEM) in the context of structural and stress analysis. The content will focus on 2-D formulations, with reference to the conceptual approach to 3-D problems. The aim is to integrate both theory and practice into a coherent whole. To this end, the fundamental theory is addressed in detail and students will be required to implement the finite element method in a spreadsheet macro and/or MATLAB programme. Topics include: Element Stiffness Matrix; Global Stiffness Matrix; Boundary Conditions; Unit Displacement Method; Principle of Minimum Potential Energy; Truss, Beam and Frame Elements in 2D; Interpolation; Constant Strain Triangle, Isoparametric Formulation; Gauss Quadrature; Quadrilateral Elements; Shear Locking.

Lecture times: Mon, Wed, Fri 4th period. Tutorial Mon 6th&7th period.

DP requirements: 40% Class Test average; completion of all tutorial, tests & assignments

Assessment: Coursework 50%, Examination 50%

MEC4106F RESOURCE ENGINEERING

12 NQF credits at level 8, 36 lectures, 12 tutorials
Convener: Associate Professor F-J Kahlen.
Course Entry Requirements: None
Course outline: This course aims to develop an advanced understanding of resource engineering. The competition for, and effective usage of, resources are expected to be primary concerns for engineers in the coming decades. The term "resources" explicitly includes workforce and workforce development, water, energy, minerals and the environment in general. Technical and engineering solutions in product and process development, in maintenance and operations, in entrepreneurship and in the design of business processes, and improving the quality of life for all (Millennium Development Goals) must then bear in mind that resource efficiency will be a distinct competitive advantage towards achieving manufacturing and operational excellence. This presents significant challenges for engineers, entrepreneurs, managers and decision-makers in general at all levels.

This course will introduce resource engineering and connect it to market assessment, venture planning, regulatory and legal compliance, industrial ecology and lean operations. Students in this course will understand that resource engineering is a continuous improvement process that, in order to be successful, must be shared by all stakeholders of an organisation. Although the most prominent examples of such continuous improvement processes are in the manufacturing sector, the concept of resource engineering and the tools and techniques can also be applied in other sectors such as mining, health care or power generation.
Lecture times: Mon, Wed & Fri 1st period.
DP requirements:
Assessment: Coursework 40%, Examination 60%

MEC4107S FUNDAMENTALS OF CONTROL SYSTEMS

8 NQF credits at level 8, 24 lectures, 8 tutorial and computer lab sessions
Convener: Associate Professor H Mouton
Course Entry Requirements: MEC2023F/S, MAM2083F/S, MAM2084F/S
Course outline: This course provides an introduction to basic techniques in control engineering. Topics include mathematical modelling of elementary systems; converting governing linear differential equations by means of the Laplace transform; transfer functions and block diagram algebra; the root-locus technique for transient analysis; frequency response of systems; the effect of introducing proportional and integral control; z - transform for digital control; and Bode plot design of control systems.
Lecture times: Mon & Wed 2nd period & Wed 6th-8th period.
DP requirements: 67% for assigned homework and 40% for class mark
Assessment: Coursework 50%, Examination 50%

MEC4108S SYSTEM DESIGN

12 NQF credits at level 8, 12 lectures, 12 practicals, 75 hours assignments
Convener: Dr W F Fuls
Course Entry Requirements: MEC4103F
Course outline: The objective of this course in system design is 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. 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. The aim of this course is to give the student an appreciation of the effort and methodologies used when developing large and complex systems like power plants, aircraft, vehicles, space stations or even transportation networks.

Lecture times: Mondays 4th period, Tut: Mondays 6th – 8th period.
DP requirements: Attendance of all tutorial sessions, and submission of all assignments
Assessment: There are no exams or tests for this course. There are, however, a number of individual and group assignments, as well as a large final hand-in. The final grade will be based on these hand-ins. Students will be graded on three levels, namely Individual 65%, Group 25%, and Peer Review 10%. Pass will be a combined score of 50% or above, provided a subminimum of 50% is attained for the Peer Review component which indicates meeting the ECSA ELO8 for group work.

MEC4109S   ENGINEERING PROFESSIONALISM
8 NQF credits at level 8, 24 lectures.
Convener: Dr B Kloot
Course Entry Requirements: None
Course outline: This course aims to deal practically with the student engineer's transition to the workplace. The aim is to produce well-rounded mechanical engineers for industry, the consulting field and the design workplace. Topics include: types of engineering employment; professional registration; professional ethics; structure of the profession; health & safety; industrial law; and intellectual property.
Lecture times: Mon & Wed, 5th period.
DP requirements:
Assessment: Coursework 50%, Examination 50%

MEC4110W   FINAL YEAR PROJECT
46 NQF credits at level 8.
Convenors: Associate Professor B I Collier-Reed; Professor G S Langdon
Course Entry Requirements: MEC3050W
Course outline: Each student engineer is required to conduct a project in their final year which is the capstone of all they have learnt so far during the course of their degree. The individual project will require the student to source new information outside of the traditional instruction mode and plan a project such that it solves a challenge from one of the areas comprising mechanical engineering. Students will be required to conduct their project, which will involve problem solving, planning, investigations and data analysis. Students must write a planning and proposal document, perform their project plan and report their results and conclusions in a main project report, a poster and orally. Independent learning, engineering professionalism, planning, communication as well as design/synthesis skills will all be required to successfully complete the course.
Lecture times: TBA.
DP requirements: Submit a proposal/planning report; give an oral presentation; attend a safety demonstration and sign a safety declaration; produce a project poster; attend an oral examination; attend Open Day; satisfactorily achieve each of the ECSA outcomes associated with the course.
Assessment: Proposal/planning report 20%; oral presentation 5%; final report 75%.

MEC4112W   MEASUREMENT AND CONTROL OF ELECTRO-MECHANICAL SYSTEMS II
Not offered in 2014
16 NQF credits at level 8; 24 lectures, 12 tutorials/practicals
Convenor: Associate Professor H Mouton
Course Entry Requirements: MEC3071F Measurement and Control of Electro-mechanical Systems I
Course outline: The ability of an Electro-Mechanical engineer to take measurements and use these measurements to control an Electro-Mechanical system is one of the pillars of the degree. This course is the second part of a two part course (MEC3071S and MEC4112F) that will develop the required knowledge and skills and will further the techniques and skills for selecting appropriate

sensors to take measurements, and design and build the supporting electronics to interface with a microcontroller. To improve the measurements, filtering of sensor data and the design of associated electronics will be introduced. The selection of appropriate actuation methods for (e.g. pneumatic and hydraulic devices, servo- and stepper motors, etc.) and associated electronics will also be introduced along with control techniques for more advanced Electro-Mechanical systems.

Lecture times:

DP requirements: 40% for the class mark. Submission of a take home tutorial and 2 lab report. Attendance of all laboratory sessions. Demonstration of the project in the lab and submission of the project report.

Assessment: Coursework (40%), Examination (60%)

PHI2040S   PHILOSOPHY OF SCIENCE

24 NQF credits at level 6.

Convener: Dr J Ritchie

Course Entry Requirements: At least second year status.

Course outline: The course aims to introduce the students to the epistemological, metaphysical and ethical issues that arise when science is considered from a philosophical perspective. Through the study of philosophers such as Popper, Kuhn and Feyerabend, among others, the following sorts of questions will be discussed: Do scientists employ a special method which sets them apart from non-scientists and gives their claims greater authority? Do electrons, genes and other entities that we can't see or touch really exist? Are scientists inevitably influenced by political and moral agendas or can pure science be value free?

Lecture times:

DP requirements: Regular attendance at lectures and tutorials; completion of all written tests, and submission of all essays and assignments by due dates.

Assessment: Coursework counts 40%; November examination 3 hours 60%.

PHY1012F/S   PHYSICS A FOR ENGINEERS

18 NQF credits at level 5; first-year first or second semester course.

Convener: Mr G Leigh

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, entropy.

Laboratory: One laboratory or tutorial session per week.

Lecture times: Group 1: 1st period every day (F only), Group 2: 2nd period every day (F/S)

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%.

PHY1013F/S   PHYSICS B FOR ENGINEERS

18 NQF credits at level 5; first-year, first or second semester course.

Convener: Mr G Leigh

Course Entry Requirements: PHY1012F/S or PHY1014F/S.

Co-requisite: MAM1020F

Course outline: The course is the second semester 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 diffraction.

Laboratory: One laboratory or tutorial session per week.

Lecture times: Group 1: 1st period every day (S only), Group 2: 2nd period every day (F/S)

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%.

PHY1014F/S   PHYSICS A FOR ASPECT

18 NQF credits at level 5; 60 lectures, 12 workshops, 36 tutorials, 6 practicals. First-year, first or second semester course.

Convener: Mr P le Roux

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, entropy.

Lecture times: 5th period every day. Tutorials Mon, Wed, Fri 4th period.

Workshop: Tuesday, $6^{th}, 7^{th}$ and 8th periods.

Laboratory: One laboratory session per week, Fridays 14h00 – 17h00.

DP requirements: An average of at least 40% on 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 theory examination paper.

PHY1015F/S   PHYSICS B FOR ASPECT

18 NQF credits at level 5; 60 lectures, 12 workshops, 36 tutorials, 6 practicals. First-year second semester course.

Convener: Mr P le Roux

Course Entry Requirements: PHY1014F/S or PHY1012F/S.

Course outline: The course is the second semester 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 diffraction.

Lecture times: 5th period every day. Tutorials Mon, Wed, Fri 4th period.

Workshop: Tuesday, $6^{th}, 7^{th}$ and 8th periods.

Laboratory: One laboratory session per week, Fridays 14h00 – 17h00.

DP requirements: An average of at least 40% on 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 theory examination paper.

PHY1031F   GENERAL PHYSICS A

18 NQF credits at level 5.

Convener: Dr S M Wheaton

Course Entry Requirements: Students will be expected to have passed Physical Science at NSC level 5.

Course outline: This course is an algebra-based introductory course for students who do not intend proceeding to second-year courses in Physics. Some calculus may be used. Topics include:
MECHANICS: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, static equilibrium, gravitation. Properties of matter: elasticity, elastic moduli, hydrostatics, hydrodynamics. Vibrations and Waves: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Dopper effect, interference, diffraction.

Lecture times: Monday to Friday, 3rd period.

Practicals: One practical or tutorial per week, Monday, Wednesday, Thursday or Friday, 14h00-17h00.

DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY1032F/S   GENERAL PHYSICS B

18 NQF credits at level 5.

Convener: Dr SW Peterson

Course Entry Requirements: PHY1031F, or PHY1023H.

Course outline: This course is an algebra-based introductory course for students who do not intend proceeding to second-year courses in Physics. Some calculus may be used. Topics include:
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, and alternating currents. Thermal Physics:

temperature, heat, kinetic theory of gases, thermodynamics. Optics: geometrical optics, polarization, electromagnetic waves. Modern Physics: the electron, quantum physical phenomena, atomic structure, wave-particle duality, X-rays, elementary nuclear physics, and radioactivity.

Lecture times: Monday to Friday, 3rd period.

Practicals: One practical or tutorial per week, Monday, Wednesday, Thursday or Friday, 14h00-17h00.

DP requirements: Minimum of 40% in class record including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 3-hour written examination counts 50%.

PHY2010S   ELECTROMAGNETISM FOR ENGINEERS

16 NQF credits at level 6; 6 practicals, 36 lectures.

Course Entry Requirements: PHY1012F/S and PHY1013F/S; or PHY1014F/S and PHY1015F/S. MAM2083F/S.

Co-requisites: MAM2084F/S.

Convener: Dr I Govender

Course outline: This course aims to develop an understanding of electromagnetism in an

engineering context. Topics include: 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.

Lecture times: Mon, Wed, Fri 2nd period.

DP requirements: Minimum of 40% in class record; completion of all laboratory reports, 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%.

SOC2033F/S DIVERSITY LITERACY

24 NQF credits at level 6; 36 lectures, 24 tutorials.

Convener: TBA

Course Entry Requirements: Students should be in their second year of study.

Course outline: This course will prepare students to engage critically with local and international contexts characterised by the increasing diversity of our globalising world. Drawing on a variety of academic, public and popular texts, students will reflect on the operations of power on and within different identity positions, such as "race" gender, sexuality, and (dis)ability, that have a significant impact on people's life opportunities. A combination of experiential reflection and engagement with contemporary social justice theory will enhance capacity to engage thoughtfully and ethically in contemporary professional and social environments.

DP requirements: Attendance is required. Students must submit both individual essays and participate in group work in order to achieve the DP requirement.

Assessment: Coursework 50%; examination 50%.

STA1000F/S STATISTICS 1000

18 NQF credits at level 5; 60 lectures

Note: This course is not a substitute for EEE2036S

Identical first year half courses offered in first and second semesters. Owing to the mathematics Course Entry Requirements, first year students must register for STA1000S in the second semester or MAM1006H.

Convener: Dr L Scott

Course Entry Requirements: STA1000F: A pass in any of MAM1004F/H or MAM1005H or MAM1000W or MAM1010F/S or MAM0102W/X or MAM1003W or MAM1017F/S or MAM1018F/S or MAM1020 or MAM1021 or STA1001F/S.

STA1000S: A pass in any of MAM1004F/H or MAM1005H or MAM1006H or MAM0102W/X or or MAM1017F/S or STA1001F or MAM1010F/S or decanted MAM1005H students.

Co-requisites: In addition students will be admitted to STA1000S if they are currently registered for MAM1000W or MAM1003Wor MAM1012S or MAM1018S or have a supplementary examination for STA1001F or MAM1004F in the same year.

Course outline: This introductory course aims to develop an understanding of statistics. Topics include: Explanatory data analysis and summary statistics. Probability theory. Random variables. Probability mass and density function. Binomial, Poisson, exponential, normal and uniform distributions. Sampling distributions. Confidence intervals. Introduction to hypothesis testing. Tests on means, variances and proportions. Determining sample size. Simple linear regression and measures of correlation.

DP requirements:

Assessment: June/November examination 3 hours.

STA1001F STATISTICS 1001

18 NQF credits at level 5; 60 lectures.

Note: No student will be permitted simultaneous credit any equivalent or subsuming first year

Mathematics course.

Convener: TBA

Course Entry Requirements: A pass in matriculation Mathematics with at least 50% on HG or a C-symbol on SG, or 5 (NSC) in Mathematics, or MAM1014F and MAM1015S. For foreign students a pass at A-level or a C-symbol at O-level is required.

Course outline: This introductory course aims to develop an understanding of statistics. Topics include: The Mathematics of Finance. Functions and graphs; straight lines, polynomials, exponential and logarithmic functions. Matrix algebra and linear programming. Counting rules and Binomial Theorem. Differential calculus. Integral calculus. Emphasis will be placed on areas of interest to Business Science students, including applications to Economics.

DP requirements:

Assessment: June/November examination 3 hours.

STA1008S   STATISTICS FOR ENGINEERS

12 NQF credits at level 5; 36 lectures, 12 tutorials, 2 practicals.

Convener: Dr J Stray

Course Entry Requirements: MAM1020F (or equivalent)

Co-requisites: CHE1005W or CIV1005W or EEE1005W 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: Attendance at all tutorials and satisfactory performance in all tutorials. Attendance at and satisfactory performance in all practicals. The tutorials are formative in nature and do not count towards the final marks; the practicals are also formative, but they do count towards the final marks

Assessment: Coursework 40%, examination 60%.

STA2020F   BUSINESS STATISTICS

24 NQF credits at level 6; 48 lectures, 12 tutorials.

Convener: TBA

Course Entry Requirements: (MAM1000W or MAM1002W or MAM1004F/H or MAM1005H or MAM1006H or MAM1010 or MAM1012 or MAM1017F/S or MAM1018F/S or STA1001F) and (STA1000F/S or STA1006S or STA1007S).

Course outline: This course aims to develop an understanding of analysis of variance (ANOVA) and experimental design; revision and extension of simple linear regression; multiple regression; econometric models; time series analysis; non-parametric statistics; and index numbers.

DP requirements:

Assessment: Class record 30%, June/November examination 3 hours 70%.

Scholarships, Prizes, Class Medals and Dean's Merit List

Scholarships/Awards

Details of scholarships and awards available are given in the Financial Assistance for Postgraduate Studies and Financial Assistance for Undergraduate Studies Handbooks available from the Registrar. The following is a selected list of scholarships and awards. Note that the scholarships on offer and the values are subject to change without notice.

Architecture, Planning and Geomatics

Architecture and Planning

Hugh and Win Walker Scholarships: Awarded with preference for degrees in Architecture and, thereafter, Planning undertaken at UCT. Applications to the Postgraduate Scholarships Office/Undergraduate Funding Office.

National Development Fund for the Building Industry Postgraduate Scholarship: Applications to the Director, National Development fund for the Building Industry, Box 1619, Halfway House, 1685, by 2 January.

Geomatics

Twamley Undergraduate Scholarship : Awarded on the basis of the most outstanding academic performance at the end of the First Year of study, provided that the nominee shall have met the requirements for inclusion in the Dean's Merit List.

Twamley Postgraduate Scholarship : Awarded on the recommendation of the Chair of Surveying on the basis of academic achievement and other appropriate experience for postgraduate study in Geomatics.

Construction Economics and Management

Association of Construction Project Management (ACPM) Scholarship: R2500 for a South African holder of UCT's Department of Construction Economics & Management's BSc Hons in Quantity Surveying or BSc Hons in Construction Management degree at UCT who meets the entrance requirements for the MSc(Project Management) programme and has financial need. Applications to the Admin Officer, Need-based Bursaries, Post-graduate Funding Office, Otto Beit building, Upper Campus, UCT. ACPM must be kept appropriately informed. (This is not a prize but an award to a worthy student in need on financial aid and must, therefore, be administered by UCT's Funding Office.)

Construction Education Sector Training Authority (CETA) Bursaries: Awarded to students entering full-time postgraduate studies. Applications to be submitted by 31 August to CETA, PO Box 644, Bedfordview 2008.

National Research Foundation: Awarded on merit for Honours, full/part-time Master's and Doctoral Study. Applications to be submitted to the Postgraduate Scholarships Office by 15 August for Honours and 31 December for Master's study and 30 April for Doctoral study.

National Research Foundation: NRF Prestigious Awards: Awarded on merit for full-time registered Master's or Doctoral Studies. Applications to be submitted by 30 June (internal) or 31 July (agency).
NRF Grantholder Bursaries: Applications to be submitted by 28 February (internal) or 31 March (agency).

Tobie Louw Bursary - BSc(Hons)(QS) Students: Awarded for Postgraduate study in Quantity

Surveying. Applications to be submitted to the Prizes and Awards Committee, Association of South African Quantity Surveyors, PO Box 3527, Halfway House, 1685 by, 31 January

Quantity Surveyor's Research Award - BSc(Hons)(QS) Students: Prestige award for research work into technical and managerial problems in the building industry. Applications to be submitted to the Prizes and Awards Committee, Association of South African Quantity Surveyors, PO Box 3527, Halfway House, 1685, by 15 June.

Queen Elizabeth II Jubilee Fund Scholarship: Awarded to Bachelor's and taught Master's students who are members of the CIOB. Applications to be submitted to the Scholarship Secretary, Professional and Technical Directorate, CIOB, Englemere, Kings Ride, Ascot, Berkshire, SL5 7TB, England.

Engineering

General

Klaus-Jurgen Bathé Scholarships : Awarded to students in the final 2 years of study who show evidence of high intellectual power and commitment to the achievement of excellence in the field of Engineering.

Council Postgraduate Scholarship) : Awarded on the results of the examinations for the degree of BSc(Eng) or BSc(Geomatics), based on honours points. Candidates should have obtained First Class Honours and intend to continue with the study of engineering or geomatics.

E D Steytler Memorial Scholarship (Undergraduate) : Awarded to the student obtaining the highest weighted average in the First Year examinations.

Twamley Undergraduate Scholarship : Awarded on the basis of the most outstanding academic performance at the end of the First Year of study.

Civil Engineering

Christopher Robertson Scholarship (Undergraduate) : Awarded to the student in Civil Engineering who has made the most progress in the Third Year of studies. (Where there is a choice between candidates of equal merit, preference is for those with fewer scholarships and to whom the value of the award would be advantageous).

Ninham Shand Scholarship (Postgraduate) : Awarded on examination results for the BSc(Eng) Civil degree. The candidate should have obtained Honours and intend to undertake further study.

Chris van Breda Scholarship (Postgraduate) : Awarded on final examination results for the BSc(Eng) Civil degree. The candidate should have obtained Honours and intend to undertake further study.

Mechanical Engineering

Duncan McMillan Scholarship (Undergraduate) : Awarded annually to the First Year Mechanical Engineering student gaining the highest weighted average, subject to the holder maintaining satisfactory progress and conduct.

Class Medals

Architecture, Planning and Geomatics

Class medals may be awarded to students who have shown special ability in the course. They are only awarded where special merit should be recognised. Only one medal may be awarded in a course. Any student who repeats a course will be ineligible for a medal in that course. Class medals

may be awarded in the following courses:

APG1016F   Geomatics
APG2039W   Design and Theory Studio II
APG3037W   Design and Theory Studio III

Construction Economics and Management and Engineering

Class medals may be awarded to the best students in each of the following first year core courses: CHE1005W, CIV1004W, CON1004W, CON1011F, CON1012S, CON1018W, CON1019F/S, EEE1004W, MEC1002W and MEC1004W.

Class medals are also awarded to each of the second, third and (where applicable) fourth years of study to students with the best weighted average in core, core-elective, elective and optional courses in the following programmes:

> Chemical Engineering
> Civil Engineering
> Construction Management
> Construction Studies
> Electrical Engineering
> Electrical and Computer Engineering
> Electro-Mechanical Engineering
> Geomatics
> Materials Science
> Mechanical Engineering
> Mechatronics
> Property Studies
> Quantity Surveying

Prizes

The following prizes may be awarded at the discretion of the Faculty. The prize offerings and values are subject to change without notice.

General

David Haddon Prize: R300 for the purchase of books for the best Architecture or Quantity Surveying student in the subject Professional Practice (APG4044S or CON4034W).

Joseph Arenow Prizes: (two x R1000) (i) for the best Master's dissertation in the Faculty of Engineering & the Built Environment (ii) for the best PhD thesis in the Faculty of Engineering & the Built Environment.

Architecture, Planning and Geomatics

Aluminium Federation of South Africa Award: R1000 for the best project in the final year of BAS or BAS(Hons)entailing the use of aluminium.

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

South African Association of Consulting Professional Planners (SAACPP) Prize: R2000 and certificate for the best dissertation in the MCRP programme.

Barry Heyman Prize: R5000 for the first year MArch(Prof) student who shows the greatest progress in Architectural Design in the MArch(Prof) programme.

Bruce Burmeister Architects Prize: R500 for the Best Student in the Technology 2 course.

Bruce Burmeister Architects Prize: R500 for the Most Improved Student in Technology 2.

Cape Institute for Architecture Measured Drawing Prize: R500 for Measured Drawings of old works in the Cape Province.

Cape Institute for Architecture Prize: R750 for the best student graduating in the MArch(Prof) programme.

Cape Institute for Architecture Prize: R750 for the best student in Design and Theory Studio II.

Cape Institute for Architecture: R750 for the best student in Design and Theory Studio III.

Cement and Concrete Institute Prize: Book and R1000 voucher for the best use of concrete in final year design in the BAS programme.

Cement and Concrete Institute Prize: Book and R1000 voucher for the best use of concrete in final year design in the MArch(Prof) programmes.

Clay Brick Association Prize: R250 for the purchase of books to the student of Architecture who has made best use of bricks in his or her design work.

Corobrik Prize: R500 for the best project entailing the innovative use of clay bricks from work done in 2nd year.

Corobrik Prize: R500 for the best project entailing the innovative use of clay bricks from work done in 3rd year.

CNdV Africa Prize: R500 for the Best Student in Landscape Construction in the second year of the Master of Landscape Architecture.

CNdV Africa Prize: R500 for the Best Student in History and Theory of Landscape Architecture across first and second year in the Master of Landscape Architecture.

Essay Prize: R50 awarded to the BAS(Hons) student who produces the best essay.

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

Gibbs St Pol Landscape Architects Prize: R1000 and a certificate awarded to a BAS student for the finest BAS Major Project exploring Landscape Architecture.

Helen Gardner Travel Prize: R10 000 awarded by UCT to a student who has completed the third year of the BAS degree but who has not yet been admitted to the BAS(Hons) degree. Applications to the Director, School of Architecture and Planning.

Holm Jordaan Architects & Urban Designers: R500 gift voucher for a Project of Merit that deals with sustainability and/or environmental issues in BAS.

Holm Jordaan Architects & Urban Designers: R500 gift voucher for a Project of Merit that deals with sustainability and/or environmental issues in BAS(Hons).

Institute of Landscape Architects of South Africa Prize: R300 book prize for the best Landscape

Design Studio Portfolio in the first year of the Master of Landscape Architecture Programme

Institute of Landscape Architects of South Africa Prize: R500 and certificate for the best student in the second year in the Master of Landscape Architecture Programme.
Institute of Landscape Architects of South Africa Prize: R300 book prize for the best Landscape Architecture dissertation in the second year of the Master of Landscape Architecture Programme.

Ivor Prinsloo Prize: R450 for the best essay in Architectural Theory in the BAS(Hons) programme.

Ivor West Memorial Prize: R500 for the best second or third year Geomatics student.

John Perry Prize: R400 for the best work done in the third year of study of the BAS degree.

Molly Gohl Memorial Prize: R750 for books or instruments to the best woman student completing the third year of study of the BAS degree.

New World Associates Prize: R300 voucher for the student with the Best Use of Landscape Design in the first year of the Master of Landscape Architecture.

OVP Associates Prize: R500 book voucher and certificate for the best student in first year in the Master of Landscape Architecture programme.

Reuben Stubbs Award: A certificate for any project exhibiting an expression of structural integrity, economy of materials, and considered a worthwhile contribution to the integration of Structure and Design.

South African Geomatics Institute (WC) prize: for the best final year student in cadastral surveying, land tenure and town planning.

South African Institute of Architects prize: R500 for the best MArch Professional Student.

SACAP (South African Council for the Architectural Profession): Medal for the best Architecture student: for work done over six years.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best first year student in the MCRP and MCPUD programmes.

South African Planning Institute (Western Cape) Prize: R1000 and certificate for the best overall student work in 2nd year MCRP and MCPUD programmes.

South African Planning Institute Prize: R1000 and certificate for the most improved student over the 2 year MCRP & MCPUD curricula.

Urban Design Institute of South Africa (Western Cape) Prize: R1000 awarded to the top student in first year subject to a minimum achievement of passing with distinction.

Urban Design Institute of South Africa (Western Cape) Prize: R1000 awarded to the top student in second year subject to a minimum achievement of passing with distinction.

Construction Economics and Management
The African Challenge Book Prize: R2000 for the best Graduating Student in BSc (Hons)(QS) - to be assessed over the four years of the programme.

Association of Project Management Book Prize: R2500 for the best overall student in the first year of the MSc(Project Management) programme based on the grade point average after one year of registration on a full curriculum load of four modules.

Association of South African Quantity Surveyors Gold Medal: The Faculty nominates a candidate for this national award for the best quantity surveying graduate at any accredited South African university offering a degree in quantity surveying. Awards are not necessarily made each year.
Association of South African Quantity Surveyors Prizes: R800, R1000, R1200 and R1500 for the best student in each year of study, respectively, for the BSc(Construction Studies) and the BSc(Hons) in Quantity Surveying.

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

Bell-John Prize: R1500 for the best all-round student registered for BSc(Construction Studies) or BSc(Hons) in Quantity Surveying in any year of study.

Bernard James and Partners Prize: R1000 for the BSc(Hons) in Quantity Surveying student (or team) obtaining the highest award (Minimum First Class Pass) in Research Project (CON4047W).

The Chartered Institute of Building (CIOB) Prize: R1000 for the final year BSc(Hons) Construction Management student who has achieved the highest average overall mark.

The Chartered Institute of Building (CIOB) Book Prize: R2000 for MSc Project Management student who has achieved the highest average overall mark.

Clay Brick Association Prizes: Two of R2000 and R1500 respectively for the best and second best students collectively in the subjects of Construction Technology 1, 2, 3 (CON1004W, CON2006W, CON3012W).

DVPM Prize: R1500 academic book voucher for the best overall student in the second year of study while registered on a full curriculum load who has completed all the coursework requirements for the degree of MSc Project Management.

George Strachan Prize: R200 for the best final year student in the BSc(Hons) in Construction Management.

Grinaker-LTA Book Prizes: R1000 for the best student registered for the BSc(Hons) in Construction Management (CON4031F, CON4038F, CON4039S and CON4040S) (Minimum First Class Pass); R1000 for the best student registered for the BSc(Hons) in Quantity Surveying in the subject of Measurement and Design Appraisal III (CON4032F and CON4037S) (Minimum First Class Pass).

Master Builders Association of the Western Cape Prize (for South African Students): R750 plus shield for the best BSc(Construction Studies) in the third year of study; R750 for the best BSc(Construction Studies) in the second year of study; R750 for the best BSc(Hons) student in Construction Management.

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

PMSA(WC) Prize: R4500 academic book voucher for the dissertation in MSc(Project Management) which, in the opinion of a select committee of PMSA (WC), is highly relevant to the project management profession. The award includes an invitation to an event hosted by PMSA (WC) at which the recipient will be given the opportunity to present the findings of his/her research to leading stakeholders in the industry to which it applies. The decision of the award will be made in the sole discretion of PMSA (WC) based on an assessment from a pool of 3 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 65% having been achieved each year. In the event of a tie, the student with the higher average for the Property Valuation courses within the two year period should be selected.

Mbata, Walters and Simpson Prize: R400 for the best all round student in third year of study for the BSc(Construction Studies) degree.

Engineering

General

ECSA Medal of Merit: for the best student graduating with the degree of BSc(Eng).

ESKOM Award (R500) and entry into the ESKOM National Awards Competition: for the best Engineering BSc(Eng) graduate over the 4-year degree curriculum.

George Menzies Prize: R500 awarded on the results of the final examination to the best student in either Geomatics or Civil Engineering.

John Martin Prize: R1500 for the best first year student in the ASPECT Programme.

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

Chemical Engineering

4th Year Book Prize for South African Institute for Mineral & Metalurgy: (Textbook) for best student in Mineral Processing for CHE4050

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

Gerda van Rosmalen Award: (Book Prize) for the most promising CHE3066 Chemical Engineering student.

Malan Chemical Engineering Medals: for the best students in each of the Second (bronze), Third (silver) and Final (gold) Years.

Malan Prize: (Perry's Chemical Engineering Handbook) for the most promising First Year student.

Omnia Prize: R2000 for the student pair completing the final year project (CHE4045Z) of the highest standard.

SA Institution of Chemical Engineers' Silver Medal: for outstanding performance in project and practical courses.

Civil Engineering

Arcus Gibb Prize for Transportation Engineering: R2000 student showing the most promise in the field of transportation and traffic engineering.

Concrete Society of SA (WP Branch) Award: R1000 a book and one year's membership of the Concrete Society of Southern Africa for outstanding work in the area of concrete technology.

D C Robertson Memorial Prize (donated by the Western Cape Branch of the South African Institution of Civil Engineering): R1000 for the student submitting the work in the final year design project.

P D Naidoo & Associates Prize: R3500 (to be shared by members of the winnin team) for the design team that delivers the best design project in the final year design project.

George Menzies Prize: R500 for the best results for final examinations in Civil Engineering.

Paterson & Cooke Prize: R2000 for the best work in final year thesis.

Jeffares & Green Award: R1000 for the Fourth Year Civil Engineering student with the highest overall achievement in professional communication.

Joint Structural Division of SAICE & IStructE Prize: R2000, for the final year student with the best overall academic achievement in the field of structural engineering.

Arcus Gibb Prize: R2000, for the student with the greatest all-round contribution to the undergraduate program.

The Aurecon Prize for Water Engineering: R1000 to the student achieving highest aggregate score in Water Engineering courses (CIV2040S, CIV3043F, CIV3044F, CIV3047S, CIV4042F).

PPC Cement Prize: R1500 voucher and a book for the best undergraduate project or dissertation on concrete technology.

Prestedge, Retief, Dresner & Wijnberg Prize: R2000 for the best Water Engineering final year thesis.

SA Institute of Steel Construction Prize: R1250 for the best structural steel design project or dissertation submitted by an undergraduate student.

Aurecon Best overall Achievement Prizes: R2500, R1500, R1000 for the three best performing students.

UWP Prize: R1500 for the student with the best result for the Urban Water Services course (CIV3047S).
Prof Derrick Sparks Geotechnical Engineering Prize (donated by the South African Institution of Civil Engineering, Western Cape Branch): R1000 for the best final year thesis in Geotechnical Engineering.

Departmental Best Thesis Poster Prize: R500
Departmental Best Thesis Talk Prize: R500

Electrical Engineering

Peralex Electronics prize: R1000 for the best student in EEE3017W.
Peralex Electronics prize: R1000 for the best student in EEE4001F.
Peralex Electronics prize: R1000 for the best student in EEE4084F.
Siemens Prize: R2500 for the final year Electrical Engineering student submitting the best thesis (EEE4022S/F).

Mechanical Engineering/Electro-Mechanical Engineering

AAT Composites Award: (R1000) for best project for MEC4110W Research Project involving use or application of composite materials.

Albert Wessels Prize for Best First Year Student in the Department of Mechanical Engineering:R5000 plus a certificate for the first year student with the highest grade point average.

Albert Wessels Prize for Best Second Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the second year student with the highest grade point average.

Albert Wessels Prize for Best Third Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the third year student with the highest grade point average.

Albert Wessels Prize for Best Fourth Year Student in the Department of Mechanical Engineering: R5000 plus a certificate for the fourth year student with the highest grade point average.

Aluminium Federation of South Africa Prize: (R1000) for the best report in MEC4110W Research Project or MEC4091S Research Project involving the use or application of aluminium.

SAI Mech Eng Award: Floating trophy and certificate for the best student in the Mechanical Engineering design and laboratory project in the Final Year of study.

SASOL Achievement Medal and R750: for the best second year student in the course MEC2020W, Design I

SASOL Achievement Medal and R1000: for the best third year student in the course MEC3050W, Design II

Dean's Merit List

The Dean's Merit List, which is published annually, contains the names of students whose academic performance over the year is meritorious and hence worthy of recognition. Students who qualify for inclusion in the List receive a letter of commendation from the Dean. The List is posted on the notice boards and published in the Dean's Circular. The academic records of students are endorsed to record their achievements in qualifying for inclusion on the List. To be eligible for the Dean's Merit List a student must pass the prescribed courses for which he or she is registered for the year in question; a student registered for a four year degree must be in the First; Second or Third year of study; and a student registered for a three year degree must be in the First, or Second year of study. The criteria for inclusion in a particular year are as follows:

an ASPECT student must have earned not less than 96 credits and obtain a year average of not less than 75 per cent;

a student in any other undergraduate programme must have earned not less than 132 credits of approved course work for the year in question and obtain a year average of not less than 70%.

Professional Status and Recognition of Degrees

Architecture, Planning and Geomatics

Architecture and Planning

The Bachelor of Architectural Studies (BAS) degree provides the necessary grounding for entry into a professional architectural course or into postgraduate programmes in city and regional planning, urban design or landscape architecture. The programme merits exemption from Part 1 of the Royal Institute of British Architects', and the Commonwealth Association of Architects', own examination in Architecture.

The BAS(Hons) qualification introduces an honours degree within a succession of qualifications leading towards professional qualification in architecture. It is a prerequisite qualification for admission into the Master of Architecture (Professional) (HEQS-F level 8).

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

Both the degrees of Master of City and Regional Planning (MCRP) and Master of City Planning and Urban Design (MCPUD) are recognised for professional accreditation purposes by the South African Council for Planners (SACPLAN). Registration with the Council, which is a statutory requirement to practise, can occur after two years of supervised practical experience. The MCRP programme has provisional accreditation from the Royal Town Planning Institute.

Landscape Architecture : The Master of Landscape Architecture (MLA) is a professional degree. Eligibility of graduates for membership of the South African Council for Landscape Architects Profession (SACLAP) will be dependent upon firstly, a further two years training under a professional landscape architect, and the successful completion of the Council's professional examination.

Information Regarding Special Qualifying Examination for Foreign Architects wishing to obtain registration as an architect within South Africa.
(a)   An applicant for registration may be recommended by the Council for admission to the Special Qualifying Examination. The nature and extent of the examination shall be determined in each case by the Council after consideration of all available evidence with regard to the standard and quality of the candidate's qualifications. If necessary, the Council may interview an applicant or require him or her to sit a written test in order to come to a decision as to the standard of the qualification. Only qualifications requiring a minimum of four years full-time study in architecture at a university or like educational establishment will be considered to be of a standard sufficient to give admission to the Special Qualifying Examination. An applicant who obtains a recommendation from the Council may be required to attend lectures and/or practical training at a university of his or her choice and to pass the examination(s) set by the University. The University or body conducting the Special Qualifying Examination shall determine when the examination(s) shall be held and when the

fees are to be paid. A candidate who completes the examination(s) will be furnished with a certified statement to that effect.

(b) All applicants who have not passed a qualifying examination recognised in terms of Section 19(2)(b) and 19(7)(c)(ii) of the Architects' Act 1970 must apply to the South African Council for Architects for admission to the Special Qualifying Examination. The following courses of action may be adopted: An applicant who, in the opinion of the Council, cannot be admitted to the Special Qualifying Examination shall be referred to the University of his or her choice which will decide what will be required of him or her in order to graduate.

Geomatics

The Education Advisory Committee of the South African Council for Professional and Technical Surveyors, recognises the BSc(Geomatics) degree as a suitable theoretical qualification for the conditions set out in Section 20 of Act 40 of 1984, for registration as a Professional Land Surveyor, Professional Surveyor in the categories of Engineering and Photogrammetry and as a Professional Geoinformatics Practitioner. In addition to the degree, a graduate wishing to register in any of the above categories is required to undergo a period of practical training (at present about 15 months) with a practising Professional and to undertake a test of professional competence. ProfessionalLand, Engineering and Photogrammetric Surveyors, as well as Professional Geoinformatics Practitioners, enjoy a status equivalent to that of an Associate Member or Fellow of the Royal Institution of Chartered Surveyors in most parts of the world.

Institutes of Professional Land Surveyors

Holders of a degree in Geomatics, after completing an articleship of about 15 months and passing a practical test of professional competency and an examination, may proceed to registration as a Professional Surveyor. The registering body is the South African Council for Professional and Technical Surveyors, PO Box 62041, Marshalltown, 2107.

Registered surveyors, at their request, will be admitted to membership of the South African Geomatics Institute.

Construction Economics and Management

All degree offerings are accredited as detailed below. The significance of accreditation is that graduates of these degrees are exempted by the accrediting bodies from having to take any further university-level exams before being allowed to take the Assessment of Professional Competence (APC) or being admitted to the Professional Interview (PI).

Association of South African Quantity Surveyors (ASAQS)

Graduates in Quantity Surveying and Construction Management are eligible for corporate membership of the Association of South African Quantity Surveyors.

Address: The Director, ASAQS, PO Box 3527, Halfway House, 1685.

South African Council for the Quantity Surveying Profession (SACQSP)

The BSc in Construction Studies together with the BSc(Hons) in Quantity Surveying and Construction Management degrees are accredited by the South African Council for the Quantity Surveying Profession as fulfilling all the academic requirements for registration as Quantity Surveyors (in terms of the Quantity Surveyors Profession Act No 49 of 2000 as amended). The BSc in Property Studies, together with the BSc(Hons) in Property Studies, enjoys similar accreditation. Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Quantity Surveyor before being admitted to the Assessment of Professional Competence and being registered with the Council as a Professional Quantity Surveyor.

Address: The Registrar, South African Council for the Quantity Surveying Profession, PO Box 3527, Halfway House, 1685.

The Royal Institution of Chartered Surveyors (RICS)
Graduates in Quantity Surveying, Construction Management and Property Studies are eligible to register with the Royal Institution as Probationers. Thereafter, a period of three years in-service training must be undertaken under the supervision of an approved mentor before being admitted to the Assessment of Professional Competence leading to membership of the Institution. Graduates of the MSc Programmes in Property Studies and Project Management enjoy similar accreditation.
Address: The Secretary-General, RICS, 12 Great George Street, Parliament Square, LondonSW1P 3AD, England.

Chartered Institute of Building (CIOB)
Graduates in Construction Management and Quantity Surveying are admitted to the Graduate Class of the Chartered Institute without further examination. Thereafter, a period of three years in-service training must be undertaken before being admitted to the Professional Interview leading to membership of the Institute. Address: The Secretariat, CIOB, Englemere, Kings Ride, Ascot, BerkshireSL5 8BJ, England.

South African Council for the Project and Construction Management Professions (SACPCMP)
The South African Council for the Project and Construction Management Professions registers professionals and candidates in the project and construction management professions. The BSc in Construction Studies together, with the Bsc (Hons) in Construction Management is accredited by the SACPCMP. The outcome of the inspection visit and report will be made known when it is available. Address: The Registrar, South African Council for the Project and Construction Management Professions, PO Box 653141, Benmore 2010.

The South African Council for the Property Valuers' Profession (SACPVP)
The BSc in Property Studies together with the BSc(Hons) in Property Studies are accredited by the South African Council for the Property Valuers' Profession as fulfilling all the academic requirements for registration as a valuer in terms of the Property Valuers' Profession Act No. 47 of 2000 as amended. Thereafter, a period of three years in-service training must be undertaken under the supervision of a registered Professional Valuer before being registered with the Council as a Professional Valuer.
Address: The Registrar, SACPVP, PO Box 114, Menlyn 0063.

Engineering
The current BSc(Eng) degrees in Chemical, Civil, Electrical, Electrical and Computer, Electro-Mechanical, Mechanical Engineering and Mechatronics are accepted by the Engineering Council of South Africa (ECSA) as fulfilling all the academic requirements for registration as a Professional Engineer. In terms of the Washington Accord signed in June 2000, of which South Africa is a signatory, the Faculty's engineering qualifications have been recognised by professional engineering accrediting bodies in the United States of America, Canada, Australia, New Zealand, the United Kingdom, Ireland and Hong Kong.
In terms of the Engineering Profession Act (Act No 46 of 2000), ECSA has stipulated a minimum period of three years' approved practical training and experience after graduation under the guidance of a Professional Engineer before a candidate may register as a Professional Engineer. This period may be shortened by up to one year in recognition of successful postgraduate degree work. It is of the utmost importance that every graduate should register immediately as a candidate engineer.
The University of Cape Town enjoys a special relationship with the Association of Commonwealth Universities. The curricula, systems and standards of engineering education at the University conform to the general pattern of the British universities and professional institutions. The degrees are therefore widely recognised.
The better known of the British and South African professional institutions are listed below. Graduates are eligible for exemption from the written Associate Membership examinations of the British institutions, as detailed below, but in all cases a period of approved professional work is required before admission to corporate membership. Student membership of these institutions is

generally available to undergraduates. Information on other professional engineering bodies is available from the relevant department in the Faculty.

The Institution of Chemical Engineers
Graduates in Chemical Engineering are eligible for exemption from the Membership Examination. Address: 165-189 Railway Terrace, Rugby. CV21 3HQ, United Kingdom.

The South African Institution of Chemical Engineers
Graduates in Chemical Engineering may be admitted to membership, without further examination. Address: PO Box 808, Pinegowrie, 2123.

The Institution of Civil Engineers
Graduates in Civil Engineering are eligible for exemption from Parts I and II of the Associate Membership examinations, and must satisfy the requirements of the Professional interview for admission to corporate membership. Address: Great George Street, Westminster, London SW1 P3AA.

The South African Institution of Civil Engineering
Graduates in Civil Engineering are eligible for corporate membership once they are registered as Professional Engineers. Address: Postnet Suite 81, Private Bag X65, Halfway House, 1685.

The Institution of Structural Engineers
Graduates in Civil Engineering are eligible for exemption from all but the final Design examinations. For admission to Corporate Membership, Graduates must sit and pass the Chartered Membership (Part 3) examination, entitling them to register with the UK Engineering Council as Chartered Structural Engineers. Address: 11 Upper Belgrave Street, London, SW1.

The Institution of Engineering and Technology (IET)
Membership of the IEE is open to everyone with a professional interest in electrical, electronic, information and manufacturing engineering. Student membership is open to any student studying engineering or IT. The following categories of membership are available: Member, Fellow, Student and Affiliate. Address: URL://www.iee.org/membership/

The South African Institute of Electrical Engineers (SAIEE)
Graduates in Electrical Engineering may be admitted to membership, without further examination. Address: 18a Gill Street, Observatory, Johannesburg, 2198.

The South African Institution of Mechanical Engineers
Graduates in Mechanical Engineering may be admitted to membership, without further examination. Address: PO Box 34008, Rhodes Gift, 7707.

The South African Institution of Certificated Engineers
Holders of the Government Certificate of Competency are members of this Institution. Graduates in the relevant branches of the engineering profession are eligible for extensive exemptions, depending upon the degree of practical experience achieved. In South Africa a Government Certificate of Competency is mandatory for persons responsible for the supervision of industrial plant exceeding a specified size. Address: 18a Gill Street, Observatory, Johannesburg, 2198.

Lecture periods

1	08:00 to 08:45	The **meridian**	13.00 to 14:00
2	09:00 to 09:45	6	14:00 to 14:45
3	10:00 to 10:45	7	15:00 to 15:45
4	11:00 to 11:45	8	16:00 to 16:45
5	12:00 to 12:45	9	17:00 to 17:45

Ethics Clearance

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

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Teaching and Learning Charter

Mutual Commitment
Benefiting from the opportunities of education requires a mutual commitment on the part of both student and teacher.

Students should understand that, by accepting the offer of a place at the University, they undertake responsibility for their own learning. This requires that they attend classes, tutorials, practicals and other scheduled activities and prepare assignments to the best of their ability, handing in work on time. Students should be considerate to the needs of others in their behaviour in lectures and tutorials. They should act with honesty and integrity, ensuring that work that they hand in is their own, that all the sources that they use are properly acknowledged, and that they respect and follow the rules and procedures for formal examinations.

Good teachers bring enthusiasm, originality and flair to their work. Good teaching is best fostered in a collegial atmosphere where codes of practice provide a baseline standard for professionalism, rather than serving as a prescriptive and proscriptive list of requirements. While Heads of academic departments are formally responsible to Senate for teaching and learning in their departments, individual members of the academic staff are accountable for their contribution to the university's educational mission. Teachers should understand that, by accepting employment on the academic staff of the University, they undertake to provide all reasonable assistance to students to enable them to succeed in their studies. This requires that they deliver lectures and other scheduled classes and make every reasonable effort to make alternative arrangements if they are unable to do so. Teachers should be available for student consultations at reasonable and clearly-advertised times, and should hand back student work timeously, and with appropriate comment. Teachers' expectations of students should be clearly set out in course outlines, available before the course starts. Required reading and other preparation should be clearly specified, and teachers should ensure that such materials are available to students in the Library, in text books that are available, and in authorized course readers. Methods of evaluation and assessment that will be used in the course must be defined and described in the course outline and followed in the course. Expectations of students in formal examinations must be set out, and such formal examinations must have a fair and reasonable relationship with the ground covered in the course. Consequently: Students should make a formal undertaking, as part of the process of admission to the University, to take responsibility for their own learning, to respect the requirements of the courses for which they register, and to take part in the academic life of the University with integrity and honesty.

Academic staff undertake to

> provide clearly written course outlines, setting out what is expected of students for the complete course, that are available well in advance of the beginning of the course, to allow students adequate time to prepare;
> provide lists of required and recommended reading for courses, in advance of the beginning of the course, and to establish that this material is in the University Library, in local bookshops (by timeous submission of reading lists), or in course readers (with copyright clearance, and within agreed policy for course levies);
> set out a clear and well-designed system of assessment for the course, which defines what is expected of a student, and the relative value of different coursework, test and examination components; set clear and consistent DP requirements for courses, consistently enforced;
> present lectures and tutorials in a clear manner, explaining technical terms where appropriate;
> establish a fair and consistent approach to hearing requests for concessions and re-marking of assignments, and for leave of absence from lectures (where attendance is compulsory), tutorials and other class sessions;
> adhere to an agreed and published timetable for lectures, tutorials and other teaching sessions, that respects the need of students to plan their class attendance and study time;

ensure that they, and other teaching staff involved in their courses, are available to meet with students at advertised office hours, and interact with students without discrimination or favouritism;

return work submitted for assessment within a reasonable period of time, with adequate and appropriate comments and other forms of evaluation, and ahead of formal examinations, so that students can incorporate feedback in their examination preparation;

ensure consistent marking of examination papers and, for large classes, effective moderation of examination marking by the lecturer concerned;

Organize a written evaluation for each course, allowing students to express their views freely and, if they wish, anonymously, and build on the outcomes of such evaluations in adapting the course for the future.

Postgraduate students have particular needs, and the relationship between postgraduate students and their supervisors is set out in a parallel policy, which should be read in conjunction with this Teaching and Learning Charter.