UNIVERSITY OF CAPE TOWN

FACULTY OF SCIENCE

2016

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The Admissions Office and Student Records Office are located in the Masingene Building, Middle Campus, and are open from 08h30 to 16h30. The Cashier's Office is located in Kramer Building, Middle Campus, and is open from 09h00 to 15h30.

This handbook is part of a series that consists of

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

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GUIDE TO THE USE 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 offices and staff in the Faculty with whom students may interact in the course of their studies, as well as explanatory notes on the course code system, terminology, term dates, etc.

(b)   *Degrees:* This section lists the qualifications offered by the Faculty, as well as defining the rules for each of the various degrees. These rules should be read in conjunction with the general University rules in the General Rules & 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.

The compulsory courses to be included in the curriculum of each undergraduate major offered in the Faculty are listed in this section.

The areas of study or disciplines for postgraduate studies are included in the postgraduate degrees section.

(c)   *Departments and Courses Offered:* This section contains entries for each department in the Faculty. Each section lists members of staff, the research areas and units and details of the courses offered and administered by each department. The detailed course information must be read together with the curriculum and degree information as noted above in section (b).

(d)   *Schedule of Courses*: The full list of undergraduate courses offered by the Faculty is set out in this section in alpha-numeric order (i.e. based on the course code prefix) and includes lecture, practical and tutorial times together with course entry requirements for some courses.

Another list groups courses by the semester and lecture period in which it is offered.

(e)   *Additional Information:* This section is at the back of this Handbook and includes lists of staff who are Fellows and Distinguished Teachers in the Faculty, as well as the various student prizes, class medals and scholarships awarded on academic merit and contains information on the criteria for the Dean's Merit List.

GENERAL INFORMATION

Officers in the Faculty

Dean of the Faculty of Science:
Professor A P le Roex, BSc *Stell* BSc Hons PhD *Cape Town*

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Personal Assistant to the Dean:
E Taladia

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Senior Secretary/Receptionist:
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Faculty Communications & Marketing Manager:
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Faculty Manager (Finance):	**Rm 6.47 P D Hahn Building**
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Assistant Faculty Finance Officer:	**Rm 6.44 P D Hahn Building**
L Kleinsmidt, BA HDE *UWC*	l.kleinsmidt@uct.ac.za
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Senior Student Advisers in the Faculty

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Associate Professor G A Verboom
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Chemical, Molecular & Cellular Sciences
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Mathematics, Physics & Astronomy
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Extended Degree Programme (EDP)
Mr G Stewart (1st Semester)
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Associate Professor B Davidowitz (2nd Semester)
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Student Advisers in the Faculty

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Biology, Earth & Environmental Sciences

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Dr C Reed	Rm 3.25 John Day Zoology Building
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Chemical, Molecular & Cellular Sciences

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Mathematics, Physics & Astronomy

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Extended Degree Programme (EDP)

Dr D Taylor (1st Semester)	Rm 3.11 R W James Building
	dl.taylor@uct.ac.za
Mr G Stewart (2nd Semester)	Rm 304.3 Computer Science Building
	gary.stewart@uct.ac.za

Departments in the Faculty

Department:	Location:	Telephone:
Archaeology	Beattie Building	(021) 650 2353
Astronomy	R W James Building	(021) 650 5830
Biological Sciences	H W Pearson Building &	
	J Day Building	(021) 650 3603
Chemistry	P D Hahn Building	(021) 650 2525
Computer Science	Computer Science Building	(021) 650 2663
Environmental & Geographical Science	EGS Building	(021) 650 2874
Geological Sciences	Geological Sciences Building	(021) 650 2931
Human Biology (Faculty of Health Sciences)	Anatomy Building, Health Sciences campus	(021) 406 6235
Mathematics & Applied Mathematics	Mathematics Building	(021) 650 3191
Molecular & Cell Biology	Molecular Biology Building	(021) 650 3270
Oceanography	R W James Building	(021) 650 3277
Physics	R W James Building	(021) 650 3326
Statistical Sciences	P D Hahn Building	(021) 650 3219

Administrative offices dealing with student matters

Query:	Whom to approach:	Telephone:
Academic transcripts/degree certificates, deferred examinations	Student Records Office, Masingene Building, Middle Campus	(021) 650 3595
Admission queries, curriculum matters, registration issues	Academic Administration, Science Faculty Office, Room 6.54	(021) 650 3023
Fee problems/accounts	Central Fees Office, Kramer Law Building	(021) 650 2142
Fee payments	Cashier's Office, Kramer Law Building (09h30 to 15h30)	(021) 650 2207/2146
Financial assistance	Student Financial Aid Office, Kramer Law Building	(021) 650 2125
Computer laboratory queries	P D Hahn extension, Scilab D	(021) 650 4772

Faculty Student Councils

The Science Students' Council (SSC) and the Science Postgraduate Students' Council (SPGSC) form an important part of the Governance and Committee structures in the Faculty of Science (see booklet "Faculty of Science, Governance and Committees").

Undergraduates:

The Science Students' Council (SSC) is elected annually by the undergraduate students in the Faculty of Science. The SSC office is located in the PD Hahn Building, Level 6, Room 6.76.1 and may be contacted via email: uct_ssc@uct.ac.za.

Postgraduates:

The Science Postgraduate Students' Council (SPGSC) is elected by the postgraduate students in the Faculty of Science. The SPSC represents the postgraduate students on the executive committee of the University Postgraduate Students' Council. The Chairperson of the SPGSC may be contacted via email: sciencepgsc@gmail.com.

The **Postgraduate Centre** is housed in the Otto Beit Building, Upper Campus. This state-of-the-art facility houses the executive committee of the Postgraduate Students Council (PSC) 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.

Term dates for 2016

1st Semester

1st Quarter	15 February to 24 March
Mid-term break	25 March to 03 April
2nd Quarter	04 April to 10 June
Mid-year break	11 June to 17 July

2nd Semester

3rd Quarter	18 July to 26 August
Mid-term break	27 August to 04 September
4th Quarter	05 September to 21 December

Explanatory Notes on Course Codes

The curriculum for the Bachelor's degree in the Faculty of Science is based on a semester system, where a semester course is equivalent to a half-year of academic study. Courses for the Bachelor's degree may be completed in one semester (i.e. a "half-course") or over two semesters (ie. a "full-course"). In this respect, the following codes are used:

F   first-semester half-course
S   second-semester half-course
H   half-course taught over the whole year*
W   full-course taught over the whole year
X   special allocation
Z   any other combination

* H courses in the EDP may be of the "intensive type" ie: half credit but full contact time over the whole year.

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Summer/Winter Term courses:
P   November-December –
L   June–July

CEM1000W	*Chemistry 1000*
CEM	designates a Chemistry course
1	designates a first-year course
000	serves to distinguish this from other first-year Chemistry courses
W	designates a full-course taught over the whole year

BIO3002F	*Marine Ecosystems*
BIO	designates a Biology course
3	designates a third-year course
002	serves to distinguish this from other third-year Biology courses
F	designates a first-semester course.

NOTE: second-year and third-year courses are usually regarded as 'senior courses' in terms of meeting the curriculum requirements for the Bachelor's degree in the Faculty of Science.

Essential Terminology

Pre-requisite courses
Most courses at UCT (except some first-year courses) require prior knowledge either in the same discipline or in other disciplines. The courses which are required to be completed prior to taking another course are called pre-requisites. The concepts and knowledge learnt in these previous courses needs to be applied in the later course; ie a pre-requisite is the foundation upon which the later course is built. Pre-requisite rules will be applied consistently because not to do so will jeopardise your chances of success.

Co-requisite courses
Some courses have particular courses as co-requisites, which means that students need to register for two or more courses at the same time. Where a course has a co-requisite of another course, it implies that the courses integrate closely with each other, and it is essential to learn and apply the concepts in both courses at the same time.

Classification of results - Refer to General Rules G26

DP (Duly Performed certificate) and DPR (Duly Performed certificate Refused) - Refer to General Rules GB 9

Academic departments at UCT support continuous learning and assessment. This means that you will be required to engage with the coursework and perform consistently well from the beginning of the course. This will earn you the right to attempt the final assessment – the examination. Earning this right is called being given a DP (Duly Performed Certificate). If you have not attended lectures, practicals and tutorials, or missed a test without being excused, or do not achieve the subminimum mark (see below) for the coursework, you will be refused this Duly Performed certificate (DPR) and you will not be eligible to sit the examination. Check the DP requirements carefully in each course to make sure that you comply.

Sub-minimum

Many courses will require you to achieve a sub-minimum mark in your coursework and/or the final examination. This means that if you do not achieve this sub-minimum mark you will not be awarded a DP (if you fail to meet the sub-minimum in your coursework) or an F (Fail) if you do not get the sub-minimum in the final examination. Check the rules for your course in the Faculty Handbook to see whether there is a sub-minimum.

Progression status

At the end of every year, after the November examination period, the Faculty Examinations Committee (FEC) provides every student in the faculty with a progression status which is reflected on the student's academic transcript. The purpose of this code is to describe accurately the student's academic status in the faculty.

One of the following descriptions will appear on the transcript:
·   Academically eligible to continue - may return the next year
·   Concession (FEC) to continue - may return the next year, but with specific conditions
·   Concession (FEC) to change field/specialisation/degree within Faculty - may return the next year but in a different field of study
·   Status pending FEC decision - status dependent on further information and final decision
·   Academically not eligible to continue - may not return the next year
·   Status pending: continue if SUPP/DE exams passed - may return conditional on passing SUPP/DE
·   Qualifies for award of degree/diploma - have met all the requirements for the award of degree
·   Qualification depends on supp/DE results - award of degree conditional on passing SUPP/DE

Supplementary examinations
Refer to this Handbook Rule FB 4.1-4.2 and General Rules G 23

Deferred examinations
Refer to General Rules G 27 & 28

RULES FOR DEGREES IN THE FACULTY

All qualifications offered in the Faculty are HEQSF (Higher Education Qualifications Sub-Framework) aligned but SAQA (South African Qualifications Authority) registration numbers are still awaited for some qualifications.

i)   Bachelor of Science (BSc) degree
ii)   Bachelor of Science Honours (BSc Hons) degree
iii)   Master of Science (MSc) degree
iv)   Master of Philosophy (MPhil) degree
v)   Doctor of Philosophy (PhD) degree
vi)   Doctor of Science (DSc) degree [SAQA ID 19751]

Rules for Degrees in the Faculty

The following rules are specific to the Faculty of Science. They must be read in conjunction with the general University rules (G and GB) for degrees and diplomas in Book 3 of this series.

General Rules for Bachelor of Science (BSc) degree

FB1   Except by permission of Senate, all students registered in the Faculty of Science will be subject to the general rules of either the BSc degree or the BSc Extended Degree Progamme, and the associated curricular rules for majors.

Duration of the Bachelor of Science degree

FB2.1   The curriculum for the Bachelor of Science degree shall extend over not less than three academic years of study.

FB2.2   The curriculum which includes the Extended Degree Programme for Science (EDP) will usually extend over four academic years of study.

FB2.3   Continuation on the three year BSc degree curriculum, or placement on the EDP, will be based on level of performance in a set of tests at the end of the first quarter, together with other information such as the NBT and NSC results, and one-on-one consultations with Student Academic Advisors.

NOTE: At the discretion of the Dean, the Faculty may admit candidates for the BSc degree who, due to special circumstances, are unable to study on a full-time basis. Students would complete the degree over an extended period of time by taking a reduced number of courses each year, but would attend normal lectures and practicals as scheduled in the University timetable. All enquiries should be directed to the Faculty Manager (Academic).

Restriction on registration and examination

FB3   A student shall not register for more than:
           (a)   the equivalent of four half-courses in each semester in the first academic year of study;
           (b)   the equivalent of three half-courses in each semester in any other year of study.
           This restriction also applies to the number of courses for which a student may be examined.

Policy
Permission of Senate to waive these restrictions will only be considered under the following circumstances:

(a)   where a student registering for the first time for the first year of a BSc degree has achieved outstanding results in all NSC subjects;

(b)   where a student who has been registered for the BSc degree for at least one semester has obtained an average of 50% or more in all courses written in the most recent set of ordinary examinations and/or tests, (ie. in June or November);

Note: Waivers to students who satisfy either of the above will depend on an assessment by a Student Adviser or Deputy Dean, on the merits of each individual case.

Supplementary examinations

First-year courses

FB4.1   The Senate may permit a first-year student who has registered for a Bachelor's degree in the Faculty of Science, and who has failed the ordinary examination in one or more courses, to write supplementary examinations in a maximum of three full-year courses or the equivalent.

Policy and guidelines:
(a)   A supplementary examination may (not will) be awarded to a student who has obtained marks from 45% to 49% in a first-year course in any Science Faculty department.

(b)   A supplementary examination may be awarded to a student who has obtained marks from 40% to 49% in first-year courses in Mathematics, except for MAM1000W, MAM1019H, MAM1043H and MAM1044H, where the conditions in (a) above apply.

(c)   A department (other than Mathematics - see (b)) may recommend the award of a supplementary examination to a student who has obtained marks from 40% to 44% in a first-year course provided that the Head of the Department submits a written recommendation and motivation to reach the Dean before the meeting of the Faculty Examinations Committee.

(d)   Where a student is awarded supplementary examinations in more than three full-year courses or the equivalent, he/she must choose which supplementary examinations to write in terms of the restriction detailed in FB4.1 above.

Senior courses

FB4.2   The Senate may permit a student other than a first-year student to write supplementary examinations in a maximum of two full-year courses or the equivalent, only one of which may be a third-year course.

Policy and guidelines:
(a)   Departments will act according to guidelines (a), (b) and (c) listed under FB4.1 in respect of first-year courses.

(b)   A supplementary examination in a senior course may be awarded if the mark obtained is at least 45% and if the department concerned

recommends it.

    (c)   A finalist who has obtained marks from 40% to 44% in any course, which is the only credit outstanding for the award of the degree, <u>may</u> be awarded a supplementary examination if the department concerned recommends it.

    (d)   Where a student is awarded supplementary examinations in more than two full-year courses or the equivalent, or more than one full-year third-year course or the equivalent, he/she must choose which supplementary examinations to write in terms of the restriction detailed in FB4.2 above.

FB4.3   The decision on whether or not to award a supplementary examination, in accordance with the policies outlined above, shall be taken by the Senate on the recommendation of the Head of the Department concerned and be based on the student's academic performance in the course concerned, except that the Senate may decide to award, or refuse to award, a supplementary examination in a course or courses taking account of the student's overall academic record.

Refusal of readmission to the Faculty and related matters

Bachelor of Science degree (excluding EDP)

FB5.1   Except by permission of Senate, a student who has registered for the Bachelor of Science degree, shall not be permitted to reregister in the Faculty unless he or she has completed:

    (a)   one and a half courses or the equivalent, including one and a half courses specific to a major, by the end of the first year;

    (b)   three and a half courses or the equivalent, including all first-year courses required for a major, by the end of the second year;

    (c)   five and a half courses or equivalent, including one and a half senior courses, by the end of the third year;

    (d)   seven and a half courses, including three senior courses, by the end of the fourth year.

    (e)   Students are expected to complete all the requirements of the degree by the end of the fifth year.

FB5.2   In addition to the readmission requirements listed in FB5.1 above, the fulfilment of other specific requirements may be required by individual majors. These requirements will be communicated to students.

Extended Degree Programme (EDP)

FB5.3   Except by permission of Senate, a student who is registered on the EDP shall not be permitted to reregister in the Faculty unless he or she has completed:

    (a)   one full-year course, or the equivalent in half courses, by the end of the first year;

    (b)   three full-year courses or the equivalent, including two and a half courses specific to a major, by the end of the second year;

    (c)   five full-year courses or the equivalent, of which at least one shall be a senior course, by the end of the third year;

    (d)   seven full-year courses, of which at least two and a half shall be senior courses, by the end of the fourth year.

General

FB5.4   Except by permission of Senate, where the academic circumstances of a student do not permit the application of Rules FB5.1-FB5.3, a student shall be required to complete the equivalent of two full-year courses per year of study.

FB5.5   In special cases, or in the case of undergraduates transferring from other faculties or other universities, the Senate may impose probationary academic requirements which must be fulfilled before the student shall be permitted to renew his or her registration in the Faculty in the following year.

FB5.6   A student who fails to complete the University examination in a course after two years of study may, at the discretion of Senate, be excluded from further attendance of such a course.

FB5.7   Except by permission of Senate, a student who has been refused permission to reregister in another faculty may not register in the Faculty of Science.

FB5.8   Re-registration in the Faculty does not imply a right to register for senior courses in subjects for which the student has completed prerequisite courses.

Transfer from other faculties into the Faculty of Science

FB6   Except by permission of Senate, a student who, after a year or more in another faculty, wishes to register in the Faculty of Science, shall, as a minimum:
  (a)   satisfy the normal school-leaving subject entry requirements for admission to the BSc degree, and
  (b)   have complied with the provisions of Rule FB5.1-FB5.3 as appropriate, as applicable *mutatis mutandis*.

Curricula rules for the Bachelor of Science (BSc) degree

All bachelor degree curricula in the Faculty of Science include courses carefully selected to provide adequate foundation for and depth in the major disciplines, as well as providing generic skills to function as a graduate. All curricula therefore require students to achieve skills in numeracy, computer literacy, problem solving and communication in the context of their majors.

Students must choose one or more majors, with curricula including compulsory courses as outlined under rules FB7.6 and FB7.7 below. The general rules governing BSc curricula are rules FB7.1 to FB7.5 which stipulate the minimum number of courses required, and the range of choices possible.

All curricula can lead to postgraduate study.

Total number of courses

FB7.1   The curriculum shall include the equivalent of at least nine full-year courses of which at least <u>six</u> full-year courses must be Science courses. A maximum of three full-year courses or the equivalent may be counted from other faculties.

Number of senior courses

FB7.2   The curriculum shall include the equivalent of at least four full-year senior courses or the equivalent, of which at least three shall be Science courses.

Mathematics

FB7.3   The curriculum shall include at least a half <u>Science</u> course in Mathematics (18 NQF credits, level 5) plus a half <u>Science</u> course in Statistics (18 NQF credits, level 5), or a full <u>Science</u> course in Mathematics (36 NQF credits, level 5).

Elective courses

FB7.4   Any course in the Faculty of Science may be taken as an elective. Courses from other Faculties may also be taken as electives, <u>but</u> subject to the following constraints and approval by a Student Adviser or Deputy Dean:

- Only courses with a NQF credit value of 18 or more will be counted (a first year half course in the Science Faculty has a NQF credit value of 18).
- If the equivalent of <u>two or less</u> full Science courses are replaced by courses from another faculty, any courses not specifically excluded by Science Faculty rules can be chosen (Refer to "Non-Science electives in the Bachelor of Science (BSc) degree" at the back of this book).
- If <u>more than two</u> full year Science courses are replaced with electives from another faculty, then the further electives must form part of a hierarchical sequence linked to those already completed.
- Courses taught by the Faculty of Science for other faculties are not available for students registered in Science. However, students transferring into Science from other faculties may be able to count such courses towards their Science curriculum, with the credit weighting, equivalence and conditions established by the Departments concerned.
  NOTE: Refer to "Non-Science electives in the Bachelor of Science (BSc) degree" at the back of this book for details on non-Science courses that do or do not carry credit in the Science curriculum.

FB7.5   In order to satisfy the requirement of competencies including numeracy, computer literacy, problem solving and communication or as a measure of integrated assessment, a Student Adviser may add one or more compulsory courses to a curriculum.

Major(s)

FB7.6   The curriculum shall include at least one major from the following list:

Applied Biology	Ecology & Evolution
Applied Mathematics	Environmental & Geographical Science
Applied Statistics	Genetics
Archaeology	Geology
Astrophysics	Human Anatomy & Physiology
Biochemistry	Marine Biology
Business Computing*	Mathematical Statistics
Chemistry	Mathematics
Computer Science	
Computer Engineering*	Ocean & Atmosphere Science
Computer Games Development*	Physics

*   These majors may only be taken in conjunction with a major in Computer Science.

NOTE: Acceptance into the Science Faculty does not guarantee acceptance into your chosen major. Formal acceptance for specific majors only takes place at the start of the second year on registration for the second year level courses. <u>A number of majors (currently Biochemistry, Genetics, Geology and Human Anatomy & Physiology) have limits on the number of students accepted into second year level courses.</u> Selection criteria, based on academic performance in first year courses, are outlined to students during the first year of study. Students will be advised in their first year to take courses which could lead to several majors. Students are encouraged to consult timeously with the relevant Department or Student Adviser regarding possible restrictions.

NQF credit requirements for the Bachelor of Science (BSc) degree

FB7.7   **Read in conjunction with rule FB7.1-FB7.6.**
           All courses have been assigned a credit value and level, according to the Higher Education Qualifications Sub-Framework (HEQSF).

           The standard BSc degree requires:
           (a)   a total of 420 NQF credits (nine full-year courses). A minimum of 396 NQ
                    suite of hierarchical courses includes at least one senior full course from an
           (b)   a minimum of 276 NQF credits from Science courses (the equivalent of six
           (c)   a minimum of 120 NQF credits at level 7
           (d)   two majors, or a curriculum leading to only one major provided it includes
           A third-year half course may be counted toward more than one major. However, th
           year semester courses recognised by the Faculty for each major.

FB7.8   **Compulsory courses to be completed for each Science major:**

NOTE 1: The compulsory courses listed below are the minimum which a student must complete for the major, in addition to those listed in FB7.3. Courses deemed by the Faculty as equivalent can be substituted as appropriate, for example: MAM1005H+MAM1006H is deemed equivalent to MAM1000W; CEM1009H+CEM1010H is deemed equivalent to CEM1000W, etc.

NOTE 2: All courses taught in other Faculties that are required/compulsory for a major in the Science Faculty will be counted as Science courses for the purpose of rules FB7.1 and FB7.2. For example, the specific EEE courses listed as compulsory for the major in Computer Engineering, the specific HUB courses listed as compulsory for the major in Human Anatomy & Physiology, the specific INF courses listed as compulsory for the major in Business Computing.

Major in Applied Biology (BIO01)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
+ STA1007S	Bionumeracy	18	5
or			
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO2010F	Principles of Ecology & Evolution	24	6
Two of:			
BIO2011S	Life on Land: Animals	24	6

Course Code	Course Title	NQF Credits	HEQSF Level
BIO2012S	Life on Land: Plants,	24	6
BIO2013F	Life in the Sea	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO3013F	Global Change Ecology	36	7
BIO3014S	Conservation: Genes, Populations & Biodiversity	36	7

Major in Applied Mathematics (MAM01)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1000W	Mathematics 1000	36	5
MAM1043H	Modelling & Applied Computing	18	5
MAM1044H	Dynamics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM2000W	Mathematics 2000	48	6
MAM2046W	Applied Mathematics 2046	48	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM3040W	Applied Mathematics 3040	72	7

Major in Applied Statistics (STA01)

(Students who major in Applied Statistics and wish to progress to Statistics Honours must complete MAM1000W or equivalent.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1004F	Mathematics 1004	18	5
or			
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5
or			
STA1000S	Introductory Statistics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
STA2007H	Applied Statistical Modelling	24	6
or			
STA2020F	Applied Statistics	24	6
STA2030S	Theory of Statistics	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
STA3022F	Research & Survey Statistics	36	7
or			
STA3036S	Operational Research Techniques	36	7

Course Code	Course Title	NQF Credits	HEQSF Level
STA3030F	Inferential Statistics	36	7

Major in Archaeology (AGE01)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
GEO1009F	Intro to Earth and Environmental Sciences	18	5
or			
EGS1004S	Intro to Earth and Environmental Sciences	18	5
AGE1002S	Africa & World Archaeology	18	5
MAM1004F	Mathematics 1004	18	5
+ STA1000S	Introductory Statistics	18	5
or			
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
AGE2011S	Human Evolution	24	6
AGE2012F	Southern African Hunters & Herders	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
AGE3013H	Archaeology in Practice	36	7
and one of:			
AGE3011F	Roots of Black Identity	36	7
AGE3012S	Global Interaction & the transformation of SA Society	36	7

Major in Astrophysics (AST02)

(Courses marked with an asterisk (*) will not be offered from 2015.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1000W	Mathematics 1000	36	5
PHY1004W	Matter & Interactions	36	5
Recommended:			
AST1000F	Introduction to Astronomy	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
AST2002H	Astrophysics	24	6
AST2003H	Astronomical Techniques	24	6
MAM2000W	Mathematics 2000	48	6
or			
MAM2004H	Mathematics 2004	24	6
and			
MAM2047H	Applied Mathematics 2047	24	6
PHY2004W	Intermediate Physics	48	6
or			
PHY2014F*	Waves, Vibrations and Electromagnetism	24	6
PHY2015S*	Classical and Quantum Mechanics	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
AST3002F	Stellar Astrophysics	36	7
AST3003S	Galactic & Extragalactic Astrophysics	36	7

Major in Biochemistry (MCB01)

(This major has limits on the number of students accepted into second year level courses.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
or			
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5
or			
STA1000F/S	Introductory Statistics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB2020F	Biological Information Transfer	24	6
MCB2021F	Molecular Bioscience	24	6
MCB2022S	Metabolism and Bioengineering	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB3012Z	Research Project in Molecular and Cell Biology	0	7
MCB3024S	Defence & Disease	36	7
MCB3025F	Structural and Chemical Biology	36	7

Major in Business Computing (CSC02)

(Must be taken concurrently with a Computer Science major.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC1015F	Computer Science 1015	18	5
CSC1016S	Computer Science 1016	18	5
MAM1000W	Mathematics 1000	36	5
ACC1006F/S	Financial Accounting	18	5
or			
FTX1004S	Introduction to Financial Management	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
INF2009F	Systems Analysis	18	6
and			
INF2006F	Business Intelligence Analysis	6	6

Course Code	Course Title	NQF Credits	HEQSF Level
INF2011S	System Design and Development	18	7

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
INF3011F	I.T. Project Management	18	7
INF3012S	BPM and Enterprise Systems	18	7
INF3014F	Electronic Commerce	18	7

Major in Chemistry (CEM01)
(Courses marked with an asterisk (*) will not be offered from 2015.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CEM1000W	Chemistry 1000	36	5
MAM1000W	Mathematics 1000	36	5
PHY1031F	General Physics A	18	5
PHY1032S	General Physics B	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CEM2005W	Chemistry II	48	6
or			
CEM2007F*	Physical Chemistry and Spectroscopy	24	6
CEM2008S*	Organic & Inorganic Chemistry	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CEM3005W	Chemistry 3005	72	7

Major in Computer Engineering (CSC03)
(Must be taken concurrently with a Computer Science major.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC1015F	Computer Science 1015	18	5
CSC1016S	Computer Science 1016	18	5
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE2040F	Basic Electronic Engineering I	24	6
EEE2026S	Electrical Engineering Part II	20	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EEE3078W	Digital, Embedded & Adaptive Systems	48	7

Major in Computer Games Development (CSC07)
(Must be taken concurrently with a Computer Science major.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC1015F	Computer Science 1015	18	5
CSC1016S	Computer Science 1016	18	5
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC2003S	Computer Games	24	6
INF2009F	Systems Analysis	18	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC3020H	Three Dimensional & Distributed Games Design	36	7
CSC3022H	C++ With Applications	36	7

Major in Computer Science (CSC05)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC1015F	Computer Science 1015	18	5
or			
CSC1018F	Computer Science 1018	18	5
CSC1016S	Computer Science 1016	18	5
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC2001F	Computer Science 2001	24	6
CSC2002S	Computer Science 2002	24	6
INF2009F	Systems Analysis	18	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
CSC3002F	Computer Science 3002	36	7
CSC3003S	Computer Science 3003	36	7

Major in Ecology and Evolution (BIO04)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
+ STA1007S	Bionumeracy	18	5
or			
MAM1000W	Mathematics 1000	36	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO2010F	Principles of Ecology & Evolution	24	6
Two of:			
BIO2011S	Life on Land: Animals	24	6
BIO2012S	Life on Land: Plants	24	6
BIO2013F	Life in the Sea	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO3015F	Ecosystem Ecology	36	7
BIO3016S	Systematics & Macroevolution	36	7

Major in Environmental and Geographical Science (EGS02)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EGS1003S	Geography, Development & Environment	18	5
GEO1009F	Intro to Earth and Environmental Sciences	18	5
MAM1004F	Mathematics 1004	18	5
or			
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5
or			
STA1000S	Introductory Statistics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
EGS2013F	The Physical Environment	24	6
EGS2014S	Contemporary Urban Challenges	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
Two of:			
EGS3012S	Atmospheric Sciences	36	7
EGS3021F	Environmental Change & Challenge	36	7
EGS3022S	Sustainability & Environment	36	7
EGS3023F	Geographic Thought	36	7

Major in Genetics (MCB04)
(This major has limits on the number of students accepted into second year level courses.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
or			

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5
or			
STA1000F/S	Introductory Statistics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB2020F	Biological Information transfer	24	6
MCB2021F	Molecular Bioscience	24	6
MCB2023S	Functional Genetics	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB3012Z	Research Project in Molecular & Cell Biology	0	7
MCB3023S	Molecular Evolutionary Genetics & Development	36	7
MCB3026F	Molecular Genetics & Genomics	36	7

Major in Geology (GEO02)

(This major has limits on the number of students accepted into second year level courses.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
GEO1009F	Intro to Earth and Environmental Sciences	18	5
GEO1006S	Intro to Minerals, Rocks & Structure	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
+ STA1000S	Introductory Statistics	18	5
or			
MAM1000W	Mathematics 1000	36	5
PHY1031F	General Physics A	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
GEO2001F	Mineralogy & Crystallography	24	6
GEO2004S	Physical Geology	24	6
GEO2005X*	Field Geology and Geological Mapping	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
GEO3005F	Petrology & Structural Geology	36	7
GEO3001S	Stratigraphy & Economic Geology	36	7
GEO2005X*	Field Geology and Geological Mapping	24	6

* fieldwork half-course to be taken over second and third years of study

Major in Human Anatomy and Physiology (HUB17)

(This major has limits on the number of students accepted into second year level courses.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
+ STA1007S	Bionumeracy	18	5
or			
MAM1000W	Mathematics 1000	36	5
	1000-level Physics highly recommended		

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
HUB2019F	Integrated Anat & Physio Sciences A	24	6
HUB2021S	Integrated Anat & Physio Sciences B	24	6
	One full senior Science course		

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
HUB3006F	Applied Human Biology	36	7
HUB3007S	Human Neurosciences	36	7

Major in Marine Biology (BIO05)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
BIO1004S	Biological Diversity	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
or			
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO2013F/S	Life in the Sea	24	6
BIO2010F	Principles of Ecology & Evolution	24	6
Recommended			
SEA2004F	Principles of Oceanography	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO3002F/S	Marine Ecosystems	36	7
BIO3017S	Marine Resources	36	7

Major in Mathematical Statistics (STA02)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1000W	Mathematics 1000	36	5
STA1006S	Mathematical Statistics I	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
STA2004F	Statistical Theory & Inference	24	6
STA2005S	Linear Models	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
STA3041F	Markov Processes & Time Series	36	7
STA3043S	Decision Theory & GLM	36	7

Major in Mathematics (MAM02)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM1000W	Mathematics 1000	36	5
MAM1019H	Fundamentals of Mathematics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM2000W	Mathematics 2000	48	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM3000W	Mathematics 3000	72	7

Major in Microbiology (MCB05)

(This major is not available to students entering post-2012. Courses marked with an asterisk will not be offered from 2015.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
BIO1000F	Cell Biology	18	5
CEM1000W	Chemistry 1000	36	5
MAM1004F	Mathematics 1004	18	5
or			
MAM1000W	Mathematics 1000	36	5
STA1007S	Bionumeracy	18	5
or			
STA1000F/S	Introductory Statistics	18	5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB2016F*	Introduction to Microbiology	24	6
MCB2017S*	Microbial Biotechnology	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MCB3012Z	Research Project in Molecular & Cell Biology 0		7
MCB3021F*	Molecular Microbial Genetics 36		7
MCB3022S*	Advanced Biotechnology...36		7
or			
MCB3024S	Defence & Disease 36		7

Major in Ocean and Atmosphere Science (SEA03)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
GEO1009F	Intro to Earth & Environmental Sciences 18		5
or			
BIO1004F/S	Biological Diversity...18		5
MAM1000W	Mathematics 1000..36		5
or			
MAM1004F	Mathematics 1004 18		5
+ STA1007S	Bionumeracy..18		5
or			
STA1000S	Introductory Statistics 18		5
PHY1031F	General Physics A (or equivalent) 18		5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
SEA2004F	Principles of Oceanography..24		6
SEA2005S	Marine Systems 24		6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
SEA3004F	Ocean & Atmosphere Dynamics 36		7
EGS3012S	Atmospheric Science 36		7

Major in Physics (PHY01)
(Courses marked with an asterisk (*) will not be offered from 2016.)

First Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Leve
MAM1000W	Mathematics 1000 36		5
PHY1004W	Matter and Interactions.. 36		5
Recommended:			
MAM1043H	Modelling 18		5
and			
MAM1044H	Applied Computing Dynamics.. 18		5

Second Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
MAM2000W	Mathematics 2000	48	6
or			
MAM2047H	Applied Mathematics 2047	24	6
and			
MAM2004H	Mathematics 2004	24	6
PHY2004W	Intermediate Physics	48	6
or			
PHY2014F*	Waves, Vibrations and Electromagnetism	24	6
PHY2015S*	Classical and Quantum Mechanics	24	6

Third Year Core Courses

Course Code	Course Title	NQF Credits	HEQSF Level
PHY3004W	Advanced Physics	72	7
or			
PHY3021F*	Advanced Physics A	36	7
PHY3022S*	Advanced Physics B	36	7

NOTE: The Faculty of Science reserves the right to change the details of the curricula for all majors and reserves the right to change or add to majors or to discontinue any major offered in the Faculty of Science, depending on circumstances and demand.

Distinction

The Bachelor of Science (BSc) degree may be awarded with distinction, and with distinction in one or more majors. See Rules FB8.1 and FB8.2 for distinctions in specialisations.

Rules for distinction in a major

FB8.1   (a)   In order to obtain a distinction in a major, a student will be required to obtain first class passes in the courses listed below, except as specified in (b) and (c):

Applied Biology:	BIO2010F; any one of BIO2011S, BIO2012S, BIO2013F, plus BIO3013F, BIO3014S
Applied Mathematics:	MAM2046W (or two of MAM2047H, MAM2048H and MAM2043S) and MAM3040W
Applied Statistics	STA2007H/STA2020S, STA2030S, STA3030F, STA3022F/STA3036S
Archaeology:	Four senior half-courses in Archaeology
Astrophysics:	AST2002H, AST2003H, AST3002F, AST3003S
Biochemistry:	MCB2020F/MCB2021F, MCB2022S, MCB3024S, MCB3025F
Business Computing:	INF2009F, INF2011S; any two of INF3011F, INF3012S and INF3014F
Ecology & Evolution:	BIO2010F; any one of BIO2011S, BIO2012S, BIO2013F, plus BIO3015F, BIO3016S
Chemistry:	CEM2005W (or CEM2007F and CEM2008S), CEM3005W
Computer Engineering:	EEE2040F, EEE2026S, EEE3078W
Computer Games Development:	CSC2003S; CSC3020H, CSC3022H and any one of CSC2001F, CSC2002S, INF2009F
Computer	CSC2001F, CSC2002S, CSC3002F, CSC3003S

Science: Environmental & Geographical Science:	EGS2013F and EGS2014S; any two of EGS3012S, EGS3020F, EGS3021F, EGS3022S, EGS3023F
Genetics:	MCB2020F/MCB2021F, MCB2023S, MCB3023S, MCB3026F
Geology:	GEO2001F, GEO2004S, GEO3005F, GEO3001S
Human Anatomy & Physiology:	HUB2019F, HUB2021S, HUB3006F, HUB3007S
Marine Biology:	SEA2004F, BIO2013F, BIO3002F, BIO3017S
Mathematics:	MAM2000W, MAM3000W
Mathematical Statistics:	STA2004F, STA2005S, STA3041F, STA3043S
Ocean & Atmosphere Science:	SEA2004F, SEA2005S, SEA3004F, EGS3012S
Physics:	PHY2004W (or PHY2014F and PHY2015S), PHY3004W (or PHY3021F and PHY3022S)

(b)   If a student obtains a first and an upper second class in two half-courses at second-year level listed in (a) above, the marks obtained in these half-courses shall be averaged. If this average is 75% or more the student will be regarded, for this purpose only, as having obtained first class passes in both these half-courses. The same applies at the third-year level.

(c)   In special cases the Board of the Faculty may replace a first class in one of the courses listed above by a first class pass in a cognate course (which has not been used for distinction in that cognate subject).

Rules for distinction in the BSc degree as a whole
FB8.2   To obtain a distinction in the degree as a whole, a student must
    (a)   obtain a distinction in at least one major (rule FB8.1); and
    (b)   obtain first class passes in at least six courses (or the equivalent in half-courses), including at least four senior courses or obtain an aggregate of at least 75% for each of four first-year courses, three second-year courses and two third-year courses obtained in a minimum period. (The minimum period will usually be three years).

In applying the rules above, only passes at the first attempt are taken into account, i.e. ordinary examinations in June or December and/or deferred examinations will be taken into account, but not any supplementary examinations.

Curriculum rules for SB006, SB012, SB013 and SB014 (Degree Programmes) (for students who registered for the first time before 2010)

Please refer to the Faculty of Science Student Handbook of 2012 for the rules and curriculum requirements which relate to the Bachelor of Science Programmes, which are no longer offered.

Curriculum rules for the General Entry Programme for Science (GEPS)

This programme is no longer offered. The curriculum rules for GEPS are to be found in the Faculty of Science Student Handbook of 2012.

Rules for the degree of Bachelor of Science Honours (BSc Hons)

(To be read with General Rules on Honours Degrees (G and GH) in Book 3 of this series).

Admission

FH1   A person shall not be admitted as a candidate for the degree unless he or she

   (a)   is a graduate of the Faculty of Science who has been awarded a Bachelor's degree in the discipline in which he or she proposes to proceed to Honours, or has subsequently met the conditions which would have enabled him or her to be awarded the degree in the Faculty with that subject as a discipline; or

   (b)   is a graduate of any other faculty in the University who has completed courses and fulfilled conditions accepted by Senate as equivalent to those required under (a) above; or

   (c)   is a graduate of any other university recognised by Senate for such purposes who has completed courses and has fulfilled conditions accepted by Senate as equivalent to those required under (a) above.

Duration

FH2.1   Subject to the provisions of rule GH3 the BSc Hons is offered over a period of not less than one academic year. Normally, candidates are required to complete the programme within one academic year.

FH2.2   In exceptional circumstances, where an application for the BSc Hons degree does not have an adequate undergraduate academic background, he/she may, with permission of the Head of Department, register as an occasional student to complete preparatory courses. On satisfactory completion of such courses, he/she may be permitted to enrol on the Honours course.

NOTE: Students following rule FH2.2 are required to apply for admission to the Honours programme for the following year.

FH2.3   In exceptional circumstances, the Senate may admit a suitably qualified student as a part-time candidate for the Honours degree. Any such candidate shall be required to complete the programme within two academic years.

The Bachelor of Science Honours degree (BSc Hons) has a total NQF credit value of 160 at HEQSF level 8.

This degree may be conferred in any one of the following specialisations:

Qualification	Degree and Plan Code	Specialisations
BSc Hons	SH001MAM01	Applied Mathematics
BSc Hons	SH001AGE01	Archaeology
BSc Hons	SH001AGE02	Archaeology & Environmental Science
BSc Hons	SH001AST03	Astrophysics & Space Science
BSc Hons	SH001EGS07	Atmospheric Science
BSc Hons	SH001BIO07	Biological Sciences
BSc Hons	SH001CEM01	Chemistry
BSc Hons	SH001CSC05	Computer Science
BSc Hons	SH001EGS02	Environmental & Geographical Science
BSc Hons	SH001GEO01	Geochemistry

BSc Hons	SH001GEO02	Geology
BSc Hons	SH001CSC05	Information Technology
BSc Hons	SH001BIO05	Marine Biology
BSc Hons	SH001MAM02	Mathematics
BSc Hons	SH001MAM04	Mathematics of Computer Science
BSc Hons	SH001MCB02	Molecular & Cell Biology
BSc Hons	SH001SEA03	Ocean & Atmosphere Science
BSc Hons	SH001PHY01	Physics
BSc Hons	SH001STA04	Statistical Sciences
BSc Hons	SH001BUS01	Statistical Sciences for Actuaries

Refer to the appropriate Department sections in this handbook for detailed course outlines.

Restriction on registration

FH4　　　A student may not take any course(s) other than those prescribed by the Honours programme for which he or she is registered.

Award of the degree

FH5　　　The degree of BSc Hons may be conferred
- (a) after the successful completion of a programme of formal training and supervised research, the latter comprising a minimum of 30 NQF credits out a total of 160 credits; and
- (b) subject to the research project being passed with a minimum of 50%.

Rules for the degree of Master of Philosophy/Science

(To be read with General Rules on Master Degrees (G and GM) in Book 3 of this series).

Master of Philosophy (MPhil)
The degree will normally be awarded for work on inter-faculty topics or where a student holds an undergraduate or Honours degree other than in Science.

Admission

FM1　　　A person shall not be admitted as a candidate for the degree unless he or she
- (a) is the holder of an Honours degree or four year equivalent of the University of any other university recognised by Senate for the purpose; or
- (b) is a graduate of the University or of any other university recognised by Senate for the purpose who has shown by examination or publication or a record appropriate training that he or she has reached the current level in the subject discipline equivalent to an Honours degree; or
- (c) has in any other manner attained a level of competence which in the opinion Senate is adequate for the purpose of admission to the degree.

Master of Science (MSc)

Admission

FM2   A person shall not be admitted as a candidate for the degree unless he or she is

    (a)   an Honours graduate in the Faculty of Science, or a graduate of another facul
           or another university who holds a degree recognised by the Senate as bein
           equivalent to an Honours degree in the Faculty of Science; or

    (b)   a graduate of the University, or of any other institution recognised by tl
           Senate for the purpose, who has shown by examination or publication or
           record of appropriate training, that he or she has reached a level in the subje
           or cognate subject equivalent to an Honours degree in Science.

Guidelines for applicants

Prospective candidates should contact a member of the academic staff under whose supervision they would like to pursue a dissertation. Alternatively applicants could approach the Head of Department that best suits their research interests and request contact with prospective supervisors. Only upon acceptance by a prospective supervisor should the candidate then submit their application to the Head of the Department for approval. The Dean (through the Head) is responsible for the final acceptance of the candidate, and appointment or approval of the supervisor(s). The candidate will then be required to complete a memorandum of understanding (MoU), between them and their supervisor(s) for approval by the Dean (through the Head). Candidates may be required, after consultation with the prospective supervisor(s), to draw up a more detailed project proposal. This may then be inspected by a departmental board or panel appointed by the Head, before the candidate may proceed with their research.

FM3   The Master of Philosophy degree (MPhil) has a total NQF credit value of 180 at HEQSF level 9. This degree may be offered as a full research dissertation of 180 NQF credits, or as a coursework and minor dissertation, each 90 NQF credits.
The Master of Science degree (MSc) has a total NQF credit value of 180 at HEQSF level 9. This degree may be offered as a full research dissertation of 180 NQF credits, or as a coursework and minor dissertation, each 90 NQF credits.

The degree may be conferred in any one of the following specialisations:

Qualification	Degree and Plan Code	Specialisations
MSc/MPhil	SM001/2 MAM01	Applied Mathematics
MSc/MPhil	SM001/2 AGE01	Archaeology
MSc/MPhil	SM001/2 AST01	Astronomy
MSc/MPhil	SM001/2 BIO07	Biological Sciences
MSc/MPhil	SM001/2 CEM01	Chemistry
MSc/MPhil	SM001/2 CSC05	Computer Science
MSc/MPhil	SM001/2 CEM03	Computational Science
MSc/MPhil	SM001/2 BIO09	Conservation Biology
MSc/MPhil	SM001/2 EGS02	Environmental & Geographical Science
MSc/MPhil	SM001/2 GEO01	Geochemistry
MSc/MPhil	SM001/2 GEO02	Geology
MSc/MPhil	SM001/2 STA02	Mathematical Statistics
MSc/MPhil	SM001/2 MAM02	Mathematics
MSc/MPhil	SM001/2 MCB02	Molecular & Cell Biology
MSc/MPhil	SM001/2 SEA03	Ocean & Atmosphere Science
MSc/MPhil	SM001/2 STA03	Operational Research
MSc/MPhil	SM001/2 SEA05	Physical Oceanography
MSc/MPhil	SM001/2 PHY01	Physics
MSc/MPhil	SM001/2 STA09	Statistical Ecology
MSc/MPhil	SM001/2 PHY02	Theoretical Physics
MSc/MPhil	SM001/2 CEM02	Tertiary Chemistry Education
MSc/MPhil	SM001/2 PHY03	Tertiary Physics Education
MSc/MPhil	SM004/5 SEA01	Applied Marine Science
MSc/MPhil	SM004/5 AST03	Astrophysics & Space Science
MSc/MPhil	SM004/5 STA10	Biostatistics
MSc/MPhil	SM004/5 EGS06	Climate Change & Sustainable Development
MSc/MPhil	SM004/5 CSC05	Computer Science
MSc/MPhil	SM004/5 BIO09	Conservation Biology
MSc/MPhil	SM004/5 STA08	Decision Sciences & Analytics
MSc/MPhil	SM004/5 EGS02	Environmental & Geographical Science
MSc/MPhil	SM004/5 EGS05	Environment, Society & Sustainability
MSc/MPhil	SM004/5 CSC06	Information Technology
MSc/MPhil	SM004/5 SEA06	Ocean & Climate Science

NOTE: SM001/SM002 refers to the MSc/MPhil by full research dissertation.
SM004/SM005 refers to the MSc/MPhil by coursework and minor dissertation.
Refer to the appropriate Department sections in this handbook for detailed course outlines.

Students undertaking any Master's degree by coursework and minor dissertation will register for a 90 NQF credit coursework component followed by a 90 NQF credit minor dissertation component.

Prescribed curriculum

The only exception is **the interdisciplinary Master's course offered by the African Climate & Development Initiative (ACDI)**, which has the following curriculum structure:

The curriculum comprises two compulsory core courses, at least two elective courses and a minor dissertation.

Compulsory (core) courses:

Course Code	Course Title	NQF Credits	HEQSF Level
EGS5031F	Introduction to Climate Change & Sustainable Development	23	9
EGS5032F	Climate Change Adaptation & Mitigation	23	9

(Refer to the Department of Environmental & Geographical Sciences section in this handbook for detailed course outlines).

Elective courses: Students will choose at least two elective courses, totalling a minimum of 45 NQF credits, chosen from a range of courses which offer the student the opportunity to explore new areas, or look at climate and development through existing disciplinary backgrounds. A partial list includes:

Course Code	Course Title	NQF Credits	HEQSF Level
AXL5408F	Tradition, Science and Environment	24	9
BIO5003Z	Biodiversity and climate change	15	9
ECO4025S	Environmental Economics	20	9
EGS4016F	Capital, Politics and Nature	32	8
EGS4023F	Research Methods for Natural Scientists	32	8
EGS4024S	Climate Modelling	32	9
EGS4039F	Urban Food Security	30	8
EGS4040F	Urban Ecology	30	8
EGS4043F	Living with Environmental Change	24	8
EGS4045F	Geomorphology	30	8
EGS4046F	Water Resource Management	30	8
EGS5024F	Managing Complex Human Ecosystems	23	9
EGS5038F	Climate Predictability and Climate Variability	24	9
END5042Z	Sustainable Urban Systems	20	9
MEC5075Z	New and Renewable Technologies	20	9
MEC5088Z	Energy, Poverty & Development	20	9
PBL5045S	Environmental Law for Non-Lawyers	15	9
PBL5046S	Climate, Law and Governance	15	9

(Details of these courses are available from the ACDI handbook or the relevant Faculty handbook. Additional elective options exist and may be added or withdrawn according to circumstances each year).

NOTE: The code EGS5012W represents the overall coursework component; the overall coursework result will be reflected against this code

The minor dissertation component (90 NQF credits) is based on a three- to six-month research project, to be submitted at the end of January, with the possibility of extension to June. The choice of project and electives will be determined by prior qualification. Students may register for a minor dissertation in a range of Departments across the University, including Biological Sciences, Environmental & Geographical Science, Geological Sciences, Chemical Engineering, Mechanical Engineering, Economics, Sociology, Law [Refer to relevant Faculty Handbooks].Students registering for the dissertation component in a Faculty other than the host Faculty (which administers the course) will be subject to the examination criteria of that Faculty.Minor dissertation options:

Course Code	Course Title	NQF Credits	HEQSF Level
BIO5011H:	Minor Dissertation (Science)... 90		9
EGS5029H	Minor Dissertation (Science)... 90		9
GEO5005H	Minor Dissertation (Science)... 90		9
END5069W	Minor Dissertation (Engineering & Built Environment)............... 90		9
PBL5047H	Minor Dissertation (Law) 60		9

Registration and candidacy

FM4   A candidate for the degree shall register for not less than one academic year. Except by permission of Senate, full-time students are required to complete the requirements for the degree within two years. In exercising its discretion, Senate may take into account the nature of the research project undertaken.

Part-time studies

FM5   On the recommendation of the Head of Department, Senate may permit a candidate who is unable to complete the course within the minimum period, to complete the course part-time over a period of at least two years or more.

NOTE: No reduction in fees is made for part-time Master's degree students.

Recognition of attendance at another institution

FM6   The Senate may accept, in lieu of, part or all of the required periods of attendance at other approved laboratories or institutions with facilities for the purpose of the proposed study, provided that supervision of the candidate by an approved officer of the University of Cape Town is assured.

Guidelines for candidates
After registration the candidate is expected to consult regularly with the supervisor(s). Prior to re-registration, the supervisor(s) is requested to confirm whether progress, relative to the stated objectives in the previous MoU, is satisfactory. Only if progress is satisfactory and re-registration is supported by the Head and the Faculty Examination Committee may the candidate re-register for the degree. Where progress is deemed unsatisfactory and both the Head and the Faculty Examination Committee does not recommend re-registration, the candidate may either cancel their studies or accept a period of probation. During probation (approximately two months) a new MoU is agreed upon and approved by the Head and Dean. The goal of the probation period is for the candidate to demonstrate sufficient progress within a revised time frame to the satisfaction of the supervisor. Only if, at the end of this probation period, progress is considered to be satisfactory, will the candidate be permitted to re-register. In appropriate cases, the supervisor(s) and Head may propose to Faculty that the candidate's registration be converted to a PhD. This should take place at the end of the first year/beginning of the second year of MSc/MPhil registration.

The dissertation

FM7.1   The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research project and an appropriate acquaintance with the relevant literature. It shall be clearly presented and conform to the standards laid down from time to time by the department and the Faculty (refer also to Faculty Postgraduate Student Information Handbook).

FM7.2   (a)   The dissertation shall be accompanied by a written undertaking by the candidate, empowering the University to reproduce for the purpose of research the whole or any part of the dissertation.

        (b)   A publication may not, without the prior permission of the Senate, contain a statement that the published material was, or is to be, submitted in fulfilment or part fulfilment of a Master's degree.

FM7.3   A candidate required to submit a dissertation shall:

        (a)   Inform the Head of Department and Faculty Office in writing of his or her intention to submit the dissertation for examination within two weeks of the intended submission date.

        (b)   Submit for examination a digital copy in the format specified by 12h00 on 15 February for graduation in June, or 15 August for graduation in December. The University does not however undertake to reach a decision on the award of the degree by any specific date. Should an examiner request a hard copy, the candidate will be asked to provide this to the Faculty Office.

        (c)   Submit a digital copy of the final corrected version of the dissertation in the format specified, for the Library.

NOTE: (1) The letter of intention to submit should include the name of the supervisor(s) and the title of the dissertation. (2) Depending on the date of submission, certain fee rebates may apply. See Book 12, Student Fees, for details.

Guidelines for candidates

The dissertation will usually consist of a detailed report on the conduct of, and analysis of the results of, a research project performed under the close guidance of a suitably qualified supervisor(s). It is not essential for the Master's degree that the dissertation constitutes a distinct contribution to knowledge in the subject, nor that the research project(s) undertaken necessarily be original. The degree is usually regarded as a training course to equip the candidate with the skills necessary either for employment in a given field, or for further, independent research for the degree of PhD in the same or related subject area. The course of training provided, and the research project(s) undertaken, will usually be less rigorous, and require less independent thought, than would study for a PhD.

Length of Master's dissertation

A Master's dissertation, submitted in fulfilment of the degree, should not exceed 30 000 words (appendices excluded). Any request to deviate from these limits must be discussed with the supervisor and forwarded with the supervisor's comments to the Dean for consideration and possible approval. For further details, refer to the "Faculty Postgraduate Student Information Handbook", section 12, *Submission of a dissertation/thesis*.

A candidate who contemplates including published papers in his/her dissertation must accept that approval to do so is not automatic. For further information, refer to the *Guidelines for the inclusion of publications in the PhD thesis*, available from the Faculty Office. The rules for publishing papers in a PhD thesis will also apply to <u>all</u> Master's dissertations.

Award of the degree

FM8.1   The degree of MSc/MPhil may be conferred

        (a)   after acceptance by the Faculty of a dissertation constituting a detailed report on a research project performed under the guidance of an approved supervisor (Master's by dissertation only). The dissertation must be presented for formal examination;

            or

(b)   after a programme of advanced formal training and supervised research, for which a minor dissertation would be a partial requirement (Master's by coursework and minor dissertation). The coursework and minor dissertation must each be passed separately for the award of the degree. The minor dissertation must be presented for formal examination.

FM8.2   The degree may be awarded with distinction. In the case of a Master's by coursework and dissertation, a distinction must be obtained in both components.

FM8.3   Supplementary examinations are not awarded to candidates for the degree of Master.

Rules for the degree of Doctor of Philosophy (PhD)
(Rules for the PhD degree may be found in Book 3, General Rules and Policies.)

Admission
The entrance requirement to the PhD is a Master's degree or equivalent. Prospective candidates wishing to register for a PhD should have a discussion with a prospective supervisor and Head of Department in the appropriate field of study prior to applying formally to the University. It is sometimes possible to upgrade to a PhD after completing the first year of Master's research.

The thesis
Where a candidate intends to submit his or her thesis for examination in the hope of the award of the degree at either the June or December graduation ceremonies, he or she must inform the Doctoral Degrees Board Office in writing of his or her intention to do so by no later than 11 January or
20 June respectively; the final dates for receipt of theses by the Doctoral Degrees Board Office are 15 February or 15 August. The University does not, however, undertake to reach a decision on the award of the degree by any specific date.

Length of the PhD thesis
The Senate has approved a recommendation from the Doctoral Degrees Board that a doctoral thesis should not exceed 80 000 words (rule GP6.8; this excludes appendices and illustrations). Any request to deviate from these limits must be discussed with the supervisor and forwarded with the supervisor's comments via the Dean to the Doctoral Degrees Board for approval. For further details, refer to the "Faculty Postgraduate Student Information Handbook", section 12, *Submission of a dissertation/thesis*.

A candidate who contemplates including published papers in his/her thesis must accept that approval to do so is not automatic. For further information, refer to the *Guidelines for the inclusion of publications in the PhD thesis*, available from the Doctoral Degrees Board or Faculty Office.

Rules for the degree of Doctor of Science

FD1   The degree of Doctor of Science is a senior degree, and is awarded for substantial and original contributions to knowledge in a field of scientific endeavour. Such contribution will normally be the result of work carried out and published over a period of years, and will be such as to have established the candidate's position as a leading authority in the field(s) in which he or she has worked. Candidates will ordinarily be senior scientists with a PhD, post-doctoral experience, and a track record of at least ten years as a leading researcher.

FD2   A Candidate for the degree must be a graduate of:
- (a) the University (only in exceptional cases will candidates who do not have a PhD be considered); or
- (b) a university recognised by the Senate for the purpose (only in exceptional cases will candidates who do not have a PhD be considered) who has or has had established research or teaching associations with the University.

FD3   A candidate for the degree of Doctor of Science
- (a) must submit published work, which must constitute a substantial, original and important contribution to learning in some branch of science;
- (b) may submit other published or unpublished work as collateral testimony of his or her fitness for the degree;
- (c) must be registered for the degree for a minimum of two academic years, and for the duration of the period of examination, whichever is longer.

FD4
- (a) The examination will consist primarily of an assessment of the work submitted by the candidate, but a candidate shall, if required by Senate, present him/herself for an oral examination on the subject of the work presented.
- (b) No work will be accepted which has already been accepted by another university for the purpose of obtaining a degree.

FD5   A candidate must submit three copies of all publications he or she wishes to be assessed for examination or as collateral testimony. If, at the date of its presentation, any portion of the work submitted has not been published, or is not being published, in a manner satisfactory to the University, the candidate must grant the University in writing a free licence to reproduce the work in whole or in part for the purpose of research. The University may waive the right so granted if the candidate subsequently makes arrangements for publication in a manner satisfactory to the University.

NOTES:
1. *The DSc is the highest and most prestigious degree awarded in the Faculty of Science; it is of higher status than the Doctor of Philosophy (PhD) degree and is awarded very rarely. In these respects the DSc at UCT is based on the DSc tradition followed by many universities in the United Kingdom. (Some universities confer the DSc degree for a thesis on research done under supervision; such a DSc is the equivalent of a PhD. UCT does not.)*
2. *The DSc at UCT is awarded on the basis of published research work in a specific scientific field in which the supplicant has been active and productive for at least ten years.*
3. *Examiners for the DSc will be asked to consider whether the work submitted for the DSc constitutes a substantial, original and important contribution to learning in some branch of science in the sense that*
   - (a) *it is likely to be regarded as 'benchmark' research in the relevant field now and in years to come, and*
   - (b) *it demonstrates that the candidate has achieved a leadership role (internationally) in that field of scientific research, and will be reminded that the emphasis in assessing the work of a DSc candidate must be on originality, substance and excellence.*

DEPARTMENTS IN THE FACULTY
DEPARTMENT OF ARCHAEOLOGY

The Department is housed in the Beattie Building, 5 University Avenue
Telephone (021) 650-2353 Fax (021) 650-2352
The Departmental abbreviation for Archaeology is AGE.

Associate Professor and Head of Department:
S L Hall, MA *Wits* DPhil *Stell*
Professor and South African Research Chair in Stable Isotopes in Archaeology and Paleo-environments:
J C Sealy, MSc PhD *Cape Town*
Senior Scholar:
J E Parkington, MA PhD *Cantab*
Emeritus Professor:
N J van der Merwe, MA PhD *Yale*
Associate Professors:
R R Ackermann, MA *Arizona* PhD *Wash U St Louis*
S Chirikure, MA PhD *UCL*
Emeritus Associate Professor:
A B Smith, PhD *Berkeley*
Lecturers:
D C Salazar Garcia, PhD *Valencia*
R Sithaldeen, BSc Hons PhD *Cape Town* (CHED)
D D Stynder, MA PhD *Cape Town*
J Wilkins, PhD *Toronto*
Principal Scientific Officer:
J L Lanham, BA (Hons) *Cape Town*
Senior Scientific Officer:
L Hutten, BSc Hons MSc *Pret*
Administrative Officer:
L J Cable
Laboratory Assistant:
D H Jacobs
Departmental Assistant:
O Noëls

RESEARCH IN ARCHAEOLOGY
The Department of Archaeology investigates how people have changed through time, in order to gain insight into why we are the way we are today. We study the cultural and biological records of the past and present in order to do this. South Africa is endowed with a rich and unique archaeological, fossil and ethnographic record, giving us considerable advantage in this respect. Within this broad theme, our researchers are especially interested in the dynamics of human change over the Quaternary Period, and indeed change, process, innovation, complexity, and adaptation are core ideas that thread throughout all of our work. This time period spans a large part of our evolutionary history, and incorporates the record of early ape-like hominins, the first members of our genus *Homo*, modern human origins, hunter-gatherer societies, farming communities, and colonists. Our specific areas of focus include but are not limited to: technological change and innovation; study of past diets and environments; understanding and reconstructing palaeoecology, the dynamics of complex social landscapes; evolutionary process and the shaping of diversity.

Undergraduate Courses

Lectures are usually held four times a week, but the fifth day may also be used and should therefore be kept free.

First-Year Courses

AGE1002S   ARCHAEOLOGY & OUR COMMON HERITAGE
18 NQF credits at HEQSF level 5
Convener: Dr D C Salazar Garcia
Course entry requirements: None
Course outline:
Archaeology is the study of physical evidence left by people, from the first use of stone tools in Africa, around 3 million years ago to the complex civilizations of the more recent past. It studies our ancestor's daily lives using the physical evidence that they discarded and left behind: their tools, their houses, the remains of the meals they ate and much more. Archaeology is the only discipline that provides insight into our common heritage before written evidence. The course gives a general introduction to how archaeologists work with physical evidence by outlining some of the methods and theories they use and apply. It then summarises how this evidence contributes to our understanding of world archaeology by outlining our early physical and cultural evolution, the development of hunting and gathering, our spread around the world, the shift to farming, the innovation of writing and the rise of complex societies. The course highlights why this heritage is significant and the consequences of this significance for its management, conservation and protection.
Lecture times: Monday - Thursday, 5th period
DP requirements: Attendance at lectures and tutorials and completion of assignments.
Assessment: Assignments and class tests count 50% towards the final mark and one 3-hour examination written in November counts 50%. A sub-minimum of 40% is required for the examination.

AGE1004S   INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES
18 NQF credits at HEQSF level 5
Convener: Dr R Sithaldeen
Course entry requirements: Permission of the Dean or Head of Department is required prior to registration for this course. Attendance and satisfactory performance in each of the three fieldtrips and reports in GEO1009F
NOTES:1) This course is intended for students who have failed GEO1009F (see entry in Department of Geological Sciences) and have therefore been advised to register for AGE1004S. 2) The course covers similar material to GEO1009F but places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 3) AGE1004S is equivalent to GEO1009F in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
This course will introduce students to the structure and geological history of Earth as well as the interactions between the abiotic and biotic systems that shape the surface of the world. Human interactions with the environment are also discussed. Topics covered are solar system evolution, plate tectonics, the structure of the earth, climate-land interactions, the evolution of landscapes, biogeography, human adaptation and interaction with the natural environment.
Lecture times: To be advised, Practicals: One per week, Friday, 14h00- 17h00
DP requirements: A class record of at least 40%; attendance at 80% each of practicals, tutorials and spot tests.
Assessment: Class project, tests, practicals and field report count 50%; one 2-hour examination written in November counts 50%. A sub-minimum of 40% is required for the final exam.

Second-Year Courses

AGE2011S   HUMAN EVOLUTION
24 NQF credits at HEQSF level 6
Convener: Associate Professor R Ackermann
Course entry requirements: Any first-year Science course, or any first-year Humanities course from a related discipline such as Social Anthropology, Historical Studies, Sociology, etc or by permission of the Head of Department.
Course outline:
In AGE2011S we examine the record of primate and human evolution, showing how fossil skeletons and artefacts are interpreted in terms of human behaviour and evolutionary processes. We also consider genetic and other comparative evidence that are increasingly providing insight into the origin of our lineage. We answer questions such as: Why did our ancestors evolve in Africa? How did we evolve such large and complex brains? What advantage does bipedalism provide? When do humans begin to make tools? Why is human skin colour so variable? What makes humans unique?
The syllabus for AGE2011S includes practical sessions for the study of primate and human, fossil and recent skeletal material and the artefacts associated with our ancestors.
Lecture times: Monday - Thursday, 2nd period, Practicals: One 2-hour practical per week, at times to be arranged
DP requirements: Attendance at lectures and practicals and completion of assignments.
Assessment: Essays and tests count 50%; one 3-hour examination in October/November counts 50%. A sub-minimum of 40% is required for the examination.

AGE2012F   THE FIRST PEOPLE
24 NQF credits at HEQSF level 6
Convener: Dr J Wilkins
Course entry requirements: Any first-year Science course; or any one of AXL1400F (was SAN1015F,) or AGE1002S or equivalent first-year semesters; or AGE2011S; or any first-year Humanities course from cognate disciplines such as Anthropology, Historical Studies, Sociology; or by permission of the Head of Department.
Course outline:
All humans living today have a common African origin. The first humans were hunter-gatherers, as were their descendants. Indeed, our ancestors were hunter-gatherers for at least 99% of our evolutionary history, which means that our physical, psychological and social selves have been shaped by this way of life. We learn about the origin and evolution of our hunter-gatherer ancestors from genetic, fossil, archaeological and ethnographic evidence. Studies of Khoisan peoples of southern Africa have contributed significantly to our understanding of such societies. In this course we focus on the hunter-gatherer way of life over the past few hundreds of thousands of years. Specific topics covered include modern human origins, the Middle and Later Stone Age, ethnographic studies of Khoisan, the origins of pastoralism, coastal vs. arid environment adaptations, rock art and symbolic interpretation, genetics and biology, revisionism, and contemporary socio-politics and identity. In the weekly practical sessions, students will conduct hands-on, problem-solving exercises with archaeological materials.
Lecture times: Monday - Thursday, 2nd period, Practicals: One 2-hour practical per week, at times to be arranged
DP requirements: Attendance at lectures and practicals, completion of assignments and participation in a one-day fieldtrip.
Assessment: Assignments and class tests count 50% towards the final mark and one 3-hour examination written in June counts 50%. A sub-minimum of 40% is required for the examination.

Third-Year Courses

AGE3006H   DIRECTED READING & RESEARCH
36 NQF credits at HEQSF level 7
Course entry requirements: For students specialising in Archaeology, with permission of the Head of Department.
Course outline:
A flexible intensive study course in a specific area customised to the needs of individual students.
Lecture times: By arrangement
DP requirements: Completion of assignments.
Assessment: Essays and tests count 20%; a long paper counts 40%; one 3-hour examination in November counts 40%.

AGE3011F   THE ROOTS OF RECENT AFRICAN IDENTITIES
36 NQF credits at HEQSF level 7
Convener: Associate Professor S Chirikure
Course entry requirements: AGE2011S or AGE2012F, or by permission of the Head of Department.
Course outline:
In this course we explore the history of Africa's people over the past 2000 years with special reference to southern Africa. Why are southern African populations so diverse? What lies behind the linguistic map that we see today? What social, technological and palaeoenvironmental systems shaped the evolution of societies? Did Africa have any civilisations? Who did Africa interact with? We use the archaeological record of artefacts, settlement systems, food waste, environmental contexts and human skeletons. We deploy historical, material science, molecular science, anthropological and palaeoclimatic techniques to explore this rich and diverse heritage of the last two thousand years.
Lecture times: Monday - Thursday, 4th period, Practicals: One 2-hour practical per week, at times to be arranged
DP requirements: Attendance at lectures and practicals, completion of assignments.
Assessment: Assignments and class tests count 50% towards the final mark and one 3-hour examination written in June counts 50%. A sub-minimum of 40% is required for the examination.

AGE3012S   GLOBAL DIASPORAS & THE ARCHAEOLOGY OF THE HISTORICAL PAST
36 NQF credits at HEQSF level 7
Convener: Associate Professor S Hall
Course entry requirements: AGE2011S or AGE2012F, or by permission of the Head of Department.
Course outline:
Over the last thousand years, southern Africa has been connected to the world in a number of ways. From the 16th century the European push to open trade routes to the east increasingly disrupted earlier interactions between the southern African interior and the wider Indian Ocean region that had been in place from the 1st millennium AD. The European diaspora into southern Africa created new orders of power, control and trade that had massive impacts on indigenous societies who were subjected to slavery, genocide and eventually apartheid. In this course we look at these interactions and transformations from both foreign and local viewpoints, in which the idea of frontier is a central theme. The focus is on archaeological evidence and the contribution it makes to understanding the texture of life on frontiers and the new identities that frontiers created. In doing this the relationship between archaeological evidence, written sources and oral history is critically addressed, particularly in the search for perspectives that address cultural change and continuity at the local scale.
Lecture times: Monday - Thursday, 4th period, Practicals: One 2-hour practical per week, at times to be arranged

DP requirements: Attendance at lectures and practicals, completion of assignments.
Assessment: Assignments and class tests count 50% towards the final mark and one 3-hour exam written in November counts 50%. A sub-minimum of 40% is required for the examination.

AGE3013H   ARCHAEOLOGY IN PRACTICE

Please note that this course requires you to make yourselves available for field excursions during the first (March/April) and second (June/July) vacations of the academic year. While the majority of field excursions are likely to be day trips, there will be a four week residential field-school during the second vacation. It is mandatory to participate fully in all field excursions.
36 NQF credits at HEQSF level 7
Convener: Dr D Stynder
Course entry requirements: AGE2011S and AGE2012F, or by permission of the Head of Department.
Course outline:
The course will run throughout the academic year. The lecture programme (campus and field) will be flexible and a schedule will be decided upon in consultation with participating students. The curriculum covers training in site location, excavation, field note taking, stratigraphic observation, site survey, use of GPS and total station, photography, rock art recording, processing of field observations, spread sheet use, preliminary conservation and accessioning of materials, preliminary analyses and report writing.
DP requirements: Participation in all field excursions and completion of all assignments.
Assessment: A class test counts 30%; a group project counts 20%; the final examination counts 50%.

Postgraduate Courses

AGE4000W   ARCHAEOLOGY HONOURS

Since the code AGE4000W will not carry a NQF credit value, students will be concurrently registered for AGE4003W (coursework component of 112 NQF credits) and AGE4004W (research project of 48 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr J Wilkins
Course entry requirements: A BSc degree majoring in Archaeology and an acceptable academic record. Students applying for admission to the Honours programme in Archaeology must satisfy the Head of Department that they have adequate fieldwork experience.
Course outline:
The purpose of the Honours programme in Archaeology is to look in depth at current issues in the discipline, both internationally and in southern Africa. Those taking part are expected to become fully involved in the academic life of the Department, attending such seminars as may be given by staff members, research students and visitors. In addition, they must participate in the structured programme of lectures and tutorials, and write a research dissertation. The dissertation is a central part of the Honours programme. Each student must prepare a project proposal, worked out with a supervisor and approved by the Head of Department. In addition, students must take part in one open seminar, where they present their project to the Department. All students are required to participate in two weeks of fieldwork.
Assessment: On average the course work component counts 70% (this includes 50% from final examinations) and the research project counts 30%. A sub-minimum of 50% is required for the research project. These component parts of the course will be combined in a final overall mark which will be reflected against the course code AGE4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

AGE4001W   ARCHAEOLOGY & ENVIRONMENTAL SCIENCE HONOURS

Since the code AGE4001W will not carry a NQF credit value, students will be concurrently registered for AGE4005W (coursework component of 112 NQF credits) and AGE4006W (research project of 48 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr J Wilkins
Course entry requirements: A BSc degree with majors in both Archaeology and Environmental & Geographical Science. Acceptance will be at the discretion of the Head of Department.
Course outline:
Using the resources of both the Departments of Archaeology and Environmental & Geographical Science, this Honours programme focuses on the palaeoenvironmental context in which humans lived during the long course of the Quaternary. Course requirements include modules from both Archaeology and from Environmental & Geographical Science and a research project (48 credits).
Assessment: On average the course work component counts 70% (this includes 50% from final examinations) and the research project counts 30%. A sub-minimum of 50% is required for the research project. These component parts of the course will be combined in a final overall mark which will be reflected against the course code AGE4001W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

AGE5000W   ARCHAEOLOGY DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
See also AGE5006W, Faculty of Humanities Handbook.
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material.

AGE6000W   ARCHAEOLOGY THESIS

360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF ASTRONOMY

The Department is housed in the RW James Building, 9 University Avenue
Telephone (021) 650-5830 Fax (021) 650-4547; website http://www.ast.uct.ac.za
The Departmental abbreviation for Astronomy is AST.

Professor and Head of Department:
P A Woudt, MSc *Groningen* PhD *Cape Town*
South African Research Chair in Astrophysics & Space Science:
T H Jarrett, PhD *Amherst*
SKA South African Research Chair in Multi-wavelength Extragalactic Astronomy:
C Carignan, MSc *Montréal* PhD *Canberra,* MASSAf
UCT-UWC-SKA Chair in Radio Astronomy:
R Taylor, MSc PhD *Vancouver*
Professor:
R C Kraan-Korteweg, Diplom (MSc) *Basle* PhD Phil II *Basle* FRSSAf, MASSAf
Senior Scholar:
B Warner, BSc Hons PhD DSc *London* MA DSc *Oxon* DSc (h.c) *Cape Town* Hon FRSSAf Hon Fell *UCL*
Honorary Professors:
W J G de Blok, MSc PhD *Groningen*
M W Feast, BSc Hons PhD *London* DSc (h.c) *Cape Town* ARCS DIC Assoc.RAS FRSSAf MASSAf FSAIP
T B Williams, BSc *Purdue* PhD *Caltech*
SKA Visiting Professor:
R Fender, PhD *OU Milton Keynes*
Adjunct Professor:
P A Whitelock, DIC PhD *London* Assoc RAS FRSSAf MASSAf
Senior Lecturers:
S-L Blyth, MSc PhD *Cape Town*
V A McBride, BSc Hons MSc *Cape Town* PhD *Southampton*
K J van der Heyden, BSc Hons MSc *Cape Town* PhD *Utrecht*
Lecturer:
B Frank, PhD *Cape Town*
Honorary Research Associate:
M Schurch, PhD *Soton*
Honorary Academic Member:
P K S Dunsby, BSc PhD *London*
Computer System Manager:
S Funani
Computer System Administrator:
B Kuck
Administrative Officer:
C Marsh
IDIA Administrator:
N Walker
NASSP Administrator:

Administrative Assistant:
R Daniels

RESEARCH CENTRE IN ASTROPHYSICS, COSMOLOGY AND GRAVITATION (ACGC)
Directors:
P K S Dunsby (MAM), BSc PhD *London*
R C Kraan-Korteweg (AST), Diplom (MSc) *Basle* PhD Phil II *Basle* FRSSAf, MASSAf
Deputy Directors:
T H Jarrett, PhD *Amherst*
J Murugan (MAM), MSc PhD *Cape Town*
Core Members:
S-L Blyth (AST), MSc PhD *Cape Town*
C Carignan (AST), MSc *Montréal* PhD *Canberra*
C A Clarkson (MAM), BSc Hons *Edinburgh* PhD *Glasgow*
G F R Ellis (MAM), BSc Hons BCom (Hons) *Cape Town* PhD *Cantab* DSc (h.c) *Natal, Haverford*
M W Feast (AST), BSc Hons PhD *London* DSc (h.c) *Cape Town* ARCS DIC Hon FRAS FRSSAf
MASSAf FSAIP
R Fender (AST), PhD *OU(Milton Keynes)*
C W Hellaby (MAM), BSc Hons *St Andrews* MSc PhD *Queen's (Ontario)*
V A McBride (AST; UCT/SAAO), BSc Hons MSc *Cape Town* PhD *Southampton*
B Osano (MAM), MSc PhD *Cape Town*
J P Shock (MAM), MPhys *Bristol* PhD *Southampton*
D Solomons (MAM), MSc PhD *Cape Town*
R Taylor (AST), MSc PhD *Vancouver*
K J van der Heyden (AST), BSc Hons MSc *Cape Town* PhD *Utrecht*
B Warner (AST), BSc Hons PhD DSc *London* MA DSc *Oxon* DSc (h.c) *Cape Town* Hon FRAS
Hon FRSSAf Hon Fell *UCL*
A Weltman (MAM), BSc Hons *Cape Town* PhD *Columbia*
P A Whitelock (AST; UCT/SAAO), DIC PhD *London* Hon FRAS FRSSAf MASSf
P A Woudt (AST), MSc *Groningen* PhD *Cape Town*

It also incorporates numerous postdoctoral fellows: Drs Armstrong, Bartlett, Charmandy, Deg, Elson, Joseph, Libert, Magoulas, Townsend, Zwart (AST) and Drs Abbott, Bioullot, Busti, Gomez, Jacobs, Lopez, Malele, Poltis (MAM)

Affiliated members from other departments and faculties at UCT, the SAAO, the KAT Project Office, UWC and the National Institute for Theoretical Physics are welcome.

INTER-UNIVERSITY INSTITUTE FOR DATA INTENSIVE ASTROPHYSICS (IDIA)
The Institute, hosted in the Department of Astronomy, is a partnership between the University of Cape Town, the University of the Western Cape and North-West University. It involves researchers in astronomy, statistics, computer science at the three partner universities and the UCT eResearch Centre.
Core Members:
B Bassett (MAM), MSc *Cape Town* PhD *Trieste*
A Beitz (UCT/eResearch), BEng BSc *Queensland*
S-L Blyth (AST), MSc PhD *Cape Town*
C Carignan (AST), MSc *Montréal* PhD *Canberra*
J W A Cleymans (PHY), MSc D en Sc *Louvain* FRSSAf
M Cluver (PHY-UWC), BSc Hons, MSc PhD *Cape Town*
R Davé (PHY-UWC), MSc *California* PhD *Santa Cruz*
T Dietel (PHY), Dipl Phys *Heidelberg* Dr phil nat *Frankfurt am Main*
M W Feast (AST), BSc Hons PhD *London* DSc (h.c) *Cape Town* ARCS DIC Hon FRAS FRSSAf
   MASSAf FSAIP
R Fender (AST), PhD *OU(Milton Keynes)*
J E Gain (CSC), MSc *Rhodes* PhD *Cantab*
A Hamilton (PHY), MSc PhD *Alberta*

T Jarrett (AST), PhD *Amherst*
R C Kraan-Korteweg (AST), Diplom (MSc) *Basle* PhD Phil II *Basle* FRSSAf, MASSAf
M Kuttel (CSC), MSc PhD *Cape Town*
M J P Lacerda (STA), MSc *Cape Town* PhD *Galway*
S Lubbe (STA), MCom PhD *Stell*
R Maartens (PHY-UWC), BSc Hons PhD *Cape Town*
P Marais (CSC), MSc *Cape Town* DPhil *Oxon*
V A McBride (AST; UCT/SAAO), BSc Hons MSc *Cape Town* PhD *Southampton*
M Santos (PHY-UWC), MSc *Cantab* PhD *Oxon*
R Simmonds (CSC), PhD *Bath*
R Taylor (AST; UWC/PHY:Director), MSc PhD *Vancouver*
M Vaccaria (PHY-UWC), MSc PhD *Padova*
K J van der Heyden (AST), BSc Hons MSc *Cape Town* PhD *Utrecht*
M Varughese (STA), BSc Hons MSc *Wits* DipAc&Tech *Edinburgh* PhD *Cape Town*
B Warner (AST), BSc Hons PhD DSc *London* MA DSc *Oxon* DSc (h.c) *Cape Town* Hon FRAS
   Hon FRSSAf Hon Fell *UCL*
P A Whitelock (AST; UCT/SAAO), DIC PhD *London* Hon FRAS FRSSAf MASSf
P A Woudt (AST), MSc *Groningen* PhD *Cape Town*

RESEARCH IN ASTRONOMY
Research at the Astronomy Department covers a number of distinct themes, ranging from *Galactic Composition and Stellar Evolution* (Professors Feast and Whitelock) and *Accretion Physics in Compact Stellar Binaries* (Professors Woudt, Warner and Fender and Dr McBride) to *Neutral Hydrogen and Dark Matter Content of Nearby Galaxies* (Professors Carignan, Jarrett, de Blok, Williams and Dr Frank), *Star Formation and Galaxy Evolution* (Professor Kraan-Korteweg, Drs Blyth and van der Heyden) and *Large-Scale Structures of Galaxies and the Zone of Avoidance* (Professors Kraan-Korteweg and Jarrett and Dr Blyth). A new research theme in the Astronomy Department is *Cosmic Magnetism* (Professor Taylor).
In each of these thematic areas, expertise exists in the department across a range of ground- and space-based observational techniques in X-ray, optical, infrared and radio astronomy, with the additional expertise in developing optical astronomical instrumentation (e.g. electron-multiplying CCDs). Besides leading many research projects on SALT, members of the Department of Astronomy lead four of the ten MeerKAT Large Survey Projects.

Undergraduate Courses

First-Year Courses

AST1000F   INTRODUCTION TO ASTRONOMY
Three sessions are held in the Planetarium of Iziko Museums of Cape Town, plus five tutorial sessions and five practical sessions.
18 NQF credits at HEQSF level 5
Convener: Dr SL Blyth
Course entry requirements: None
Course outline:
The course introduces students to the subject of Astronomy and our place in the universe from the small scales of the Earth-Sun-Moon system to the large scales of distant galaxies. It aims to provide insight into how we study astrophysical objects via EM radiation and telescopes (theory) as well as providing a high-level overview of objects in the universe, moving outwards from our solar system, to stars and stellar remnants, our galaxy and others, dark matter and cosmology, and the study of the universe at the largest scales. The course is open to all interested students as well as providing a solid introduction to those wishing to continue in astrophysics.
Lecture times: Monday - Friday, 5th period

DP requirements: Satisfactory attendance at lectures and compulsory attendance at Wednesday afternoon sessions and submission of bi-weekly problem sets; class record of at least 35%.
Assessment: Class record: 50%, June examination 2 hours: 50%. Sub-minimum: 40% for final examination.

Second-Year Courses

AST2002H   ASTROPHYSICS
One fieldtrip to the South African Astronomical Observatory, Sutherland.
24 NQF credits at HEQSF level 6
Convener: Dr V A McBride
Course entry requirements: PHY1004W, MAM1000W
Course outline:
This course presents an introduction to the theoretical aspects of modern astrophysics. The key objective is to illustrate the application of physical laws in an astronomical context and to explain how we know what we do about the universe and its constituents. Subject matter broached includes: Celestial mechanics; radiation laws; blackbody radiation, Planck function and approximations; magnitudes; the hydrogen atom; stellar spectroscopy; stellar evolution and remnants; special relativity; the Earth-Moon system; the Solar system; extrasolar planets; stellar motions; the Milky Way and other galaxies; the extragalactic distance scale; large scale structure; Newtonian cosmology.
Lecture times: Mon, Wed, and Fri, 2nd period (no Friday lecture in second semester), Tutorials: 10 Compulsory tutorial/practical sessions over the year, Wed, 14h00-17h00
DP requirements: Satisfactory attendance at lectures and tutorials; class mark of at least 35%.
Assessment: Three class tests count 25%; 10 compulsory tutorials/practicals including a virtual observatory project, an essay and one presentation count 25%. One 2-hour final examination in November counts for 50%; subminimum requirement of 40% for final examination.

AST2003H   ASTRONOMICAL TECHNIQUES
One observational radio astronomy project and one observational optical astronomy project, by arrangement. One fieldtrip to South African Astronomical Observatory, Sutherland
24 NQF credits at HEQSF level 6
Convener: Dr K van der Heyden
Course entry requirements: PHY1004W and MAM1000W (pre-requisites), or   PHY1023H and MAM1005H (pre-requisites) and PHY1004W and MAM1006H (co-requisites)
Course outline:
This course combines a large practical component (radio and optical astronomy practicals) with theoretical background in astronomical techniques, instrumentation and data analysis. The techniques, instrumentation and data analysis section includes: Positional astronomy: time systems, spherical astronomy, co-ordinate systems and conversions, astrometry; Detection systems: interaction of radiation and matter, ultraviolet and optical detectors; Optics and telescope design; Multi-wavelength astronomy: infrared, ultraviolet, x-ray and gamma–ray astronomy, fundamentals of radio astronomy; Observational techniques: photometry and spectroscopy; Orthodox statistics: probability distributions, Chi-squared distribution, propagation of errors; Stochastic processes and noise: photon noise.
Lecture times: Tue and Thu, 2nd period (no Thursday lectures in second semester), Tutorials: Five over the year, Wed, 14h00-16h30, by arrangement
DP requirements: Satisfactory attendance at lectures and tutorials. Attendance at all fieldwork practicals. Class record of at least 35%.
Assessment: Two class tests 15%; 5 tutorials over the year in which students will learn astronomical data analysis and statistical techniques count 10%. One 2-hour theoretical examination counts 25%; two projects count 40% and presentation counts 10%

Third-Year Courses

AST3002F   STELLAR ASTROPHYSICS

Two evening observing sessions at the UCT teaching observatory, by prior arrangement.
36 NQF credits at HEQSF level 7
Convener: Professor P A Woudt
Course entry requirements: AST2002H and AST2003H (or AST2002S), PHY2004W (or PHY2014F and PHY2015S), MAM2000W (or MAM2004H and MAM2047H).
Course outline:
This course introduces fundamental concepts such as radiative transfer and opacity to explain the observed spectroscopic and photometric signatures of stars. Students will interpret the observed intrinsic properties of stars through a theoretical understanding of the energy production inside stars and the propogation of the electromagnetic radiation from the stellar core through its interior to the stellar surface, from where the radiation escapes unhindered. The life cycle of stars is considered in great detail, from the collapse of an interstellar gas cloud to the end products of stellar evolution: white dwarfs, neutron stars and black holes. This course includes an observational component in which the students use the modern teaching observatory on campus to derive fundamental properties of stars and stellar systems.
Lecture times: Monday - Friday, 2nd period, Practicals: One practical or tutorial per week, Wed, 14h00-16h00
DP requirements: Satisfactory attendance at lectures and tutorials; class record of at least 35%.
Assessment: Class record 50% (this includes two class tests, tutorials, and practicals); one 2-hour final examination 50%; subminimum requirement of 40% for final examination.

AST3003S   GALACTIC & EXTRAGALACTIC ASTROPHYSICS

One observing trip to Sutherland in the semester break is compulsory.
36 NQF credits at HEQSF level 7
Convener: Professor R C Kraan-Korteweg
Course entry requirements: AST2002H and AST2003H (or AST2002S), PHY2004W (or PHY2014F and PHY2015S), MAM2000W (or MAM2004H and MAM2047H).
Course outline:
The aim of this course is to provide a broad introduction to galactic & extragalactic astrophysics and cosmology. Topics will include the Milky Way and normal galaxies, supermassive black holes, active galaxies, clusters of galaxies, and cosmology and the origin of structure in the universe. Current hot topics in the area are also discussed in lectures from time to time and students are encouraged to keep abreast of the latest developments. A further aim is to develop observing data reduction skills. Students will therefore participate in a fieldtrip to the South African Astronomical Observatory in Sutherland, where they will obtain their own spectroscopic data and will be taught how to do the data reduction and analysis.
Lecture times: Monday - Friday, 2nd period, Practicals: One practical or tutorial per week, Wed, 14h00-16h30
DP requirements: Satisfactory attendance at lectures and tutorials; class record of at least 35%.
Assessment: Class record 50% (this includes two class tests, tutorials, and practicals); one 2-hour final examination 50%; subminimum requirement of 40% for final examination.

Postgraduate Courses

AST4007W   ASTROPHYSICS & SPACE SCIENCE HONOURS
Since the code AST4007W will not carry a NQF credit value, students will be concurrently registered for AST4008W (coursework component of 128 NQF credits) and AST4009W (research project of 32 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr K van der Heyden
Course entry requirements: AST3002F and AST3003S or PHY3004W (or PHY3021F and PHY3022S) or MAM3040W or equivalent. Candidates with an Engineering background will also be considered. Enrollments are limited to 20 students. Candidates must satisfy the Steering Committee that they have sufficient background in Mathematics and Physics. Admission is subject to the approval of the Steering Committee and an application must be made before 30th September of the preceding year. Late applications will also be considered.
Course outline:
The Honours course in Astrophysics & Space Science consists of courses presented by distinguished South African researchers from research institutions participating in NASSP. There is a theory component which includes courses in spectroscopy, electrodynamics, general relativity, general astrophysics, galaxies, computational physics, astrophysical fluid dynamics and computational methods, as well as an observational techniques component which includes optical and infrared astronomy and radio astronomy. In addition students will complete a mini research project as well as a main research project and go on a number of fieldtrips to the national facilities.
DP requirements: Satisfactory lecture attendance (minimum 50%); class record of at least 40%.
Assessment: The assessment of the coursework is based on the class records and examinations for each of the modules. In general they are made up from tests, oral presentations, projects and a final examination. Examinations count 40%, class record 40% and research project 20% of the final result. The project component must be passed at 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code AST4007W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

AST5000W   ASTRONOMY DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

AST5001W   ASTROPHYSICS & SPACE SCIENCE MINOR DISSERTATION
(National Astrophysics & Space Science Programme (NASSP))
90 NQF credits at HEQSF level 9
Course entry requirements: AST5003F
Course outline:
This course consists of an investigation of an approved research topic on which a minor dissertation must be presented for formal assessment. The minor dissertation shall demonstrate the successful

completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

AST5003F   ASTROPHYSICS & SPACE SCIENCE COURSEWORK

(National Astrophysics & Space Science Programme (NASSP). All students on the National Astrophysics & Space Science Programme (NASSP) will enrol (and pay fees) for the coursework component (AST5003F) at the start of their first year of registration. Those who choose to remain at UCT to complete the minor dissertation component (AST5001W, MAM5005W or PHY5003W) will be required to enrol (and pay fees) for the minor dissertation component in July. Where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s.
90 NQF credits at HEQSF level 9

Convener: Dr K van der Heyden

Course entry requirements: This course is open to Honours graduates in Astronomy and Space Science (AST4007W), Physics (PHY4000W, PHY4001W, PHY4002W) or equivalent, and Engineering. Entrance is subject to a minimum pass mark of 60% in the Honours degree.

Course outline:

This course consists of a selection of advanced topics presented by distinguished South African researchers from research institutions participating in NASSP. The courses vary from year to year but usually include cataclysmic variables, extragalactic astronomy, space technology, hot topics in cosmology, advanced general relativity, high energy astrophysics, observational cosmology, geomagnetism and aeronomy, plasma physics and magnetohydrodynamics.

Assessment: On average, examinations of individual modules count 60% of the final result, and marked practical work counts 40%.

AST6000W   ASTRONOMY THESIS

360 NQF credits at HEQSF level 10

Course outline:

The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF BIOLOGICAL SCIENCES

The Department is housed in the John Day Building, 20 University Avenue
Telephone (021) 650-3603/4 Fax (021) 650-3301
and the H W Pearson Building, 8 University Avenue
The Animal Demography Unit may be reached on telephone (021) 650-2423
The Percy Fitzpatrick Institute for African Ornithology may be reached on telephone (021) 650-3291
The Plant Conservation Unit may be reached on telephone (021) 650-2440
The Departmental abbreviation for Biological Sciences is BIO.

Associate Professor and Head of Department:
A M Muasya, MPhil *Moi* PhD *Reading*
Leslie Hill Professor of Plant Conservation:
M T Hoffman, BSc Hons PhD *Cape Town*
Pola Pazvolsky Chair of Conservation Biology:
C Spottiswoode, BSc Hons *Cape Town* PhD *Cantab*
H W Pearson Honorary Professor of Botany:
J S Donaldson MSc *Rhodes* PhD *Cape Town*
Professors:
J J Bolton, BSc Hons PhD *Liverpool*
A Chinsamy-Turan, BSc Hons PhD *Wits*
T A Hedderson, MSc *Memorial* PhD *Reading*
J J Midgley, BSc Hons PhD *Cape Town*
M J O'Riain, BSc Hons PhD *Cape Town*
P G Ryan, MSc PhD *Cape Town*
Senior Scholars:
G M Branch, BSc Hons PhD *Cape Town* FRSSAf
G Gäde, MSc PhD *Munster*
C L Griffiths, BSc Hons *Soton* PhD *Cape Town*
L G Underhill, MSc PhD *Cape Town*
Emeritus Professor:
W J Bond, BSc Hons *Exeter* MSc *Cape Town*
Honorary Professors:
R M Cowling, BSc Hons PhD *Cape Town*
L Hutchings, BSc Hons PhD *Cape Town*
H P Linder, BSc Hons PhD *Cape Town*
Associate Professors:
C Attwood, BSc Hons PhD *Cape Town*
M D Cramer, MSc *Wits* PhD *Cape Town*
E C February, BA (Hons) PhD *Cape Town*
L Gillson, MSc *Imperial* DPhil *Oxon*
M I Lucas, BSc Hons PhD *Wales*
C L Moloney, BSc Hons PhD *Cape Town*
M D Picker, BSc Hons PhD *Wits*
G A Verboom, BSc Hons PhD *Cape Town*
South African Research Chair in Animal Evolution and Systematics:
D S Jacobs, BSc Hons *Cape Town* PhD *Hawaii*
South African Research Chair in Marine Ecology & Fisheries:
A Jarre, MSc *Kiel* PhD *Bremen*
Emeritus Associate Professors:
J A Day, BSc Hons PhD *Cape Town*
J H Hoffmann, MSc PhD *Rhodes*
J U M Jarvis, MSc *Cape Town* PhD *East Africa* FRSSAf

Honorary Associate Professor:
R J Anderson, BSc Hons *Wits* PhD *Cape Town*
Senior Lecturers:
A D Amar, BSc Hons *Newcastle* PhD *Aberdeen*
J M Bishop, BSc Hons *King's College London* PhD *Cape Town*
G N Bronner, MSc PhD *Natal*
R Kelly-Laubscher, BSc PhD *UCC*
H Marco, BSc Hons PhD *Cape Town*
D Pillay, BSc Hons PhD *UKZN*
C C Reed, MSc PhD *UFS*
R L Thomson, MSc PhD *Oulu*
A G West, MSc *Cape Town* PhD *Utah*
Lecturers:
S B M Chimphango, MSc *Malawi* PhD *Cape Town*
S J Cunningham, BSc *Victoria* PhD *Massey*
L M Kruger, MSc PhD *Cape Town*
Honorary Research Associates:
R Barlow, PhD *Cape Town*
N G Bergh, BSc Hons PhD *Cape Town*
P J Carrick, PhD *Cantab*
O Curtis, PhD *Cape Town*
H Dallas, BSc Hons *Rhodes* MSc PhD *Cape Town*
R Govender, PhD *Wits*
H J Hawkins, BSc Hons MSc *Cape Town* PhD *Germany*
J Huggett, PhD *Cape Town*
S E Kerwath, MSc *Erlangen* PhD *Rhodes*
C Klak, BSc Hons PhD *Cape Town*
K Ludynia, PhD *Germany*
L Mattio, BSc Hons *Napier* MSc PhD *Marseille*
B M C J Paterson, MA *Aachen* PhD *Cape Town*
G C Pitcher, PhD *Cape Town*
T Samaai, PhD *UWC*
C Savage, BSc Hons *Cape Town* PhD *Stockholm*
G Scott, MSc PhD *Cape Town*
A H W Seydack, BSc Hons PhD *Stell*
K Sink, PhD *Cape Town*
J A Slingsby, BSc Hons PhD *Cape Town*
C H Stirton, PhD *Cape Town*
C van der Lingen, PhD *Cape Town*
H Van der Merwe, PhD *Pret*
H Verheye, PhD *Cape Town*
NRF Research Career Advancement Fellows:
L Blamey, PhD *Cape Town*
S L Steenhuisen, PhD *UKZN*
Postdoctoral Fellows:
D Angst, PhD *France*
A Bastian, PhD *doctor rerum naturalium* , *Germany*
Y Barshep, PhD, *Nigeria*
M R Brand, PhD *Cape Town*
T Charles-Dominique, PhD *Montreal*
A Coetzee, PhD *Stellenbosch*
B Cristescu, PhD *Alberta USA*
R Cooper, PhD *Cape Town*
M D Cyrus, PhD *Cape Town*

E Hellard, PhD *Lyon*
S D Hofmeyr, PhD *Cape Town*
J A Howard, PhD *Dunelm*
S Lardy, PhD *Lyon*
A T K Lee, PhD *Manchester*
J Miller, PhD *Yale USA*
T I Mzumara, PhD *UKZN*
N Nesi, PhD *Paris, France*
M Noyon, PhD, *Cherbourg, France*
D Okubamichael, MSc, PhD *Eritrea*
S T Osinubi, PhD *Canterbury*
D Parker, PhD *Rhodes*
M Rat, PhD *Cape Town*
C Reynolds, PhD *Cape Town*
E L Rocke, PhD *Hong Kong*
L E Serieys, PhD *UCLA, USA*
C D Shelton, PhD *Bonn, Germany*
P Sumasgutner, PhD *Vienna*
A van Heteren*,* PhD *UK*
N Visser, PhD, *Cape Town*
F G. Weller, PhD *Munich*
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Principal Technical Officers:
G A Aguilar, MSc *Chile*
P Müller
A Plos, BSc *Cape Town*
Chief Scientific Officer:
L V Phigeland, BSc *Cape Town*
Chief Technical Officer:
G du Plessis
Senior Technical Officer:
D I Barnes, BA *Cape Town* BPhil *Stell*
Departmental Administrative Manager:
C Khai
Administrative Assistants:
N Jodamus
A Stain
Senior Secretary:
S Abrahams
Departmental Assistants:
N Davids
G Faulmann
Z Jikumlambo
D Meyer, BSc *UWC*

BOLUS HERBARIUM
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A M Muasya, MPhil *Moi* PhD *Reading*
Keeper:
J J Midgley, BSc Hons PhD *Cape Town*
Curator/Principal Scienctific Officer:
T H Trinder-Smith, BSc Hons MSc *Cape Town*

Principal Scientific Officer (part-time):
C Klak, BSc Hons PhD *Cape Town*
Librarian:
A K Gebregziabher, BSc *Asmara* MSc *Stell*
Departmental Assistant:
C J Christians

THE PERCY FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY
Professor and Director:
P G Ryan, MSc PhD *Cape Town*
Pola Pazvolsky Chair of Conservation Biology:
C Spottiswoode, BSc Hons *Cape Town* PhD *Cantab*
Emeritus Professors:
T M Crowe, MSc *Chicago* PhD *Cape Town*
W R Siegfried, PhD *Cape Town*
Honorary Professor:
D Cumming, BSc Hons PhD *Rhodes*
Senior Lecturers:
A D Amar, BSc Hons *Newcastle* PhD *Aberdeen*
R L Thomson, MSc PhD *Oulu*
Lecturer:
S J Cunningham, BSc *Victoria* BSc Hons PhD *Massey*
Manager, Centre of Excellence:
R M Little, PhD *Cape Town*
Honorary Research Associates:
P Barnard, MSc *Wits* PhD *Upsala*
R Covas, MSc *Lisbon* PhD *Cape Town*
G S Cumming, PhD *Oxford*
T Flower, PhD *Cantab*
D Grémillet, PhD *Kiel*
K Maciejewski, PhD *NMMU*
A R Ridley, PhD *Camb*
R Simmons, MSc *Acadia* PhD *Wits*
R Wanless, PhD *Cape Town*
Research Affiliates:
R C K Bowie, MSc PhD *Cape Town*
R.S. Boyes, PhD *UKZN*
T Cook, PhD *La Rochelle*
W R J Dean, MSc *Natal* PhD *Cape Town*
C Doutrelant, PhD *Montpellier*
A Jenkins, PhD *Cape Town*
G Joseph, PhD *Cape Town*
A Makhado, PhD *Cape Town*
A McKechnie, PhD *Natal*
M Melo, MSc *Cape Town* PhD *Edinburgh*
A Milewski, MSc *Cape Town* PhD *Murdoch*
M S L Mills, MSc *Cape Town*
S J Milton, PhD *Cape Town*
P Pistorius, PhD *NMMU*
L Roxburgh, BSc Hons *Pietermaritzburg* PhD *Ben Gurion*
C Seymour, PhD *Cape Town*
A Steinfurth, MSc *Goettingen*, PhD *Kiel*
Principal Technical Officer:
G A Aguilar, MSc *Chile*

Librarian:
S Mvungi, BEng *Lesotho* MSc *Cape Town*
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A Links
Senior Secretary:
D Scheepers

PLANT CONSERVATION UNIT
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M T Hoffman, BSc Hons PhD *Cape Town*
Associate Professor and Deputy Director:
L Gillson, BA *Oxon* MSc *Imperial* DPhil *Oxon*

ANIMAL DEMOGRAPHY UNIT
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L G Underhill, MSc PhD *Cape Town*
Honorary Associate Professor:
R J M Crawford, MSc PhD *Cape Town*
Honorary Research Associates:
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R J M Crawford, PhD *Cape Town*
S Kirkman, PhD *Cape Town*
M Remisiewicz, PhD *Gdansk Poland*
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Research Assistants:
M Brooks, Nat Dipl in Conservation
H D Oschadleus, MSc PhD *Cape Town*
Administrative Assistant:
S Kuyper, BA *Natal* HDLS *Unisa*
Postdoctoral Fellows:
Y Barshep, PhD *Cape Town*
S Hofmeyer, PhD *Cape Town*

SEAWEED RESEARCH UNIT
DEPARTMENT OF AGRICULTURE, FORESTRY & FISHERIES (DAFF)
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R J Anderson, BSc Hons *Wits* PhD *Cape Town*
Oceanographic Researcher:
M D Rothman, BSc Hons *UWC* MSc PhD *Cape Town*
Principal Oceanographic Research Assistants:
C J T Boothroyd
F A Kemp

WEED BIOLOGICAL CONTROL UNIT
Emeritus Associate Professor:
J H Hoffmann, MSc PhD *Rhodes*
Scientific Officers:
F A C Impson, BSc Hons *Rhodes* MSc *Cape Town*
C A Kleinjan, MSc *Cape Town*
V C Moran, MSc PhD *Rhodes* FRES FLS FRSSAf

RESEARCH IN THE BIOLOGICAL SCIENCES

The mission of the Department of Biological Sciences is to conduct high quality teaching and research in the biodiversity, conservation, ecology, ecophysiology, evolution, and systematics of terrestrial and aquatic life. Courses offered are designed to reflect these research interests and train students in the major areas of ecology and evolution, applied biology and marine biology.

Ecophysiology: Dr SBM Chimphango (nitrogen fixation and agriculture), Associate Professor MD Cramer (carbon-nitrogen interactions, nutritional physiology), Associate Professor EC February (plant water relations, anthropogenic impacts), Dr HG Marco (crustacean neuroendocrinology) Dr AG West (impacts of climate change, drought), Emeritus Professor G Gäde (invertebrates, neuropeptides).

Evolution and Systematics: Dr JM Bishop (evolutionary genetics, phylogeography), Dr G Bronner (micromammal systematics, conservation biology), Professor A Chinsamy-Turan (palaeobiology, vertebrate bone & teeth histology), Associate Professor D Jacobs (SARChI Chair, animal evolution and systematics, biology & behaviour of bats), Professor TA Hedderson (molecular ecology, bryophytes), Associate Professors AM Muasya (wetlands and Cyperaceae, Fabaceae) and GA Verboom (evolutionary ecology, speciation, Cape flora).

Ecology and Behaviour: Emeritus Associate Professor JA Day (fresh water ecology & conservation), Associate Professor EC February (savannas, Cape flora), Associate Professor L Gillson (long-term ecology, conservation), Associate Professor JH Hoffmann (bio-control, plant-insect interactions), Professor MT Hoffman (historical ecology, rangelands), Professor JJ Midgley (ecosystem dynamics, plant-animal interactions), Professor MJ O'Riain (behavioural ecology, human-wildlife conflict solutions), Associate Professor MD Picker (insect ecology & biodiversity), Emeritus Professor LG Underhill (applications of statistics in the biological sciences, particularly ornithology and ecology), Emeritus Associate Professor JUM Jarvis (small mammal biology, mole-rats).

Marine Biology: Associate Professor C Attwood (marine protected areas, line fish population biology), Professor JJ Bolton (seaweed biology, marine aquaculture), Emeritus Professor CL Griffiths (coastal ecology, taxonomy), Associate Professor A Jarre (SARChI Chair; ecosystem modelling, ecosystem approach to fisheries management), Associate Professor MI Lucas (biological oceanography, biogeochemical cycling), Associate Professor C Moloney (ecological modelling, fisheries), Dr D Pillay (estuarine and intertidal ecology), Dr CC Reed (parasitology, aquatic ecology), Emeritus Professor GM Branch (rocky shore & coastal ecology).

Ornithology: Dr AD Amar (conservation and raptor biology), Dr SJ Cunningham (ecophysiology, climate change, chemo-tactile reception), Professor PG Ryan (seabirds, marine mammals) Dr RL Thomson (behavioural ecology).

The department is also home to the following research entities:

The Animal Demography Unit*: Animal population dynamics, distributions and conservation with a focus on long-term monitoring and statistical modelling (Director: Emeritus Professor LG Underhill)

The Bolus Herbarium: Taxonomy of the Cape Flora (Curator: T Trinder-Smith)

The Percy FitzPatrick Institute of African Ornithology*: Avian Conservation Biology and Evolutionary Ecology (Director: Professor PG Ryan)

The Plant Conservation Unit: Plant ecology and conservation with an emphasis on long-term ecology and the Cape Flora (Director: Professor MT Hoffman, Leslie Hill Chair of Plant Conservation)

The Seaweed Research Unit of the Department of Agriculture, Forestry & Fisheries (Head: Associate Professor RJ Anderson)

Undergraduate Courses

First-Year Courses

BIO1000F   CELL BIOLOGY
18 NQF credits at HEQSF level 5
Convener: Professor T A Hedderson
Course entry requirements: Admission will be restricted to students who have passed either NSC Physical Science or Life Science with at least 60%.
NOTE: Preference will be given to students registered in the Science Faculty. Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to BIO1000H from week 7.
Course outline:
Basic biological principles and processes at a cellular level provide an essential grounding for future study in the life sciences. The structure and function of cell components is introduced, followed by the structure and functions of biological macro-molecules. Cell division and the role of genetics in inheritance and the control of biological systems is then considered. This leads into an introduction to membrane physiology, metabolism and its regulation. Cellular processes that are considered in detail include the functioning of photosynthesis and cellular respiration, and how these relate to organismal physiology.
Lecture times: Monday - Friday, 5th period, Tutorials: One per week, by arrangement, Practicals: One afternoon per week, Mon, Tue, Wed or Thu, 14h00-17h00
DP requirements: Attendance at 70% of the practicals and a minimum of 35% for the class record.
Assessment: Class record counts 45% (three class tests count 27% and a practical book mark of 18%); one practical paper counts 15%; one 2-hour examination paper written in June counts 40%. A subminimum of 40% is required in the June examination.

BIO1000H   CELL BIOLOGY
18 NQF credits at HEQSF level 5
Convener: Dr R Kelly-Laubscher
Course entry requirements: Admission will be restricted to students who have passed either NSC Physical Science or Life Science with at least 60%. The permission of the Dean or Head of Department is required prior to registration for this course.
NOTES:1) Preference will be given to students registered in the Science Faculty.2) This course only begins in week 7 and is intended for students who have been advised to transfer to this course after initially registering for BIO1000F (see entry forBIO1000F).3) The course places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning.4) BIO1000H is equivalent to BIO1000F in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
Basic biological principles and processes at a cellular level provide an essential grounding for future study in the life sciences. The structure and function of cell components is introduced, followed by the structure and functions of biological macro-molecules. Cell division and the role of genetics in inheritance and the control of biological systems is then considered. This leads into an introduction to membrane physiology, metabolism and its regulation. Cellular processes that are considered in detail include the functioning of photosynthesis and cellular respiration, and how these relate to organismal physiology.
Lecture times: Monday - Friday, 5th period, Tutorials: One per week, by arrangement, Practicals: One afternoon per week, Thu, 14h00-17h00
DP requirements: Attendance of all lectures and practicals, completion of the project and a minimum of 35% for the class record.

Assessment: Class record counts 45% (four class tests count 27% and a practical book mark of 18%); one practical examination counts 15%; one 2-hour examination paper written in November counts 40%. A subminimum of 40% is required in the November examination.

BIO1004F/S   BIOLOGICAL DIVERSITY

Preference will be given to students registered in the Science Faculty. Fieldwork: A compulsory one-day excursion will be held over a weekend.
18 NQF credits at HEQSF level 5
Convener: Professor A Chinsamy-Turan
Course entry requirements: BIO1000F or BIO1000H, or a pass at 60% in NSC Life Sciences or by permission of the Head of Department.
Course outline:
This course investigates a range of plants and animals to illustrate the diversity and complexity of living organisms. Topics covered include: historical evidence and evolution as a means of interpreting change with time; modern theories on the mechanism of evolution; the origin of species, including humans; characteristics and distribution of South African biomes. This course includes a strong practical component which further examines animal and plant diversity.
Lecture times: Monday - Friday, 5th period, Tutorials: One per week, by arrangement, Practicals: BIO1004F, one practical per week, Thu, 14h00-17h00, BIO1004S, one practical per week, Mon, Tue, Wed, Thu, or Fri, 14h00-17h00
DP requirements: Attendance of all lectures and practicals and an average of 50% for the practical record.
Assessment: Class record counts 40%; one 2-hour theory examination (written in June for BIO1004F, written in November for BIO1004S) counts 40% (subminimum of 40% applies); one 1.5-hour practical examination (written in June for BIO1004F, written in November for BIO1004S) counts 20%.

Second-Year Courses

BIO2010F   PRINCIPLES OF ECOLOGY AND EVOLUTION

A compulsory weekend fieldtrip
24 NQF credits at HEQSF level 6
Convener: Associate Professor G A Verboom
Course entry requirements: BIO1000F or BIO1000H, BIO1004F/S, STA1007S or STA100F/S highly recommended.
Course outline:
This course explains how species have evolved and have adapted to the environments in which they live. Topics include an introduction to evolution; natural selection; inheritance and genetics; ecology at the community, population and individual levels; and animal and plant life histories and interactions. The formal lectures and practicals are supported by a two-day compulsory field camp.
Lecture times: Monday - Friday, 1st period, Practicals: One per week, Mon, 14h00-17h00
DP requirements: 50% for class record, submission of assignments on schedule, and attendance at a field camp held during the Easter vacation.
Assessment: A 3-hour examination, written in June, with a sub-minimum of 40% will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%; project based on field camp data collection counts 10%; two class tests count 20%.

BIO2011S   LIFE ON LAND: ANIMALS

A compulsory five day fieldtrip during the September vacation.
24 NQF credits at HEQSF level 6
Convener: Dr G Bronner
Course entry requirements: BIO1000F or BIO1000H, BIO1004F/S.
Course outline:
This course familiarises students with the evolution, functional biology and physiology of invertebrates and vertebrate animals living in terrestrial environments. It covers the diversity and life styles of land animals (particularly myriapods, arachnids, insects and tetrapod vertebrates), and pays special attention to the major adaptations required for life on land.
Lecture times: Monday - Friday, 3rd period, One per week, Mon, 14h00-17h00
DP requirements: 40% for class record; submission of assignments on schedule and attendance at a 4 day field camp held during the September vacation.
Assessment: A 2-hour theory examination and 2-hour practical examination will each count 25% of the course, both written in November. There is a sub-minimum of 40% for the combined mark (theory & practical). Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 15%; project based on field camp data counts 15%; two class tests count 20%.

BIO2012S   LIFE ON LAND: PLANTS

A compulsory five-day field excursion.
24 NQF credits at HEQSF level 6
Convener: Dr S B M Chimphango
Course entry requirements: BIO1000F or BIO1000H, BIO1004F/S
Course outline:
Terrestrial plants inhabit a broad range of environments, that are distinguished by their abiotic (e.g. light, temperature, water, nutrients) and biotic (e.g. animals, plants, microbes) features. Adaptation to contrasting habitats has generated a diversity of form in plants, as well as a fascinating array of ecophysiological and ecological strategies. Starting with roots, stems and leaves, and finishing with reproductive structures (flowers and seeds) and life-histories, this course explores plant structure and function, and the manner in which this has changed through the course of evolutionary history. This is followed by an introduction to the diversity of vascular plants, with an emphasis on flowering plants, particularly those that typify the Cape flora. Finally, the biology of bryophytes (mosses and relatives) is considered, highlighting the very different solutions they employ for a life on land.
Lecture times: Monday - Friday, 2nd period, Practicals: One per week, Thu, 14h00-17h00
DP requirements: Minimum of 40% for class record and attendance at practicals and five-day field camp.
Assessment: A 3-hour examination written in November, with a subminimum of 40%, will count 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%, project based on field camp data collection counts 10%; two class tests count 20%.

BIO2013F   LIFE IN THE SEA

A compulsory four-day fieldtrip during the April vacation.
24 NQF credits at HEQSF level 6
Convener: Dr D Pillay
Course entry requirements: BIO1000F or BIO1000H, BIO1004F/S.
Course outline:
The Life in the Sea course is intended to introduce students to the diversity of life present in oceans, including the invertebrates, vertebrates and plants. It will focus on adaptations of form to function (locomotion, reproduction, feeding) and to habitat (rocky shore, open ocean, sedimentary). The course is also intended to familiarise students with biophysical processes that influence life in the oceans.
Lecture times: Monday - Friday, 3rd period, Practicals: Wed, 14h00-17h00

DP requirements: 50% for class record; submission of assignments on schedule; attendance at field camp.
Assessment: A 3-hour examination, written in June, with a subminimum of 40% will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%; project counts 10%; two class tests count 20%.

Third-Year Courses

BIO3002F   MARINE ECOSYSTEMS
A compulsory five-day field camp during first semester
36 NQF credits at HEQSF level 7
Convener: Professor J J Bolton
Course entry requirements: SEA2004F, BIO2013F
Course outline:
The course aims to develop and promote skills in the marine sciences in South Africa, making students familiar with global marine ecosystem structure and functioning, but with an emphasis on South African systems. Lectures, tutorials and practicals will be aimed at developing interpretative and integrative skills built during previous courses (e.g. SEA2004F; BIO1004S; BIO1000F) which cover large amounts of more basic information. A further important aim will be to develop numerical and written skills, as well as introducing students to modern research techniques and approaches.
Lecture times: Monday - Friday, 1st period, Practicals: One per week, Wed, 14h00-17h00
DP requirements: 40% for class record; submission of assignments on schedule and attendance at field camp.
Assessment: A 3-hour examination written in June, with a sub-minimum of 40% will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%; research project counts 15%; two class tests count 15%.

BIO3013F   GLOBAL CHANGE ECOLOGY
36 NQF credits at HEQSF level 7
Convener: Dr A G West
Course entry requirements: BIO1000F or BIO1000H, BIO1004F/S; approved 2000-level semester Science course.
Course outline:
How are organisms and ecosystems affected by the drivers of global environmental change? In this course we briefly explore the drivers of global change, both natural (e.g. Milankovitch cycles, tectonic drift) and anthropogenic (e.g. greenhouse gas emissions, pollution, land-use change), and then examine how these drivers influence (and are influenced by) terrestrial and marine biological systems. We cover a variety of topics, ranging from organismal and physiological responses to global change, biodiversity, global biogeochemical cycles, ecological function and ecosystem services. While the majority of the class is focussed on contemporary global change, this is contextualized relative to palaeohistorical environmental change. The course provides an integrated knowledge of contemporary environmental issues related to global change (e.g. carbon sequestration, climate change mitigation, land-use change) and its implications for biodiversity, ecosystem services and human wellbeing).
Lecture times: Monday - Friday, 2nd period, Practicals: One per week, Mon, 14h00-17h00
DP requirements: Minimum of 40% for class record.
Assessment: A 3-hour examination written in June, with a sub-minimum of 40%, will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 15%; research project counts 20%; class tests count 15%.

BIO3014S   CONSERVATION: GENES, POPULATION & BIODIVERSITY

36 NQF credits at HEQSF level 7
Convener: Associate Professor L Gillson
Course entry requirements: BIO2010F
Course outline:
This course introduces students to the science and practice of conservation biology, beginning with an overview of conservation issues, the value of biodiversity, extinction risks and the history and philosophy of conservation. The conservation of biodiversity is explored at multiple levels, including the diversity of genes, species, populations and ecosystems. At the species and population levels, the role of life history, behaviour in the management of populations in the real world is covered. The conservation and management of ecosystems is considered in terms of important processes, such as disturbance, re-wilding and threats by alien species. This course includes consideration of conservation, society, landscapes and ecosystem services. Issues to be considered here include: incentives, access, who benefits from conservation, legal aspects and management policies.
Lecture times: Monday - Friday, 2nd period, Tutorials, by arrangement, Practicals: One per week, Mon, 14h00-17h00
DP requirements: Submission of assignments by due date and 50% subminimum.
Assessment: A 3-hour examination written in November, with a sub-minimum of 40%, will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%; project work counts 15%; two class tests count 15%.

BIO3015F   ECOLOGY

This course is a residential two week field course, occurring before term starts. During term time further lectures and various assignments need to be completed.
36 NQF credits at HEQSF level 7
Convener: Associate Professor M D Cramer
Course entry requirements: BIO2010F
Course outline:
This course concerns advanced topics in African terrestrial ecology. We span variation in scale, from local community ecology (such as of freshwaters) to ecosystem ecology (such as the dynamics of fynbos, forest and savanna). We focus on plants and animals, as well as their interactions. Important environmental factors (such as soil, climate and water) are also considered. Some further topics that are dealt with are biogeochemistry (from geology and nutrients to plant and animal distributions), disturbance and succession (such as the role of fire and herbivory), patterns and causes of animal and plant distributions and of species richness. The course is fieldwork-orientated with a two-week fieldtrip before the first semester starts. This provides ample opportunity for lectures as well as studying plants, animals, their interactions and the role of local environments. During the rest of the semester emphasis is placed on completing practical assignments, with only a limited number of lectures.
Lecture times: Monday - Friday, 5th period
DP requirements: A minimum of 40% for class record, attendance of two week field camp.
Assessment: A 3-hour examination written mid-semester will count for 50% of the course with a sub-minimum of 40%. Coursework marks will be allocated as follows: Practical and project work counts 40%; one class test counts 10%.

BIO3016S   EVOLUTIONARY BIOLOGY

A compulsory weekend fieldtrip.
36 NQF credits at HEQSF level 7
Convener: Professor J J Midgley
Course entry requirements: BIO2010F

Course outline:
This course deals with the description and analysis of biodiversity and evolution at the species level and above. The course begins by considering the nature and definition of species, the processes by which new species arise in nature (speciation), and the data and procedures employed in the practical discovery and description of previously-undescribed species. Thereafter, the focus shifts to the inference of evolutionary relationships amongst populations and species, with an emphasis on the types of data and the analytical methods employed. Following on from this, the course explores macroevolutionary approaches to the study of adaptation, key innovation and lineage diversification (radiation), and approaches employed in studying the genetic mechanisms that underpin adaptation and species radiation. The course concludes with an exploration of selected 'big' questions in evolutionary biology, such as the coevolution (mutualism, parasitism), evolution of sex and the evolution of cooperative behaviour.
Lecture times: Monday - Friday, 5th period, Tutorials: By arrangement, Practicals: One per week, Tue, 14h00-17h00
DP requirements: Minimum of 40% for class record and attendance at weekend field camp.
Assessment: A 3-hour examination written in November, with a sub-minimum of 40%, will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 20%; project based on field camp data collection counts 15%; two class tests count 15%.

BIO3017S   MARINE RESOURCES
36 NQF credits at HEQSF level 7
Convener: Associate Professor C Attwood
Course entry requirements: BIO2013F
Course outline:
Topics include the diversity and life-history strategies of living marine resources, the diversity of fishing methods and fisheries, surplus production and responses of exploited populations, monitoring and assessment techniques, regulatory strategies, non-consumptive industries, diversity and principles of marine aquaculture, and marine conservation theory and practise.
Lecture times: Monday - Friday, 3rd period, Tutorials: By arrangement, Practicals: One per week, Fri, 14h00-17h00
DP requirements: 50% for class record; submission of assignments on schedule.
Assessment: A 3-hour examination written in November, with a sub-minimum of 40% will count for 50% of the course. Coursework marks will be allocated as follows: Practical classes count 12%; project work counts 18%; two class tests count 20%.

Postgraduate Courses

BIO4000W   BIOLOGICAL SCIENCES HONOURS
Since the code BIO4000W will not carry a NQF credit value, students will be concurrently registered for BIO4002W (coursework component of 88 NQF credits) and BIO4003W (research project of 72 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr J M Bishop
Course entry requirements: A BSc degree in Biology. Enrolments are limited to 32, and acceptance will be at the discretion of the Head of Department who will consider quality of final year results, material covered in the undergraduate curriculum, and also possibly referees' reports.
Course outline:
The Honours course is designed to enrich the student's appreciation of theory through advanced coursework, essay writing, seminars, discussion groups and compulsory fieldwork. In addition to compulsory coursework modules, students are required to choose eight elective modules. Students will conduct two research projects.

Assessment: Two 3-hour examinations written in November count 16%; two projects count 50%; a research seminar counts 5%; compulsory coursework counts 9%; elective coursework counts 20%. The non-project component of the course carries a sub-minimum of 45% and the project component a sub-minimum of 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code BIO4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

BIO4001W   MARINE BIOLOGY HONOURS
Since the code BIO4001W will not carry a NQF credit value, students will be concurrently registered for BIO4004W (coursework component of 88 NQF credits) and BIO4005W (research project of 72 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr J M Bishop
Course entry requirements: BSc degree in Marine Biology. Enrolments are limited to 10, and acceptance will be at the discretion of the Head of Department who will consider quality of final year results, material covered in the undergrad curriculum, and also possibly referees' reports.
Course outline:
The Honours course is designed to enrich the student's appreciation of theory through advanced coursework, essay writing, seminars, and discussion groups and a compulsory fieldtrip. In addition to compulsory coursework modules, students are required to choose eight elective modules. At least four electives must be marine topics; students will conduct one research project.
Assessment: Two 3-hour examinations written in November count 16%; projects and research seminars count 55%; compulsory coursework counts 9%; elective coursework counts 20%. The nonproject component of the course carries a sub-minimum of 45% and the project component a subminimum of 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code BIO4001W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

BIO5005H   APPLIED MARINE SCIENCE COURSEWORK
Students will enrol (and pay fees) for both courses BIO5005H and BIO5006W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s.
90 NQF credits at HEQSF level 9
Convener: Dr C Reed
Course entry requirements: A relevant honours degree or equivalent in Marine Sciences or related field. The course is intended for professional scientists interested in applied aspects of marine science.
Course outline:
The objective of this course is to provide skills and specialised knowledge appropriate for a broad range of disciplines in marine science. It is intended for professional scientists interested in applied aspects of marine science, where broadly-based, practical skills are required, often in a management context. This coursework component runs for approximately 7-8 months, and consists of a series of modules. Students are engaged full-time with activities relating to the modules. Topics include coastal and shelf oceanography, marine ecology, numerical skills (Matlab), statistics, marine environmental law, mariculture, remote sensing, multivariate analysis, marine conservation, marine project management, ecosystem approach to fisheries management, decision analysis, ecosystem modelling and marine global change.. The modules are conducted in a classroom setting involving lectures and tutorials, and field and laboratory practicals.
DP requirements: Satisfactory completion of each module, and a pass in the first examination; we reserve the right to ask students to leave part way through the course if their progress is deemed unsatisfactory.

Assessment: Students are assessed on each module, with formal marks for essays, presentations and mini-projects, and in some cases for class tests. Two formal examinations are used to assess progress, and to consolidate the material covered in the completed modules. Overall class assessments will count 60% and two formal examinations will count 40%.

BIO5006W   APPLIED MARINE SCIENCE MINOR DISSERTATION

Students will enrol (and pay fees) for both courses BIO5005H and BIO5006W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s.
90 NQF credits at HEQSF level 9
Convener: Dr C Reed
Course entry requirements: BIO5005H
Course outline:
The research component must be submitted as a minor dissertation for formal examination. The expected duration of the research component is 5-6 months.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

BIO5007H   CONSERVATION BIOLOGY COURSEWORK

Students will enrol (and pay fees) for both courses BIO5007H and BIO5008W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s.
90 NQF credits at HEQSF level 9
Convener: Associate Professor P G Ryan and Dr S J Cunningham
Course entry requirements: A relevant honours degree or equivalent: students with an honours degree from another discipline may be required to register for an MPhil in Conservation Biology.
Course outline:
This course deals with the conservation and biologically sustainable use of biodiversity. It provides the education and training necessary to identify threatened species, ecosystems and ecological processes, and to develop appropriate measures to reduce the effects of threats to biodiversity. This course is intended for students concerned with both the theory and practise of conservation. The coursework consists of a series of compulsory modules that run from January to August and cover a range of fields of conservation biology: biodiversity basics, philosophy of science and conservation ethics; population ecology and viability analysis, conservation genetics, community ecology, ecosystem/aquatic ecology, disturbance and restoration ecology, invasive species, landscape ecology, GIS and conservation planning, climate change and conservation, resource economics, societies and natural resources.
Assessment: Each student receives a mark for each of the modules, and the modules are examined in groups during 'open-book' examinations.

BIO5008W   CONSERVATION BIOLOGY MINOR DISSERTATION

Students will enrol (and pay fees) for both courses BIO5007H and BIO5008W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s. Those students already in possession of a Masters degree, or in exceptional cases those who wish to upgrade to a PhD, may expand a project in accord with the normal pursuit of that degree at UCT. A handbook of postgraduate studies is available from the Percy Fitzpatrick Institute's website: www.fitzpatrick.uct.ac.za.
90 NQF credits at HEQSF level 9
Convener: Associate Professor P G Ryan and Dr S J Cunningham

Course entry requirements: BIO5007H
Course outline:
The research component must be submitted as a minor dissertation for formal examination. It should be completed by mid-February following first registration.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

BIO5009W   CONSERVATION BIOLOGY DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of this handbook.

BIO5010W   BIOLOGICAL SCIENCES DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

BIO6002W   CONSERVATION BIOLOGY THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

BIO6003W   BIOLOGICAL SCIENCES THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF CHEMISTRY

The Department is housed in the P D Hahn Building, 28 Chemistry Mall
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The Departmental abbreviation for Chemistry is CEM.

Professor and Head of Department:
S A Bourne, BSc Hons PhD *Cape Town* CChem FRSC MSACI
Mally Professor of Organic Chemistry:
R Hunter, BSc Hons PhD *London* DIC
Jamison Professor of Inorganic Chemistry:
T J Egan, BSc Hons PhD *Wits* MSACI
Professor of Physical Chemistry:
S A Bourne, BSc Hons PhD *Cape Town* CChem FRSC MSACI
South African Research Chair in Drug Discovery:
K Chibale, BScEd *Zambia* PhD *Cantab*
South African Research Chair in Scientific Computing:
K J Naidoo, MSc *Cape Town* PhD *Michigan*
Professors:

Senior Scholars:
M R Caira, MSc PhD *Cape Town* Dr Hon Causa Univ Med Pharm 'Iuliu Hatieganu' *Romania*
L R Nassimbeni, MSc *Rhodes* PhD *Cape Town* CChem FRSC FRSSAf MSACI
A L Rodgers, MSc PhD *Cape Town*
Emeritus Professors:
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G E Jackson, BSc Hons PhD *Cape Town* CChem FRSC MSACI
Associate Professors:
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A T Hutton, MSc PhD *Cape Town* CChem MRSC MSACI
N Ravenscroft, BSc Hons PhD *Cape Town* MSACI
G S Smith, BSc *Natal* BSc Hons MSc PhD *UWC* MSACI
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S Wilson, BSc Hons PhD *Cape Town*
Lecturers:
C Kaschula, BSc Hons PhD *Cape Town*
C L Oliver, BSc Hons PhD *Cape Town*
S N Sunassee, BSc Hons PhD *Rhodes*
G A Venter, MSc PhD *Stell* MSACI
Research Fellow:
D L Cruickshank, BSc Hons PhD *Cape Town*
Chemical Safety Officer:
M Muller, MBA *UFS*
Principal Scientific Officers:
D Jappie-Mohamed, BSc Hons PhD *Cape Town* MSACI
C Lawrence-Naidoo, BSc Hons MSc *Cape Town*
Chief Scientific Officers:
E Murray, BSc Med (Hons) *Stell* PhD *Cape Town*
H Su, MSc PhD *Cape Town*
Senior Scientific Officers:
A Gamieldien, BSc Hons HDE *UWC*
T Theka, MSc *Venda* PhD *Cape Town*

Scientific Officer:

Principal Technical Officers:
P D de Kock, BEng MEng *Stell*
A de Jager
Chief Technical Officers:
A D Joseph
G Hesselink
Senior Technical Officers:
G Benincasa, BSc Hons *Natal*
P Roberts
Technical Officer:
K Willis
Assistant Technical Officer:
F Majola, NDipl ElectEng *CPUT*
Departmental Administrative Manager:
S Manie, Dipl Acc & Fin Dipl HRM *Damelin*
Administrative Assistants:
D C Brooks
Z Najaar
P Smit
Senior Secretary:
L Lalbahadur, BPaed *UDW* BEd (Hons) *UNISA*
Departmental Assistants:
S Y Dyule-Nozewu
F Esau
G M Harker
A M Khoapa
G M Mlungu
N Ngqanya
K M Sigam
C M Stanley
Workshop Assistant:
Y Ely

DRUG DISCOVERY & DEVELOPMENT (H3D)
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K Chibale, BScEd *Zambia* PhD *Cantab*
Principal Research Officers:
G S Basarab, BSc *Penn State* PhD *MIT*
L Street, BSc Hons PhD *Leeds UK*
Senior Chief Research Officer:
J Eyermann, BSc *Marietta* PhD *Miami*
Chief Research Officers:
S R Ghorpade, BPharm MPharm *Mumbai* PhD *NCL*
R Mueller, Dipl (equals MSc) PhD *Würzburg*
Research Officers:
R K Gessner, MSc PhD *Cape Town*
T Paquet, MSc *Cape Town* PhD *Cantab*
R van der Westhuyzen, MSc PhD *Stell*
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D Gonzalez Cabrera, BSc MChem PhD *Edinburgh*

C le Manach, Msc *Ecole Polytechnique* PhD *Paris Sud 11*
A Nchinda, MSc *Yaounde I* PhD *Rhodes*
C Soares de Melo, BSc *Cape Town* BSc Hons *Stell* MSc *Cape Town* PhD *Nijmegan*
Principal Scientific Officer (ADMET):
E Abay, BSc *Asmara* BSc Hons MSc PhD *UFS*
Chief Scientific Officer:

Principal Technical Officer:

Chief Technical Officers:
A R Khoury, MSc *UFS*
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Senior Research Officer:

Senior Scientific Officer:

Senior Technical Officer:
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BSL3 Laboratory Technologist:
R Seldon, MScMed *Cape Town*
Business Development Manager:
A Oelofse, MSc *Pret* MBA *Stell*
Senior Finance Officer (P-T):
A Banderker, B Com *Cape Town* BCom Hons *UKZN*
Administrative Officer:
E Rutherfoord-Jones, BSocSc *Cape Town*
Administrative Assistant:
S Naicker

SCIENTIFIC COMPUTING RESEARCH UNIT (SCRU)
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Academic Staff:
G A Venter, MSc PhD *Stell* MSACI
Research Officer:
C Barnett, MSc PhD *Cape Town*
Administrative Officer:

CENTRE FOR SUPRAMOLECULAR CHEMISTRY RESEARCH (CSCR)
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C L Oliver, BSc Hons PhD *Cape Town*
Research Fellow:
D L Cruickshank, BSc Hons PhD *Cape Town*
Senior Research Scholar:
L R Nassimbeni, MSc *Rhodes* PhD *Cape Town* CChem FRSC FRSSAfMSACI

Administrative Officer:
K Badenhorst

RESEARCH IN CHEMISTRY
The research activities of the department reflect the wide range and scope of the traditional sub-disciplines of inorganic, organic and physical chemistry, sustained by analytical, spectroscopic and computational methodology. The Department has active research groups with strengths in Catalysis, Bioinorganic, Biophysical and Bioanalytical Chemistry, Synthetic Chemistry, Medicinal Chemistry, Supramolecular Chemistry, Scientific Computing and Chemical Glycobiology. Programmes are devoted to fundamental and applied chemical research, and to interdisciplinary studies in which chemistry plays a key role. Synthetic studies are carried out in organic, organometallic and co-ordination chemistry, in order to develop and apply new methodology, and to prepare biologically active compounds, novel catalysts and components of new materials. These studies also provide tools for analytical and separation science, and models for advanced structural and conformational studies. Molecular structure determination with the aid of spectroscopic and X-ray diffraction techniques are two areas of specialisation in the department. Computational chemistry is a leading area of specialisation supported by several state of the art clusters. Computer code development and modelling applications of biological and industrial problems play a key role in many of the Department's research programmes. There is also an active research thrust in the area of chemistry education, with a particular focus on student learning in tertiary level chemistry courses.

The Department of Chemistry is home to four UCT-accredited research units:

The *Centre for Supramolecular Chemistry Research, CSCR (Dir. Professor Mino Caira)* studies the physical chemistry of supramolecular systems. Research projects include the synthesis and characterization of metal organic frameworks (MOFs) and large metal-containing supramolecular assemblies with the potential for guest uptake (gas storage, molecular sensing), the study of selectivity in organic host-guest systems, and the beneficiation of pharmaceutically relevant materials through the investigation of their polymorphs, solvates, cyclodextrin inclusion complexes and cocrystals. Solid phases are studied using powder and single crystal X-ray diffraction, thermal analysis (including TGA and DSC) and spectroscopy (FTIR and solid-state NMR techniques). The thermodynamics of inclusion and complexation processes in solution are investigated by high-resolution NMR spectroscopy and isothermal titration calorimetry.

The *MRC/UCT Drug Discovery & Development Research Unit (Dir. Professor Kelly Chibale)*. The mandate of this unit includes the development of infrastructural and operational systems for new drug discovery and development, with special reference to natural product-guided medicinal chemistry, as well as biological screening platforms against communicable and non-communicable diseases.

H3D Drug Discovery and Development Centre (Dir. Professor Kelly Chibale) aims to bridge the gap between basic and clinical studies, training a new generation of African scientists with key skills required for drug discovery and development – integrating medicinal chemistry, biology, pharmacology as well as drug metabolism and pharmacokinetics (DMPK) studies as reflected in the processes of Absorption, Distribution, Metabolism and Excretion (ADME). H3D also focuses on beneficiation of clinically used drugs, including generic medicines. Drug beneficiation, amongst other things, involves selection of the optimum form of a solid drug candidate for pharmaceutical development and (re)formulation.

The *Scientific Computing Research Unit, SCRU (Dir. Professor Kevin J. Naidoo)* develop state-of-the-art high performance computing (HPC) software as well as providing a modelling and informatics platform for applications in chemistry and chemical biology. SCRU's research activities include the development of software acceleration for life science applications. This aspect the unit's research is supported by hardware giant Nvidia Corporation. SCRU's specialised HPC facility houses South Africa's most sophisticated scientific compute servers and GPU clusters designed for chemical and chemical biology applications. The specific objectives of the unit are to trace gene-to-

glycan biochemical schemes important in glycobiology as well as model enzyme catalysed chemical reactions and ionic liquids.

The research enterprise of the Department of Chemistry is significantly enhanced by the appointment of two of its permanent staff members to DST/NRF South African National Research Chairs - Professor Kevin Naidoo in *Scientific Computing* and Professor Kelly Chibale in *Drug Discovery*. These highly prestigious appointments have raised the Department's international research profile significantly and contribute substantially to its research outputs.

Further information may be found on the Department's website at http://www.chemistry.uct.ac.za

Undergraduate Courses
Supplementary examinations:
For all undergraduate Chemistry courses, borderline candidates may not necessarily be awarded a supplementary examination to be written in January/February of the following year. As an alternative, the Department reserves the right to apply rule G19.6 which implies that a further test, which may be oral or written, may take place before the date of the Faculty Examinations Committee. Students are accordingly warned that they may be expected to make themselves available for such further testing.

First-Year Courses
CEM1000W is the first-year full qualifying course for entrance to second-year courses in the Faculty of Science and in Chemical Engineering in the Faculty of Engineering & the Built Environment. CEM1009H and CEM1010H are half courses taken by students who are placed on the Extended Degree Programme, and completion of both courses is equivalent to the full course CEM1000W. The Department also offers CEM1008F: Chemistry for Engineers and CEM1011F: Chemistry for Medical Students, which is repeated as CEM1111S and CEM1011X as part of the Faculty of Health Sciences Intervention Programme. Details of these courses can be found in the relevant faculty student handbooks.

Undergraduate Courses

First-Year Courses

CEM1000W   CHEMISTRY 1000
NOTE: Preference will be given to students registered in the Science Faculty. Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to CEM1009H from week 7.
36 NQF credits at HEQSF level 5
Convener: Associate Professor G S Smith
Course entry requirements: Students wishing to register for CEM1000W will normally be expected to have passed NSC Physical Science with at least 60% and NSC Mathematics with at least 70%. In exceptional circumstances, a student who has passed a full suite of 1st year courses may register for CEM1000W without meeting the NSC Physical Science requirement. Such registration requires the permission of the Head of Department.
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. Practicals: Tue, Thur or Fri, 14h00-17h00.

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

Assessment: Class record (comprising tests, tutorials and practicals) counts 50%; one 3-hour examination written in November counts 50%. A subminimum of 45% is required in the final examination.

CEM1009H   CHEMISTRY 1009

NOTE: 1) Preference will be given to students registered in the Science Faculty. 2) This course only begins in week 7 and is intended for students who have been advised to transfer to this course after initially registering for CEM1000W (see entry for CEM1000W). 3) The course places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 4) CEM1009H + CEM1010H is equivalent to CEM1000W in level, credit value towards the degree and as prerequisite for certain other courses.

18 NQF credits at HEQSF level 5

Convener: Associate Professor B Davidowitz

Course entry requirements: Admission will be restricted to students who have passed NSC Physical Science with at least 60%. The permission of the Dean or Head of Department is required prior to registration for this course.

Course outline:

This course lays the foundation of chemistry in its context as a central science for scientists working in the chemical, biological or earth sciences. 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, chemical equilibrium, acids and bases, solubility, phases of matter, thermochemistry, osmosis and chemical kinetics. The course continues with an introduction to the language of organic chemistry, including naming of compounds, identification of functional groups and isomers. Practicals are designed to develop essential manipulative and technical laboratory skills, to take measurements and handle data, as well as to draw links to interpreting the physical world in terms of its molecular nature.

Lecture times: Wed to Fri, 4th period. Tutorials: Mon and Tue, 4th period. Practicals: Wed, 14h00-17h00.

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

Assessment: Class record (comprising tests, tutorials and practicals) counts 50%; one 2-hour examination written in November counts 50%. A subminimum of 45% is required in the final examination.

CEM1010H   CHEMISTRY 1010

NOTES: 1) This course follows on from CEM1009H and also places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 2) CEM1009H + CEM1010H is equivalent to CEM1000W in level, credit value towards the degree and as prerequisite for certain other courses.

18 NQF credits at HEQSF level 5

Convener: Associate Professor A T Hutton

Course entry requirements: CEM1009H

Course outline:
Topics covered at a more advanced level 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, vapour pressure and phase diagrams, thermodynamics, colligative properties, oxidation and reduction, electrochemistry and chemical kinetics. The course includes an introduction to the language of organic chemistry, 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, 4th period. Tutorials: Thu, 4th period. Practicals: Tue, 14h00-17h00.
DP requirements: Attendance and completion of practicals, tests and tutorial exercises and at least 35% for the class record.
Assessment: Class record (comprising tests, tutorials and practicals) counts 50%; one 2-hour examination written in November counts 50%. A subminimum of 45% is required in the final examination.

Second-Year Courses
CEM2005W is required for students proceeding to a major in Chemistry.

CEM2005W   INTERMEDIATE CHEMISTRY
48 NQF credits at HEQSF level 6
Convener: Dr G A Venter
Course entry requirements: For Science students: CEM1000W (or equivalent), 1000-level full course in Physics, 1000-level full or semester course in Mathematics. Concurrent registration for STA1000F/S (or equivalent) is highly recommended. For Chemical Engineering students: CEM1000W (or equivalent), PHY1012F/S, MAM1020F/S, CHE1005W
Course outline:
This course develops the foundations of a major in Chemistry at an intermediate level and allows continuation to third year Chemistry for the completion of a major in Chemistry. The theory component features a set of intermediate topics, and the laboratory component develops both experimental and interpretative skills. The course includes the following topics: structure and modern analytical tools, introduction to inorganic chemistry, organic structure and reactivity, thermodynamics, thermodynamics of solutions, phase equilibria, chemical reaction kinetics and equilibria, reactions of organic molecules (patterns, predictions and preparation of new products), introduction to coordination chemistry, structures and energetics of inorganic solids and electrochemistry. The practical course covers the same topics and aims to develop manipulative and technical laboratory skills including the application of modern analytical methods to the elucidation of chemical structures.
Lecture times: Mon to Fri, 3rd period. Six tutorials by arrangement. Practicals, EBE: Tue, 14h00-17h00; Science: Thu, 14h00-17h00.
DP requirements: Attendance and completion of practicals, tests and tutorial exercises; minimum 50% for the practicals and tutorial exercises; minimum average of 45% for class tests
Assessment: The class record (comprising tests and practicals) counts 50%; one 3-hour examination written in November counts 50%. The class record consists of two class tests (2 x 5%), one 2-hour June test counts 15%, tutorials count 5% and practicals count 20%. A subminimum of 45% is required in the final examination.

Third-Year Courses
CEM3005W is the required course for students completing a major in Chemistry.

CEM3005W   CHEMISTRY 3005
72 NQF credits at HEQSF level 7
Convener: Professor R Hunter
Course entry requirements: CEM2005W (or CEM2007F and CEM2008S), 1000-level full course in Mathematics; completion of or concurrent registration for STA1000F/S is highly recommended.
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. Practicals: Wed and Fri, 14h00-17h00.
DP requirements: Attendance and completion of practicals, tests and tutorial exercises, and at least 50% for the class record.
Assessment: Class record (comprising tests, writing project and practicals) counts 50% and two 3-hour examinations written in November count 50% towards the final mark. A subminimum of 45% is required in the final examination.

Postgraduate Courses

CEM4000W   CHEMISTRY HONOURS
Since the code CEM4000W will not carry a NQF credit value, students will be concurrently registered for CEM4001W (coursework component of 94 NQF credits) and CEM4002W (research project of 66 NQF credits). Entrance is limited to 16 students
160 NQF credits at HEQSF level 8
Convener: Professor T J Egan
Course entry requirements: A BSc degree (or equivalent) with a major in Chemistry at a sufficiently high standard to satisfy the Head of Department. Entrance to the Honours course is competitive and applications are considered individually, taking into consideration the entire academic record. Priority will be given to UCT graduates, who require 60% or higher in CEM3005W as the normal minimum prerequisite for admission. Applicants from other universities must satisfy the Honours steering committee that they have covered the same topics at the equivalent level.
Course outline:
The Honours course is designed to enrich understanding of chemical theory, while developing skills in the modern research techniques and approaches required of the professional Chemist. The course has several components:
Modern instrumental methods and group theory are taught through experiential workshops and lectures covering topics in NMR spectroscopy, X-ray methods of analysis, separation methods, electrochemical techniques, group theory and molecular modelling methods.
The *core lecture course* provides the conceptual tools required in modern inorganic, organic and physical chemistry. Topics covered include aqueous coordination chemistry, organometallic chemistry, bioinorganic chemistry and catalysis (inorganic chemistry), organic synthesis, the third dimension in organic reactions, asymmetric synthesis and advanced reagents (organic chemistry), as well as statistical thermodynamics, quantum chemistry, solid state chemistry and the chemistry of liquids (physical chemistry).

A 14-week *research project* caps the course. After presentation of a research proposal, the student engages in 10 weeks of full-time research work which culminates in the presentation of a short dissertation, research poster and an oral presentation to the Department. Training in oral communication is provided during this period.

Lecture times: By arrangement. Lectures, tutorials and practicals start at the end of January. Lectures and tutorials are daily in the first three periods and at other times arranged. Practical work and other activities occupy three afternoons per week during the first semester and all day all week during the second semester.

Assessment: Examinations count 33%, coursework 26% and the Honours research project 41%. To pass the Honours course candidates must obtain an overall average of 50%, an average of 45% for the Core Course written examinations with a subminimum of 33% on each individual paper of the Core Course examinations. In addition, candidates must attain at least 50% for the research project, 45% for the Modern Instrumental Methods and Group Theory module, complete all practical work, tutorial assignments, generic skills course and any other compulsory activities. These component parts of the course will be combined in a final overall mark which will be reflected against the course code CEM4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

CEM5000W   CHEMISTRY DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

CEM5002W   COMPUTATIONAL SCIENCE DISSERTATION
180 NQF credits at HEQSF level 9
Convener: Professor K Naidoo
Course entry requirements: Honours degree, having achieved a course mark of at least 70%, in one or more of the following domain disciplines: chemistry, molecular and cellular biology, physics, applied mathematics, statistics and computer science. Students with four-year degrees in electrical, chemical and mechanical engineering will be considered.
Course outline:
Academic disciplines of chemistry, chemical biology and biophysics have a critical dependence on computer simulation and large scale data analysis to understand observed phenomena and advance the frontiers of disciplinary knowledge. This course aims to prepare students to undertake research in computational science as applied to chemistry, chemical biology, biophysics and chemical physics. The two streams of focus are computation and informatics. The course will commence with project assignment followed by a combination of in-house and online training short (non credit) courses in: Scientific Computing, High Performance Computing, Computational Methods for Data Analysis, Data Management, R programming, Quantum Mechanics and Statistical Mechanics. The above short training courses are designed to prepare students to successfully complete a computational science project and dissertation.

CEM5004W   TERTIARY CHEMISTRY EDUCATION DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

CEM6000W   CHEMISTRY THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates for the PhD degree must submit a thesis on an approved research topic, and are referred to Book 3, General Rules and Policies, in which the rules for the degree are set out.

CEM6001W   TERTIARY CHEMISTRY EDUCATION THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates for the PhD degree must submit a thesis on an approved research topic, and are referred to Book 3, General Rules and Policies, in which the rules for the degree are set out.

DEPARTMENT OF COMPUTER SCIENCE

The Department is housed in the Computer Science Building, 18 University Avenue
Telephone (021) 650-2663 Fax (021) 689-3551
The Departmental abbreviation for Computer Science is CSC.

Associate Professor and Head of Department:
H Suleman, MSc *UDW* PhD *Virginia Tech*
Professors:
E H Blake, BSc Hons *Wits* PhD *London*
R Simmonds, BSc PhD *Bath*
T Meyers, MSc *RAU* PhD *Unisa*
Adjunct Professor:
A C M Hutchison, MSc HDE (PG) Sec *Cape Town* PhD *Zurich*
Honorary Professors:
M Jones, BSc Hons *London* PhD *Cantab*
Y Rogers, BA (Hons) *Wales* MSc *London* PhD *Wales*
Associate Professors:
S Berman, BSc *Rhodes* MSc PhD *Cape Town*
J E Gain, MSc *Rhodes* PhD *Cantab*
M Kuttel, MSc PhD *Cape Town*
P C Marais, MSc *Cape Town* DPhil *Oxon*
Senior Lecturers:
M Densmore, BA *Cornell* MSc *UCL* PhD *Berkeley*
B DeRenzi, BComEng *Santa Barbara* MSc PhD *University of Washington*
A Kayem, MSc *Yaoundé* PhD *Queens*
M Keet, BSc Hons *OU* MSc *Wageningen* MA *Limerick* PhD *Bozen-Bolzano*
G Nitschke, BSc Hons *Curtin* PhD *VU Amsterdam*
G Stewart, BSc Hons *Cape Town*
Adjunct Senior Lecturer:
D Johnson, BEng *Cape Town* MEng *Pret* PhD *Santa Barbara*
Computer System Managers:
C Balfour, BSocSc *Cape Town* BA (SS) Hons *UNISA*
S Chetty, IT Management Cert *Cape Town*
Senior Scientific Officer:
S Jamieson, MSc *London*
Administrative Officer:
S Valley
Administrative Assistant:
E M Gill
Senior Secretary:
T Jenneker
Departmental Assistant:
B J Sam

RESEARCH IN COMPUTER SCIENCE
Research in the Department is organised into well-equipped laboratories funded by international, governmental and industrial sponsors. More information can be obtained by writing to the department or on the Departmental Web pages.
COLLABORATIVE VISUAL COMPUTING (Co-ordinator: Associate Professor J Gain). Topics of research include: Collaborative Virtual Environments; Usability and Human-Computer Interaction; Computer Graphics; Image Analysis applied to Medical Images; Virtual Reality and Behavioural Therapy; allowing end-users to create interesting virtual environments; Interaction with Mobile

Computing Devices; Scalable Interfaces; and implications of these for Government Information Technology Policy. Special interests within the CVC lab include Socially Aware Computing, VR Methodology, Virtual Environments, Modelling and Procedural Graphics.

DIGITAL LIBRARIES (Co-ordinator: Associate Professor H Suleman). Research areas covered within digital libraries include information storage and retrieval; multilingual retrieval; Web-based systems; scalable and flexible repositories; interoperability and protocols; component-based systems; Open Access; and cultural heritage preservation.

HIGH PERFORMANCE COMPUTING (Co-ordinator: Associate Professor M Kuttel). This laboratory investigates aspects of high performance and high throughput computing, including: parallel algorithms; computational science; high performance visualisation; software optimisation; and multi-core and GPU programming.

ICT FOR DEVELOPMENT CENTRE (Director: Professor E Blake). The UCT Centre in ICT for Development seeks to create ICTs that are appropriate for developing nations. To date, most innovation in ICT has been driven by the developed world to meet challenges originating from that context. This centre will design, create and evaluate technologies that address the needs of the developing world and the people who live there.

NETWORK AND INFORMATION SECURITY (Co-ordinator: Dr A Kayem). Artificially Intelligent Security Mechanisms: this group aims to design security mechanisms that can adapt automatically to changes in security policies; research includes service oriented architectures, database security and autonomic computing. Computer Network Security: this group aims to design and implement network security protocols to address problems of security in web services, cloud computing environments and enterprise environments; research includes goal-oriented protocol design and identity management.

Undergraduate Courses

Credit will not be given for CSC1015F and CSC1016S together with CSC1010H and CSC1011H. From 2017 all second year Computer Science students will need to own a laptop.

First-Year Courses

CSC1010H   COMPUTER SCIENCE 1010

NOTE: This course only begins in week 7 and is intended for students who have been advised to transfer to this course after initially registering for CSC1015F (see entry for CSC1015F). The course places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. CSC1010H is equivalent to CSC1015F in level, credit value towards the degree and as prerequisite for certain other courses.

18 NQF credits at HEQSF level 5

Convener: G Stewart

Course entry requirements: The permission of the Dean or Head of Department is required prior to registration for this course.

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

Lecture times: Monday - Friday, 5th period, Tutorials:One per week, replacing one lecture, Practicals: One per week, Thu, 14h00-17h30

DP requirements: Minimum of 45% aggregate in practical work.

Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 3-hour examination written in November counts 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1011H   COMPUTER SCIENCE 1011

NOTE: 1) This course follows on from CSC1010H and also places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning.2) CSC1011H is equivalent to CSC1016S in level, credit value towards the degree and as prerequisite for certain other courses.
18 NQF credits at HEQSF level 5
Convener: G Stewart
Course entry requirements: CSC1010H, MAM1005H
Course outline:
The first half of the course aims to further develop problem solving and programming in Python. The second half focuses on object-oriented design and programming in Java, as well as introducing important considerations relating to ethical and professional issues. The latter introduces students to ethical issues such as property rights, freedom of expression and privacy, and concepts such as free and open source software, ICT for Development, and Professional Codes of Conduct. The Java component of the course covers object-oriented design techniques and UML class diagrams, as well as elementary data structures such as lists, stacks and queues. The practical component includes use of inheritance, polymorphism, interfaces, generics and GUI programming in Java.
Lecture times: Monday - Thursday, 4th period, Tutorials: One per week, replacing one lecture, Practicals: One per week, Mon, 14h00-16h00
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Theory tests count 25%; practical tests and practical assignments count 25%; one 3-hour examination written in November counts 50%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1015F   COMPUTER SCIENCE 1015
18 NQF credits at HEQSF level 5
Convener: Dr M Keet
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.
Lecture times: 4th or 5th period daily, Tutorials: One per week, replacing one lecture, Practicals: One per week, Mon, Tue or Wed, 14h00-17h30
DP requirements: Minimum of 45% aggregate in practical work.
Assessment: Theory tests 15%; practical tests and practical assignments 25%; June examination 2 hours 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1016S   COMPUTER SCIENCE 1016

18 NQF credits at HEQSF level 5
Convener: Dr M Keet
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.
Lecture times: 4th or 5th period daily, Tutorials: One per week, replacing one lecture, Practicals: One per week, Mon, Tue or Wed, 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 exam written in November counts 60%. Subminima: 45% for practicals and 45% on weighted average of theory tests and examination.

Second-Year Courses

CSC2001F   COMPUTER SCIENCE 2001

24 NQF credits at HEQSF level 6
Convener: Associate Professor P Marais
Course entry requirements: CSC1015F and CSC1016S or CSC1010H and CSC1011H, MAM1000W or equivalent.
Course outline:
This course builds on the first year Computer Science foundation with an emphasis on data storage and manipulation. The course covers abstract data types and assertions, recursive algorithms, tree structures such as AVL and B-trees, graph traversals, minimum spanning trees, sets, hashing and priority queues. An introduction to conceptual modelling, database design and relational database manipulation is included. Practical programming in Java in a Unix environment is an important part of the course
Lecture times: Monday - Friday, 2nd period, Four or five lectures per week, Practicals: One 4-hour practical per week, Mon - Fr, 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

24 NQF credits at HEQSF level 6
Convener: Associate Professor P Marais
Course entry requirements: CSC2001F (or supp for CSC2001F), MAM1000W or equivalent.
Course outline:
The goal of this course is to complete the basic education of a Computer Scientist. Mobile application development and interface design, an introduction to computer architecture and concurrent programming . Practical work in Java and in assembler programming are included.
Lecture times: Monday - Friday, 2nd period, Four lectures per week, Practicals: One 4-hour practical per week, Mon - Fri, 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
24 NQF credits at HEQSF level 6
Convener: Dr G Nitschke
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. Fundamental 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 a game using LibGDX, a Java-based game engine. The final deliverable is a fully functional 2D game which implements many of the techniques explored in lectures.
Lecture times: Monday - Friday, 3rd period, Practicals: One 4-hour practical per week, Mon - Fri, 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.

CSC2005Z   INDEPENDENT RESEARCH IN COMPUTER SCIENCE
Supervisor Meetings: By arrangement with supervisor
24 NQF credits at HEQSF level 6
Convener: Associate Professor H Suleman
Course entry requirements: Academically strong students may apply for entrance. Selection will be made on the basis of marks for CSC1015F, CSC1016S and CSC2001F. The number of places will be limited depending on the availability of supervisors, and the final decision will be at the discretion of the Head of Department.
Course outline:
This course allows students to pursue a course of independent research in one of the areas of specialisation of the department, as listed on the department's website, under the direct supervision of one of the staff members. Students will learn research methods in Computer Science and apply these in a suitable project. They will also learn about research writing (proposal and report).
Students will complete a research project and document this in a research report (mini-dissertation). An intermediate deliverable will be a project proposal and presentation to staff.
Assessment: Proposal 20%, Final research report 80%

Third-Year Courses

CSC3002F   COMPUTER SCIENCE 3002
36 NQF credits at HEQSF level 7
Convener: Professor T Meyer
Course entry requirements: CSC2001F and CSC2002S.
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.
Lecture times: Monday - Friday, 2nd period, Practicals: Two 4-hour practicals per week, Mon - Fri, 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
36 NQF credits at HEQSF level 7
Convener: Professor T Meyer
Course entry requirements: CSC2001F and CSC2002S, and either INF2009F or permission from the Head of Department to do compensation work to a satisfactory standard.
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 compilers 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.
Lecture times: Monday - Friday, 2nd period, Practicals: Two 4-hour practicals per week, Mon - Fri, 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.

CSC3020H   THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN
36 NQF credits at HEQSF level 7
Convener: Dr G Nitschke
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.
Lecture times: 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

CSC3022H   C++ WITH APPLICATIONS
36 NQF credits at HEQSF level 7
Convener: Dr G Nitschke
Course entry requirements: CSC2001F, CSC2002S
Course outline:
This course introduces the C++ programming language, followed by a practical exploration of topics in machine learning using C++. Students learn how to use features such as templates and basic concurrency, and a detailed treatment of the C++ memory model is also covered. A number of

machine learning algorithms are introduced and students implement a subset of these in C++. By the end of the course, students should understand how to write efficient objection oriented programs in C++, be familiar with major categories of learning algorithms, and be able to select and implement the most appropriate algorithm for a given problem.

Lecture times: 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.

EEE3078W   DIGITAL EMBEDDED & ADAPTIVE SYSTEMS

For Science students only. Please see the Science Faculty Handbook for further details.

48 NQF credits at HEQSF level 7

Course outline:

EEE3064W, EEE3074W and EEE4096F

DP requirements: As for EEE3064W, EEE3074W and EEE4096F

Assessment: As for EEE3064W, EEE3074W and EEE4096F. Credit weighted

Postgraduate Courses

CSC4000W   COMPUTER SCIENCE HONOURS

Since the code CSC4000W will not carry a NQF credit value, students will be concurrently registered for CSC4001W (coursework component of 100 NQF credits) and CSC4002W (research project of 60 NQF credits). Combined entry to CSC4000W and CSC4016W is limited to 45 students and admission is on a competitive basis. Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.cs.uct.ac.za/teaching. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.

160 NQF credits at HEQSF level 8

Convener: Associate Professor M Kuttel

Course entry requirements: Students must have a BSc degree in Computer Science from UCT, with an average of at least 60% in CSC3002F and CSC3003S

Course outline:

The modules offered may vary from year to year but will typically be a selection from: Research Methods (compulsory), New Venture Planning (compulsory), Mobile Interaction Design, ICT for Development, Computer Graphics, Network Security, Digital Libraries, Image Processing and Computer Vision, Games and Virtual Environments, Information Retrieval, User Experience in Games and Virtual Environment, Community Based Co-Design, Intelligent Systems Design, Parallel and Multicore Computing, Visual Thinking and Visualisation, Wireless Sensor Networks, Ontology Engineering. Some courses may also be taken from other departments, with approval of the Honours course convener. A major research project makes up 60 credits and the remaining 100 credits is calculated from the coursework modules. A pamphlet outlying the year's programme is available from the Department (and at http://www.cs.uct.ac.za/teaching)

DP requirements: Students will only be allowed to proceed with the second semester if, by the end of the first semester, they have an overall average of 50% in their coursework having gained credit for at least 60 credits of coursework (including compulsory modules).

Assessment: Project mark counts 38% of the total (60 credits). The remaining 62% of the mark (100 credits) is calculated from the best modules taken. They must include Research Methods and New Venture Planning. No module will be considered for course credits unless a student has obtained at least 40% in that module. Subminima: At least 50% must be achieved in the Project. At least 40% must be achieved in the Research Methods and New Venture Planning modules. An average mark of at least 50% must be attained in the modules making up the best 100 course credits. The final mark, calculated as explained above, must not be less than 50%. These component parts of the course will

be combined in a final overall mark which will be reflected against the course code CSC4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

CSC4016W INFORMATION TECHNOLOGY HONOURS

Since the code CSC4016W will not carry a NQF credit value, students will be concurrently registered for CSC4017W (coursework component of 100 NQF credits) and CSC4018W (research project of 60 NQF credits). Combined entry to CSC4000W and CSC4016W is limited to 45 students
160 NQF credits at HEQSF level 8
Convener: Associate Professor M Kuttel
Course entry requirements: Entrance requirement is a Bachelor's degree with a major in Computer Science or related field. Students must have an average of at least 60% in the major. Priority will be given to students meeting the requirements for CSC4000W. Acceptance will be at the discretion of the Head of Department who will consider quality of final year results and material covered in the undergraduate curriculum. Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The <u>minimum specifications</u> of the laptop are available at *www.cs.uct.ac.za/teaching*. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
Course outline:
The modules offered may vary from year to year but will typically be a selection from: Research Methods (compulsory), New Venture Planning (compulsory), Distributed Systems, Mobile Interaction Design, ICT for Development, Computer Graphics, Network Security, Digital Libraries, Biologically Inspired Computing, Image Processing and Computer Vision, Games and Virtual Environments, Information Retrieval, User Experience in Games and Virtual Environment, Community Based Co-Design, Intelligent Systems Design, Parallel and Multicore Computing, Visual Thinking and Visualisation,Wireless Sensor Networks, Ontology Engineering. Some courses may also be taken from other departments, with approval of the Honours course convener. A major research project makes up 60 credits and the remaining 100 credits is calculated from the coursework modules. A pamphlet outlining the year's programme is available from the Department (and at http://www.cs.uct.ac.za/teaching).
DP requirements: Students will only be allowed to proceed with the second semester if, by the end of the first semester, they have an overall average of 50% in their coursework having gained credit for at least 60 credits of coursework (including compulsory modules).
Assessment: Project mark counts 38% of the total (60 credits). The remaining 62% of the mark (100 credits) is calculated from the best modules taken. They must include Research Methods and New Venture Planning. No module will be considered for course credits unless a student has obtained at least 40% in that module. Subminima: At least 50% must be achieved in the Project. At least 40% must be achieved in the Research Methods and New Venture Planning modules. An average mark of at least 50% must be attained in the modules making up the best 100 course credits. The final mark, calculated as explained above, must not be less than 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code CSC4016W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

MAM4007W MATHEMATICS OF COMPUTER SCIENCE HONOURS

This course will not be offered in 2016.
160 NQF credits at HEQSF level 8
Course entry requirements: Normally a BSc degree with a major in either Computer Science or Mathematics and at least second-year level in the other, but in all cases subject to individual approval by the Heads of both departments.
Course outline:
This Honours degree is offered jointly by the Departments of Computer Science and Mathematics & Applied Mathematics. Its subject matter involves logical and mathematical theories and structures relevant to computer science, together with their applications. Students will be required to do

approximately half their work in each department, including course work in both departments for the course. Courses that are offered typically include some of the following: Computational Complexity, Cryptography, Enumerative Combinatorics, and Graph Theory. Every syllabus must be approved by the Heads of both departments. Each student will be required to do a research project. Completion of this degree could yield admission to Master's studies in either Mathematics or Computer Science.
Assessment: The project counts 18.75% of the final mark for the course and must be passed (with 50%). On average, the examination counts at least 50% of the balance of the final course mark.

CSC5000W   COMPUTER SCIENCE DISSERTATION
Students will be expected to attend a research methods course in the first year.
180 NQF credits at HEQSF level 9
Convener: Dr B DeRenzi
Course entry requirements: A relevant Honours degree or four year equivalent
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook. Students will be expected to attend a research methods course in the first year.

CSC5001W   COMPUTER SCIENCE COURSEWORK
Students will be expected to attend a research methods course in the first year.
90 NQF credits at HEQSF level 9
Convener: Dr B DeRenzi
Course entry requirements: A relevant Honours degree or four year equivalent
Course outline:
This coursework component starts with registration in January. The couerse aims to provide students with an overview of those fields of Computer Science in which the department undertakes research, from which the student selects coursework modules: artificial intelligence, collaborative visual computing, computer graphics, computer vision, databases, digital libraries, games and virtual environments, high-performance computing, human-computer interaction, ICT for development and security. At the end of the coursework students must sit formal examinations. Upon successful completion of the coursework component, students will be required to register for the minor dissertation component (CSC5002W).
Assessment: Coursework modules are assessed by a combination of practical work and examination. All modules contribute equally to the final coursework mark, which counts 50% of the final degree requirement.

CSC5002W   COMPUTER SCIENCE MINOR DISSERTATION
90 NQF credits at HEQSF level 9
Convener: Dr B DeRenzi
Course entry requirements: CSC5001W
Course outline:
Upon successful completion of the coursework component (CSC5001W), students will be required to register for this minor dissertation component and complete a suitable research project under supervision of an appropriate computer science academic staff member. The research component will expose the student to research methodology, experimental design, data analysis techniques, and

dissertation writing skills. Students should be in a position to submit the final dissertation in the following year.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

CSC5004W   INFORMATION TECHNOLOGY MINOR DISSERTATION

90 NQF credits at HEQSF level 9
Convener: Dr M Densmore
Course entry requirements: CSC5005H and CSC5006H
Course outline:
Upon successful completion of the coursework component (CSC5005H and CSC5006H), students will be required to register for this minor dissertation course and complete a one year research project under supervision of an appropriate computer science academic staff member.

Assessment: The minor dissertation must be presented for formal examination.The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

CSC5005H   INFORMATION TECHNOLOGY COURSEWORK PART 1

45 NQF credits at HEQSF level 9
Convener: Dr M Densmore
Course entry requirements: An Honours degree or 4-year equivalent plus access to the Internet.
Course outline:
CSC5005H and CSC5006H together constitute the coursework component. CSC5005H comprises 4 modules selected from the following: Object-oriented programming; Human-Computer Interaction; Databases; Networks; Web Programming; Software Engineering; Cyberlaw and Ethics; Research Methods. CSC5006H comprises the remaining 4 modules, i.e. excluding modules for which credit was received in CSC5005H. All study is via on-line self-study materials.

DP requirements: A subminimum of 40% average for the assignment of at least 3 modules and an average of at least 40% in the mid-year examinations.

Assessment: In CSC5005H and CSC5006H assignments count 30% and the examination 70%. A subminimum of 40% for examinations is required in each of CSC5005H and CSC5006H. A module can be repeated once only; two unsuccessful attempts constitute a fail. A student who accumulates two failed modules will not be permitted to continue. To pass each course an overall average of at least 50% is required.

CSC5006H   INFORMATION TECHNOLOGY COURSEWORK PART 2

45 NQF credits at HEQSF level 9
Convener: Dr M Densmore
Course entry requirements: An Honours degree or 4-year equivalent plus access to the Internet.
Course outline:
CSC5005H and CSC5006H together constitute the coursework component. CSC5005H comprises 4 modules selected from the following: Object-oriented programming; Human-Computer Interaction; Databases; Networks; Web Programming; Software Engineering; Cyberlaw and Ethics; Research Methods. CSC5006H comprises the remaining 4 modules, i.e. excluding modules for which credit was received in CSC5005H. All study is via on-line self-study materials.

Lecture times: Monday - Thursday, 7th period

DP requirements: A subminimum of 40% average for the assignment of at least 3 modules and an average of at least 40% in the mid-year examinations.

Assessment: In CSC5005H and CSC5006H assignments count 30% and the examination 70%. A subminimum of 40% for examinations is required in each of CSC5005H and CSC5006H. A module can be repeated once only; two unsuccessful attempts constitute a fail. A student who accumulates

two failed modules will not be permitted to continue. To pass each course an overall average of at least 50% is required.

CSC6000W   COMPUTER SCIENCE THESIS
Students will be expected to attend a research methods course in the first year.
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE

The Department is housed in the Environment & Geographical Science Building, South Lane
Telephone (021) 650-2874 Fax (021) 650-3456
The Departmental abbreviation for Environmental & Geographical Science is EGS.

Professor and Head of Department:
M E Meadows, BSc Hons *Sussex* PhD *Cantab* FSSAG
South African Research Chair in Climate Change:
B C Hewitson, BSc *Cape Town* MSc PhD *Penn State*
Professors:
S M Parnell, MA PhD *Wits* FSSAG
M F Ramutsindela, MA *UNIN* PhD *London* FSSAG
Emeritus Professor:
R F Fuggle, BSc Hons UED *Natal* MSc *Louisiana* PhD *McGill*
Honorary Professors:
J Boardman, BSc Hons PhD *Cantab*
J Crush, MA *Cantab* MA *Laurier* PhD *Queens*
D S G Thomas, MA PhD *Cantab*
Associate Professors:
S E Oldfield, BA (Hons) *Syracuse* MA PhD *Minnesota*
M R Sowman MSc PhD *Cape Town*
G Ziervogel, BSc Hons *Rhodes* DPhil *Oxon*
Associate Professor and South African Research Chair in Environmental and Social Dimensions of the Bio-economy:
R P Wynberg, BSc Hons MSc MPhil *Cape Town* PhD *Strathclyde*
Senior Lecturers:
B J Abiodun, MTech *FUTA* PhD *Uppsala*
P Anderson, BSc Hons PhD *Cape Town*
S Daya, MA PhD *Durham*
F D Eckardt, BSc Hons *KCL* MSc *Cranfield* DPhil *Oxon*
R C Hill, BSc (Eng) *Cape Town* Pr Eng PhD *Cape Town*
Z Patel, MSc *Natal* PhD *Cantab*
K J Winter, BA (Hons) *Cape Town* MA *London* PhD *Cape Town*
Lecturers:
S Raemaekers, MSc *Ghent* PhD *Rhodes*
M-A Baudoin, MSc PhD *Brussels*
Honorary Research Fellow:
L Nathan BBus Sc/LLB *Cape Town* MPhil *Bradford* PhD *LSE*
Honorary Research Associates:
D Fig, BA *Cape Town* BSc Hons PhD *LSE*
M Hauck, BA (Hons) *Alberta* MA PhD *Cape Town*
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Researchers:
P Mbatha, BSocSc (Hons) MSocSc *Cape Town*
J Sunde, MA *York* PhD *Cape Town*
J van Niekerk, BSc Hons *Stell* MPhil *Cape Town*
S Williams, BA (Hons) MA *UWC* PhD *Cape Town*
Chief Technical Officer:
C Jack, BSc Hons PhD *Cape Town*
Administrative Officer:
S Adams

Finance Officer:
N Toffar
Senior Secretaries:
T Basadien
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Librarian:
S Reddy, BA PGDipLIS MPhil (Adult Educ) *Cape Town*
Laboratory Departmental Assistant:
S Hess
Library Assistant:
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C Lennard, BSc Hons MSc PhD *Cape Town*
A Steynor, BSc Hons MSc *Cape Town*
K Sutherland, MSc *NMMU*
M Tadross, BSc Hons *Newcastle* PhD *Cantab*
P Wolksi, MSc *Krakow* PhD *Free University*
IT Support:
R Duffet
P Mukwena
Administrative Assistant:
S Barnard

RESEARCH IN ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE
Research in Environmental and Geographical Science embraces a variety of topics that are listed below. More detailed information can be obtained by writing to the Department of Environmental and Geographical Science or by consulting the departmental website, www.egs.uct.ac.za.

The Department undertakes research into numerous aspects of the environment, but is particularly involved in studies of environmental change and human-environment interactions. There is an active graduate programme. An 18-month Master's degree in Environment, Society and Sustainability is organised and taught within the Department, and research for higher degrees is also supervised in the more traditional way. There are postgraduate programmes in Environmental & Geographical Science by coursework and dissertation.

Of major interest is the identification and evaluation of environmental problems, along with the assessment of environmental impacts. The Environmental Evaluation Unit of the Department is active in projects which involve assessing the impact of development projects on the biophysical and social environment.

The problem of urbanization in Africa provides a focus for staff engaged in an analysis of the process in both contemporary and historical contexts. Biogeographical research is also pursued by staff and research students. The ways in which environmental change and human activities have shaped the landscape and vegetation patterns of southern Africa are interpreted through palaeoecological, remote sensing and geomorphological studies. The Department houses a large reference collection of pollen slides and photographs which is used in reconstructing former vegetation types. Research in climatology focuses on Southern Hemisphere climate variability, regional implications of global climate change, climate modelling, precipitation controls, satellite climatology, and mesoscale meteorology.

Undergraduate Courses

Fieldwork
All students attending courses in Environmental & Geographical Science are required to take part in fieldwork arranged during the year.

First-Year Courses

AGE1004S INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES
18 NQF credits at HEQSF level 5
Convener: Dr R Sithaldeen
Course entry requirements: Permission of the Dean or Head of Department is required prior to registration for this course. Attendance and satisfactory performance in each of the three fieldtrips and reports in GEO1009F
NOTES:1) This course is intended for students who have failed GEO1009F (see entry in Department of Geological Sciences) and have therefore been advised to register for AGE1004S. 2) The course covers similar material to GEO1009F but places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 3) AGE1004S is equivalent to GEO1009F in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
This course will introduce students to the structure and geological history of Earth as well as the interactions between the abiotic and biotic systems that shape the surface of the world. Human interactions with the environment are also discussed. Topics covered are solar system evolution, plate tectonics, the structure of the earth, climate-land interactions, the evolution of landscapes, biogeography, human adaptation and interaction with the natural environment.
Lecture times: To be advised, Practicals: One per week, Friday, 14h00- 17h00
DP requirements: A class record of at least 40%; attendance at 80% each of practicals, tutorials and spot tests.
Assessment: Class project, tests, practicals and field report count 50%; one 2-hour examination written in November counts 50%. A sub-minimum of 40% is required for the final exam.

EGS1003S GEOGRAPHY, DEVELOPMENT & ENVIRONMENT
There is a compulsory fieldwork component involving half-day field excursions.
18 NQF credits at HEQSF level 5
Convener: Professor M F Ramutsindela
Course entry requirements: A 50% pass in NSC Geography or GEO1009F
Course outline:
The course introduces students to development and environment debates in geography, by exploring the geography of third world development, focusing on the historical roots and spatial patterns that underpin development
Lecture times: Monday - Friday, 2nd period
DP requirements: Attendance and satisfactory completion of practicals, including fieldwork, and tutorial assignments; students must attain an average mark of not less than 40% for the coursework component.
Assessment: Essays, a class test, practical assignments (including fieldwork) and tutorial work count 50%; one 2-hour theory examination written in November counts 50% (subminimum of 40% required).

GEO1009F   INTRODUCTION TO EARTH AND ENVIRONMENTAL SCIENCES

This course is presented jointly by the Departments of Archaeology, Environmental & Geographical Science and Geological Sciences, but administered by Geological Sciences. Students who fail this course will be advised to register for AGE1004S (see entry in Department of Archaeology). Students are required to attend three half-day excursions in the Cape Peninsula.

18 NQF credits at HEQSF level 5

Convener: Associate Professor J S Compton

Course entry requirements: At least 60% for NSC Physical Science, Life Sciences or Geography (or AGE1004S). NOTE: Preference will be given to students registered in the Science Faculty.

Course outline:

This course aims to develop a broad understanding of how the Earth works, leading to majors in Archaeology, Environmental & Geographical Sciences, Geology and Ocean & Atmosphere Science. The course covers the following general topics: structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; humans and the environment.

Lecture times: Monday - Friday, 2nd period

DP requirements: An average of 30% on all marked classwork and tests.

Assessment: Marked classwork counts 24%; marked class tests count 16%; June examination 3 hours 60%. A Subminimum of 40% is required in the theory examination paper. Supplementary examinations for GEO1009F will be written in November.

Second-Year Courses

EGS2013F   THE PHYSICAL ENVIRONMENT

There is a compulsory fieldwork component involving half-day field excursions.

24 NQF credits at HEQSF level 6

Convener: Dr F Eckardt

Course entry requirements: GEO1009F or EGS1004S

Course outline:

The course focuses on contemporary Atmosphere-Earth surface interactions, in particular the role of precipitation and water from a global to a regional scale and examines temporal dynamics, driven by natural process as well as anthropogenic pressures. It covers in detail global circulation patterns, climate variability, soil formation, polar response to climate change, tropical deforestation, and desertification and earth observation technology. It concludes with a detailed study of local scale systems and applications covering stream catchments, estuaries, wetlands and coastlines. It is expected that students will enhance their understanding of Earth system dynamics, systems interactions and develop an appreciation for scales both temporal and spatial. Students are also expected to put the local context into a regional setting and make linkages to the larger global picture.

Lecture times: Monday - Friday, 5th period

DP requirements: Satisfactory completion of practicals and all written assignments, including projects, fieldwork reports, practicals, essays and class tests. Students must attain an average mark of not less than 40% for the coursework.

Assessment: Project, essays, class tests and practical assignments including fieldwork report count 50%; one 3-hour examination written in June count 50% (subminimum of 40% required).

EGS2014S   CONTEMPORARY URBAN CHALLENGES

There is a compulsory fieldwork component involving half-day field excursions.

24 NQF credits at HEQSF level 6

Convener: Dr S Daya

Course entry requirements: For BSc: EGS1003S; For BA or BSocSc: EGS1003S or Social Science Foundation course and two full first year Humanities courses, or equivalent.

Course outline:
This course focuses on urban change in South Africa, drawing together historical and contemporary analysis of social, political, economic and environmental dimensions of the South African city. The course includes a section on the historical geography of the South African city to contextualise contemporary challenges, and explores issues of race and gender politics in South African cities, as well as challenges of service delivery and natural systems. This conceptual material is grounded in field-based experiential learning in Cape Town.
Lecture times: Monday - Friday, 5th period
DP requirements: Attendance and satisfactory completion of practical including fieldwork and tutorial assignments; students must attain an average mark of not less than 40% for the coursework.
Assessment: Essays, a class test, practical assignments based on compulsory fieldwork and tutorial work count 50%; one 2-hour theory examination written in November counts 50% (subminimum of 40% required).

Third-Year Courses

EGS3012S   ATMOSPHERIC SCIENCE
36 NQF credits at HEQSF level 7
Convener: Dr B J Abiodun
Course entry requirements: GEO1009F or equivalent, EGS2013F or SEA2004F (or SEA2002S or SEA2003F) or approved 2000-level Science course or any 1000-level Physics course.
Course outline:
This course aims to provide a thorough understanding of the climate system, including the following topics: atmospheric energy balance; winds and circulations; clouds and cloud formation; thermodynamics; rainfall and weather systems in the tropics and midlatitudes; general circulation of the atmosphere; South African weather and climate; droughts and floods.
Lecture times: Monday - Friday, 1st period
DP requirements: Satisfactory completion of practicals and all written assignments, including essays, project reports and class tests.
Assessment: Essays and tests count 20%; project reports and practicals count 20%; one 3-hour examination in November counts 60% (subminimum of 40% required).

EGS3021F   SUSTAINABILITY & ENVIRONMENT
There is a compulsory fieldwork component involving half-day field excursions.
36 NQF credits at HEQSF level 7
Convener: Associate Professor M Sowman
Course entry requirements: EGS2013F, EGS2014S
Course outline:
The course critically engages with current debates and discourses in the fields of sustainability, vulnerability and environmental management, including examination of key concepts such as integration, systems-thinking, complexity, equity, vulnerability, risk, resilience, adaptation and mitigation. Approaches and methods for analysing environmental problems and integrating risk reduction as well as sustainability principles and practices into policy, programme, plan and project cycle processes are investigated and applied in different contexts.
Lecture times: Monday - Friday, 3rd period
DP requirements: Attendance and satisfactory completion of practicals (including fieldwork), other assignments and tests; students must attain an average mark of not less than 40% for the coursework.
Assessment: Practical reports (including fieldwork), class tests and other assignments count 50%; one 3-hour June examination counts 50% (subminimum of 40% required).

EGS3022S   GEOGRAPHIC THOUGHT
36 NQF credits at HEQSF level 7
Convener: Professor S Parnell
Course entry requirements: EGS2014S
Course outline:
The course focuses on international debates in classical and contemporary human geography. It considers important thematic areas in the geographical literature, such as development; spatiality; urban, political and feminist geographies. Each thematic area explores specific debates and key author's work in the field, providing students with an introduction to literature, a content overview, and skills to deconstruct and build conceptual and analytical arguments related to evidence drawn from geographical research from around the world, other than South Africa. The course also emphasises academic reading and writing skills taught in the practical sessions.
Lecture times: Monday - Friday, 4th period
DP requirements: Satisfactory completion of essay assignments and class test; students must attain an average mark of not less than 40% for the coursework
Assessment: Essay and other assignments count 50%; one 3-hour written examination in November count 50% (subminimum of 40% required).

EGS3023F   ANTHROPOCENE ENVIRONMENTS IN PERSPECTIVE
There is a compulsory fieldwork project.
36 NQF credits at HEQSF level 7
Convener: Professor M E Meadows
Course entry requirements: EGS2013F
Course outline:
The course deals with the dynamic physical environment including the human impact on global environments at various spatial and temporal scales during the so-called Anthropocene. The general aim of this course is to illustrate the nature and scale of changes that characterise the earth's environment, against a background of both natural and anthropogenically-induced processes. This provides an important perspective when thinking about contemporary environments and how they might change in the future – with obvious consequences for our own species and that of the others with which we share the planet.
Lecture times: Monday - Friday, 5th period
DP requirements: Satisfactory completion of practicals and all written assignments, including fieldwork report, essays and class tests. Students must attain an average mark of not less than 40% for the coursework.
Assessment: Field report, essays, class tests and practical assignments count 50%; one 3-hour examination written in June count 50% (sub-minimum of 40% required).

Postgraduate Courses

Ancillary activities
In addition to formal courses, students undertaking postgraduate courses are required to participate fully in other departmental activities of an academic nature. Such activities are weekly seminars on environmental topics addressed by persons prominent in their fields, field camps and field exercises away from Cape Town, and study tours to obtain first-hand exposure to environmental problems and their solutions. Graduate students who, in the opinion of the Head of Department, have not had adequate exposure to undergraduate courses with environmental content may also be required to attend specified courses.

EGS4001W   ATMOSPHERIC SCIENCE HONOURS

Since the code EGS4001W will not carry a NQF credit value, students will be concurrently registered for EGS4052W (coursework component of 120 NQF credits) and EGS4053W (research project of 40 NQF credits).

160 NQF credits at HEQSF level 8

Convener: Dr B J Abiodun

Course entry requirements: As for EGS4004W, with the additional requirement of at least a half-course in Mathematics or a full-course in Physics, as well as a senior undergraduate course in climatology or atmospheric science. Experience with computers is highly recommended.

Course outline:

The Atmospheric Science programme provides a 4th year of development for those interested in following a career associated with atmospheric science and climatology, or for progression to research in this area. The focus is on practical skills and the application of theory to the issues related to the climate system. The programme follows the same pattern as EGS4004W, with the constraint that three of four course modules must be from the atmospheric options, and the fourth module from one of the Honours level physical science options in Environmental & Geographical Science or the Oceanography department. Included in the requirements are a research project, two seminar presentations, and course fieldwork. Students will also attend and present at the annual conference of the South African Society for Atmospheric Scientists.

Assessment: The examinations will follow the same structure as EGS4004W. Not all course options have formal examinations, and a significant portion of the total coursework mark may be based on set project tasks. Examinations on average count 50% and coursework 50% for each module. The combined module results count 75% and the research project counts 25% of the degree as a whole. Students must pass the project component in order to qualify. These component parts of the course will be combined in a final overall mark which will be reflected against the course code EGS4001W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

EGS4004W   ENVIRONMENTAL & GEOGRAPHICAL SCIENCE HONOURS

Since the code EGS4004W will not carry a NQF credit value, students will be concurrently registered for EGS4054W (coursework component of 120 NQF credits) and EGS4055W (research project of 40 NQF credits). Entrance is limited to 30 students

160 NQF credits at HEQSF level 8

Convener: Dr Z Patel

Course entry requirements: A BSc degree with a major in Environmental & Geographical Science or related field. Acceptance will be at the discretion of the Head of Department who will consider quality of final year results, material covered in the undergraduate curriculum, and referee reports. Preference may be given to UCT graduates who meet the course entry requirements.

Course outline:

Students complete four advanced semester modules. One of these four modules must be a research methods module. Students complete a research methods course and then select a further three modules from a range of advanced courses in Environmental and Geographical Science that have foundations in one or more of the following areas of study: Human Geography, Environmental Management, Physical Geography. Curricula must be approved by the course convener in consultation with the Head of Department. In addition, each student completes a research project. At the discretion of the Convener, in consultation with the Head of Department, students may take one course from outside the Department (in addition to the methods course) towards the BSc Hons degree in Environmental & Geographical Science.

Assessment: Courses will be examined at the end of each semester, and the marks combined with project, essay, fieldwork and seminar presentation marks. Examinations on average count 50% and coursework 50% for each module. The combined module results count 75% and the research project counts 25% of the degree as a whole. Students must pass the project component in order to qualify. These component parts of the course will be combined in a final overall mark which will be

reflected against the course code EGS4004W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

EGS5003W   ENVIRONMENTAL & GEOGRAPHICAL SCIENCE DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

EGS5008H   ENVIRONMENT, SOCIETY & SUSTAINABILITY COURSEWORK
Students will enrol (and pay fees) for both courses EGS5008H and EGS5009W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s. Entrance is limited to 12 students
90 NQF credits at HEQSF level 9
Convener: Dr P Anderson
Course entry requirements: An Honours degree (or equivalent). In special circumstances graduates who have shown by examination, or publication, or a record of appropriate training, that they have reached a level equivalent to an Honours degree may be considered. Since there is a limit of 12 places in this course, admission is competitive. Selection will be at the discretion of the Head of the Department, based on quality of qualification, experiential learning and/or referee reports. For further details refer to the departmental website - see www.egs.uct.ac.za.
Course outline:
This interdisciplinary course is designed for students with diverse backgrounds who have an interest in the issues pertaining to the environment, society and sustainability. This course contributes half of the total credits for a Master's qualification which can be awarded as a MSc or MPhil, depending on the academic background of the student. The coursework component starts with registration in January. Students select four coursework modules in, for example, Theory & Practice of Environmental Management, Capital Politics & Nature, Geography of Development & Environment, Living with Environmental Change, Urban Food Security, Cultural Geographies, Managing Complex Human-Ecological Systems, or Geomorphology. Upon successful completion of the coursework component, students will be required to register for the minor dissertation component (EGS5009W) in the second semester of the first year.
Assessment: Assessment for the coursework modules includes both written examinations and coursework assignments such as essays, projects, practical assignments, etc. Examinations on average count 50% and coursework 50% for each module. The combined module results will be reflected as a final coursework result.

EGS5009W   ENVIRONMENT, SOCIETY & SUSTAINABILITY MINOR DISSERTATION
90 NQF credits at HEQSF level 9
Convener: Dr P Anderson
Course entry requirements: EGS5008H

Course outline:
Students will be required to register for this course in the second semester of the first year and complete a suitable research proposal in consultation with an appropriate supervisor. After approval of the proposal, students will undertake a research project demonstrating the application of theory to practical issues in the research area of environment, society and sustainability. The work must be submitted in the form of a minor dissertation early in the second year.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

EGS5010H   ENVIRONMENTAL & GEOGRAPHICAL SCIENCE COURSEWORK

Students will enrol (and pay fees) for both courses EGS5010H and EGS5020W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s. This course will not be offered in 2016.
90 NQF credits at HEQSF level 9
Convener: Dr P Anderson
Course entry requirements: A BSc Honours degree in Environmental & Geographical Science. Individual specialist modules may carry additional prerequisites.
Course outline:
This coursework component starts with registration in January. Students select four coursework modules from a range of advanced courses in Environmental & Geographical Science that have foundations in one or more of the following areas of study: Human Geography, Physical Geography, Atmospheric Science, Environmental Management, Geographical Information Systems. At the discretion of the convener, in consultation with the Head of Department, students may count one or two modules from outside the department towards the coursework component of this Masters degree in Environmental & Geographical Science. Upon successful completion of the coursework component, students will be required to register for the minor dissertation component (EGS5020W) in the second semester of the first year.
Assessment: Modules are conventionally examined by 3-hour written examinations in combination with various coursework elements such as essays, projects, practical assignments etc. Examinations on average count 50% and coursework 50% for each module. The combined module results will be reflected as a final coursework result.

EGS5020W   ENVIRONMENTAL & GEOGRAPHICAL SCIENCE MINOR DISSERTATION

This course will not be offered in 2016
90 NQF credits at HEQSF level 9
Convener: Dr P Anderson
Course entry requirements: EGS5010H
Course outline:
Students will be required to register for this course in the second semester of the first year and complete a suitable research proposal in consultation with an appropriate supervisor. After approval of the proposal, students will undertake a research project demonstrating the application of theory to practical issues in a research area of Environmental & Geographical Science. The work must be submitted in the form of a minor dissertation early in the second year.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

EGS5012W   CLIMATE CHANGE COURSEWORK

This course is convened by UCT's African Climate & Development Initiative; refer to the section "Inter-faculty Units" later in this handbook. The code EGS5012W represents the overall coursework component; the overall coursework result will be reflected against this code. There are a range of possible minor dissertation codes, depending on the discipline in which the student chooses to register for the research component.

0 NQF credits at HEQSF level 9

Convener: Dr M-A Baudoin

Course entry requirements: A relevant Honours degree (or equivalent). Students with backgrounds in scientific, planning, engineering, economic, educational, social and legal disciplines are encouraged to apply.

Course outline:

This full time taught Master's course (MSc or MPhil) is offered over 13 months, beginning in January. It provides interdisciplinary training in climate change and sustainable development, with a focus on the issues of relevance to African development. The course is designed for both recent graduates as well as those with several years' experience and who wish to gain a broad understanding of the issues involved in climate change and sustainable development from an African and developing world perspective. The curriculum comprises two compulsory core courses, EGS5031F: Introduction to Climate Change & Sustainable Development and EGS5032F: Climate Change Adaptation & Mitigation (details of these courses are presented later in this section). In addition, students will choose at least two elective courses, chosen from a range of courses which offer the student the opportunity to explore new areas, or look at climate and development through existing disciplinary backgrounds. A partial list and details of these courses are available from the ACDI handbook.

Assessment: To qualify for the Master's degree, students must pass all coursework with a subminimum of 33% for each core or elective course module; an aggregate coursework mark of 50% is required. A composite grade of the performance on the coursework component as a whole will be reflected against the assessment course EGS5012W. The choice of project for the minor dissertaton will be determined by prior qualification. Students may register for a minor dissertation in a range of Departments across the University, including Biological Sciences, Environmental & Geographical Science, Geological Sciences, Chemical Engineering, Mechanical Engineering, Economics, Sociology, Law [Refer to relevant Faculty Handbooks]. Minor Dissertation options in the Science Faculty.

BIO5011H   CLIMATE CHANGE MINOR DISSERTATION

90 NQF credits at HEQSF level 9

Convener: Dr M-A Baudoin

Course entry requirements: EGS5012W

Course outline:

The minor dissertation is based on a three- to six-month supervised research project, to be submitted at the end of January, with the possibility of extension to June 2016.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

EGS5029H   CLIMATE CHANGE MINOR DISSERTATION

90 NQF credits at HEQSF level 9

Convener: Dr M-A Baudoin

Course entry requirements: EGS5012W

Course outline:

The minor dissertation is based on a three- to six-month supervised research project, to be submitted at the end of January, with the possibility of extension to June 2016.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

GEO5005H CLIMATE CHANGE MINOR DISSERTATION

90 NQF credits at HEQSF level 9
Convener: Dr M-A Baudoin
Course entry requirements: EGS5012W
Course outline:
The minor dissertation is based on a three- to six-month supervised research project, to be submitted at the end of January, with the possibility of extension to June 2016.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

EGS5031F INTRODUCTION TO CLIMATE CHANGE & SUSTAINABLE DEVELOPMENT

23 NQF credits at HEQSF level 9
Convener: Dr M-A Baudoin
Course entry requirements: Acceptance for EGS5012W or by permission of the convener
Course outline:
This course provides a broad, integrated, knowledge on key issues in climate change and sustainable development, making students conversant across the spectrum of climate change issues and history. Topics covered include: sustainable development; the climate system, anthropogenic forcing and climate system response; African climate variability and change; international climate change legal frameworks, negotiations, and politics; the economics of climate change and climate change financing; the concept of climate compatible development. The course is lecture, seminar and group-work based. Each section of the course will involve basic framing lectures, supported by either an essay exercise or a group work exercise and seminar.
Assessment: Three essays count 20% each; one group-based student project counts 10%; one 3-hour examination counts 30%.

EGS5032F CLIMATE CHANGE ADAPTATION & MITIGATION

23 NQF credits at HEQSF level 9
Convener: Dr D Sparks
Course entry requirements: Acceptance for EGS5012W or by permission of the convener
Course outline:
This course provides in depth coverage of (i) adaptation and (ii) mitigation from both a theoretical and practical/applied point of view. Adaptation and mitigation are the two key domains of academic and applied learning required for students to be qualified to undertake research and be employable in the climate change arena in the South African and developing country context. The issues are explored from a developing country, climate compatible perspective.
Assessment: Four essays on mitigation counts a total of 80%; one 2- hour exam counts 20%.

PBL5045S ENVIRONMENTAL LAW FOR NON-LAWYERS

15 NQF credits at HEQSF level 9
Convener: Professor A Paterson
Course entry requirements: Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree.
Course outline:
The inclusion of an environmental right in South Africa's Constitution has led to the emergence of many environmental laws and court decisions in the past 15 years. These developments are of key relevance to those working in the environmental sector including developers, consultants, biologists,

zoologists, planners, sociologists and anthropologists. This course provides students undertaking postgraduate studies relevant to the environment with an insight into relevant principles of international and domestic environmental law. Key content covered in the course includes: an introduction to basic legal principles and resources; constitutional aspects (environmental rights, access to information, administrative justice and access to courts); framework environmental laws; land-use planning laws (planning law, environmental impact assessment and protected areas); natural resource laws (biodiversity, water and marine living resources); and pollution laws (fresh water, land and air pollution).

Lecture times: 1 x 3 hour lecture per week.
DP requirements: Satisfactory attendance of lectures and completion of essay.
Assessment: Short Assignment (10%); Long Assignment (40%); Written Examination (50%)

EGS6003W   ENVIRONMENTAL & GEOGRAPHICAL SCIENCE THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Prospective candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF GEOLOGICAL SCIENCES

The Department is housed in the Geological Sciences Building, 13 University Avenue
Telephone (021) 650-2931 Fax (021) 650-3783
The Departmental abbreviation for Geological Sciences is GEO.

Philipson Stow Professor of Mineralogy & Geology and Head of Department:
C Harris, MA DPhil *Oxon*
Chamber of Mines Professor of Geochemistry:
A P le Roex, BSc *Stell* BSc Hons PhD *Cape Town*
Professor:
S H Richardson, BSc Hons *Cape Town* PhD *MIT*
Emeritus Professor:
J J Gurney, BSc Hons PhD *Cape Town* FRSSAf
Associate Professor:
J S Compton, BA *San Diego* PhD *Harvard*
Emeritus Associate Professor:
D L Reid, MSc *Wellington* PhD *Cape Town*
Senior Lecturers:
M E Bordy, MSc *Budapest* PhD *Rhodes*
J F A Diener, MSc *Stell* PhD *Melbourne*
P E Janney, BSc *New Hampshire,* PhD *San Diego*
Lecturers:
L Greyling, MSc *RAU* PhD *Wits*
B Kahle, MA *Oxon* PhD *Cantab*
R Pickering, MSc *Wits* PhD *Berne*
A Sloan, MSc PhD *Cantab*
Senior Research Officer:
P J le Roux, BSc Hons PhD *Cape Town*
Honorary Research Associates:
A Fagereng, BSc Hons *Cape Town* PhD *Otago*
H E Frimmel, PhD *Vienna*
W L Taylor, MSc PhD *Rochester*
Principal Technical Officer:
J Harrison
Chief Scientific Officers:
K Gray, MSc *Cape Town*
C E Tinguely, MSc *Clermont-Ferrand*
Senior Scientific Officer:
F Rawoot, BSc *UWC*
Administrative Officer:
L Evon
Senior Secretary:
D Lesch
Thin Section Technicians:
R van der Merwe
D Wilson
Departmental Assistants:
J van Rooyen
I Wilson

RESEARCH IN GEOLOGICAL SCIENCES
Research in Geological Sciences embraces a variety of topics that are listed below. More detailed information can be obtained by writing to the Department of Geological Sciences.
The Department has research strengths in geochemistry, structural geology and tectonics, igneous and metamorphic petrology, sedimentology, marine geology, economic geology and petroleum geophysics. General research interests include: global tectonics and geodynamics with emphasis on Gondwana geology; structural geology; oceanic and continental igneous processes and the geochemical evolution of the underlying mantle; kimberlites and the genesis of diamonds; open and closed system behaviour during metamorphism and related ore genesis; economic geology with emphasis on base metal deposits; environmental geochemistry; sedimentology, sedimentary geochemistry, and sedimentary processes; chemical stratigraphy and crisis in the geological record; marine sedimentology and geophysics. The Department is well equipped for analytical studies with X-ray fluorescence, electron microprobe and X-ray diffraction equipment, solution and laser ablation ICP-MS facilities, and access to gas-source mass spectrometers for oxygen, hydrogen and carbon stable isotope measurements. The Department is also equipped for structural and tectonic analysis and seismic interpretation, with microcomputer laboratories and relevant software.

Undergraduate Courses

Field excursions:
All students attending courses in Geology are required to take part in field excursions which take place during the Easter and September mid-semester vacations; full daily participation is required by all students.

NOTE: Supplementary examinations are not normally granted to students for senior courses in Geology.

First-Year Courses

GEO1006S   INTRODUCTION TO MINERALS, ROCKS & STRUCTURE
18 NQF credits at HEQSF level 5
Convener: Professor C Harris
Course entry requirements: A minimum of 45% in GEO1009F or a pass in AGE1004S
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; the interpretation of geological maps. A three day field trip to the Western Cape serves as an introduction to field geology.
Lecture times: Monday - Friday, 5th period
DP requirements: An average of 30% in all marked classwork and tests.
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.

GEO1009F   INTRODUCTION TO EARTH AND ENVIRONMENTAL SCIENCES
This course is presented jointly by the Departments of Archaeology, Environmental & Geographical Science and Geological Sciences, but administered by Geological Sciences. Students who fail this course will be advised to register for AGE1004S (see entry in Department of Archaeology). Students are required to attend three half-day excursions in the Cape Peninsula.
18 NQF credits at HEQSF level 5
Convener: Associate Professor J S Compton
Course entry requirements: At least 60% for NSC Physical Science, Life Sciences or Geography (or AGE1004S). NOTE: Preference will be given to students registered in the Science Faculty.

Course outline:
This course aims to develop a broad understanding of how the Earth works, leading to majors in Archaeology, Environmental & Geographical Sciences, Geology and Ocean & Atmosphere Science. The course covers the following general topics: structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; humans and the environment.
Lecture times: Monday - Friday, 2nd period
DP requirements: An average of 30% on all marked classwork and tests.
Assessment: Marked classwork counts 24%; marked class tests count 16%; June examination 3 hours 60%. A Subminimum of 40% is required in the theory examination paper. Supplementary examinations for GEO1009F will be written in November.

Second-Year Courses

GEO2001F   MINERALOGY & CRYSTALLOGRAPHY
Entrance is limited to 35 students
24 NQF credits at HEQSF level 6
Convener: Professor S H Richardson
Course entry requirements: GEO1009F (or AGE1004S from 2015) and GEO1006S, CEM1000W or equivalent.
Course outline:
This course covers the fundamentals of physical and chemical mineralogy as a basis for senior courses in petrology. The course comprises four inter-related sections as follows: crystallography, crystallographic calculations and a brief introduction to X-ray crystallography; Crystal optics: the theory and practice of identifying minerals by means of the polarising microscope; Mineralogy: the chemical, physical and optical properties of selected groups of rock-forming minerals; Phase diagrams: interpretation of one, two and simple three component phase diagrams; classification and petrography of igneous rocks; physical processes in magma chambers; the relationship between chemical and mineralogical composition; types of metamorphism, metamorphic textures and mineral assemblages.
Lecture times: Monday - Friday, 2nd period
DP requirements: Attendance at 80% of practicals and an average of 30% in all marked class work and tests.
Assessment: Marked class work, including tests, count 20%; one 2-hour practical examination in June counts 30%; one 2-hour theory examination in June counts 50%. Subminima of 40% are required in practical and theory examination papers.

GEO2004S   PHYSICAL GEOLOGY
24 NQF credits at HEQSF level 6
Convener: Dr J F Diener
Course entry requirements: GEO2001F, PHY1031F or equivalent
Course outline:
This course builds on the previous mineralogy course and explores the physical processes involved in igneous, metamorphic and sedimentary rock formation, modification and destruction as follows: Stratigraphy of South Africa; transport and deposition of siliciclastic sediment; sedimentary textures and structure;. siliciclastic, carbonate, evaporitic and other sedimentary rocks; earthquakes, stress, displacement and strain; brittle and ductile deformation; interpretation of geological maps and cross sections; introduction to tectonics and geophysics.
Lecture times: Monday - Friday, 2nd period
DP requirements: An average of 30% in marked class work, and attendance at 80% of practicals.
Assessment: Class tests and practicals count 25%; one 2-hour practical examination in November counts 30%; one 2-hour theory examination in November counts 45%. Subminima of 40% are required in practical and theory examination papers.

GEO2005X   FIELD GEOLOGY & GEOLOGICAL MAPPING
24 NQF credits at HEQSF level 6
Convener: Dr J F Diener
Course entry requirements: GEO1006S, GEO2004S (co-requisite)
Course outline:
This is a field-based course that introduces techniques used to identify, describe and document rocks in the field and for interpreting their inter-relationships, with the view to producing geological maps, stratigraphic logs and structural sections. Techniques covered include: mineralogical and textural descriptions of rocks using a hand-lens; measurement of attitude of bedding using compass and clinometer; measurement, description and interpretation of depositional and deformational structures; stereo plots, interpretation and use of aerial photographs; identifying contact relationships; GPS positioning. Course material is taught over four separate field camps spread over two years of study.
Lecture times: None
DP requirements: Attendance at all field camps
Assessment: Maps and reports count 70%; three 2-hour practical examinations in June and November count for 30%.

Third-Year Courses

GEO3001S   STRATIGRAPHY & ECONOMIC GEOL
36 NQF credits at HEQSF level 7
Convener: Dr L N Greyling
Course entry requirements: GEO2004S and DP in GEO3005F
Course outline:
This course covers the development of the oceanic and continental rock record and associated ore deposits as follows: the principles of stratigraphy with examples drawn from the South African rock record; the methods and procedures involved in dating rocks; the genesis of economic mineral deposits, their microscopic textures, and their valuation and exploitation; geophysical techniques.
Lecture times: Monday - Friday, 2nd period
DP requirements: An average of 30% in all marked class work and class tests.
Assessment: Practicals and tests count 25%; one 3-hour theory examination written in November counts 45%; two 2-hour practical examinations written in November count 30%. Subminima of 40% required in practical and theory examination papers.

GEO3005F   PETROLOGY & STRUCTURAL GEOLOGY
36 NQF credits at HEQSF level 7
Convener: Dr P E Janney
Course entry requirements: GEO2001F, GEO2004S
Course outline:
This course covers key concepts in igneous, metamorphic and sedimentary petrology in combination with structural geology as follows: interpreting major and trace element and isotope variations in igneous rocks; origin and evolution of the major magma series; thermodynamics, kinetics and chemography of metamorphic reactions; tectonic setting of metamorphic terrains; principles of interpretations and classification of continental and marine sedimentary environments; fault related folding, fold and thrust systems, kinematic principles and section balancing; ductile deformation.
Lecture times: Monday - Friday, 2nd period
DP requirements: Attendance at 80% of practicals and an average of 30% in all marked class work and tests.
Assessment: Class work counts 20%; one 4-hour practical examination written in June counts 30%; one 3-hour theory examination written in June counts 50%. Subminima of 40% required in practical and theory examination papers.

Postgraduate Courses

GEO4000W   GEOLOGY HONOURS

Since the code GEO4000W will not carry a NQF credit value, students will be concurrently registered for GEO4003W (coursework component of 120 NQF credits) and GEO4004W (research project of 40 NQF credits).Entrance is limited to 16 students
160 NQF credits at HEQSF level 8
Convener: Dr P Janney
Course entry requirements: A BSc degree with a major in Geology, first qualifying courses in Chemistry and Mathematics. A first qualifying course in Physics is recommended. The Senate may accept other courses as being equivalent to these and this criterion will be applied when considering science graduates from other universities. Registrations are limited to 16 and acceptance will be at the discretion of the Head of Department, who will consider quality of final year results, material covered in undergraduate curriculum, and referee reports in making decisions. Preference will be given to UCT graduates who meet the course entry requirements.
Course outline:
Selections of compulsory and elective modules are available, and would normally include the following: Analytical Geochemistry, Applied Geophysics, Economic Geology, Igneous Petrology, Applied Palaeontology, Isotope Geochemistry, Mantle Petrology, Marine Geochemistry, Metamorphic Petrology, Petroleum Geology, Sedimentary Basins, Structural Geology. Earth Science Concepts and Geodata Analysis are compulsory modules for all students. In addition, each student is required to undertake a supervised research project. Choice of optional modules and research project require the approval of the Honours course co-ordinator and Head of Department. All students are required to attend a two week fieldtrip held during the year.
Assessment: The compulsory and optional modules will each have an associated examination held in mid-year and towards the end of the Honours year. These examinations will count 60%, practical and assignment work done during the year counts 15%, and the research project 25% towards the final grade. Subminima are required for the overall examination mark (40%) and for the research project (50%). These component parts of the course will be combined in a final overall mark which will be reflected against the course code GEO4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

GEO4001W   GEOCHEMISTRY HONOURS

As for GEO4000W above, but with a restricted choice of modules. Since the code GEO4001W will not carry a NQF credit value, students will be concurrently registered for GEO4005W (coursework component of 120 NQF credits) and GEO4006W (research project of 40 NQF credits).
160 NQF credits at HEQSF level 8

GEO5000W   GEOLOGY DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

GEO5003W   GEOCHEMISTRY DISSERTATION
180 NQF credits at HEQSF level 9

Course outline:

This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found at the front of the handbook.

GEO6000W   GEOLOGY THESIS
360 NQF credits at HEQSF level 10

Course outline:

The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.

GEO6001W   GEOCHEMISTRY THESIS
360 NQF credits at HEQSF level 10

Course outline:

The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.

DEPARTMENT OF HUMAN BIOLOGY (FACULTY OF HEALTH SCIENCES)

Room 5.1.4, Level 5, Anatomy Building, Health Sciences Campus and Sports Science Institute of South Africa Building, Newlands. Telephone (021) 406-6235

(This department incorporates the disciplines of anatomy, biokinetics, biological anthropology, biomedical engineering, cell biology, exercise science, health technology and infrastructure management, human nutrition, physiology, and sport and exercise medicine).

This department offers the Human Biology (HUB) courses detailed in this section towards the Integrated Human Anatomical & Physiological Sciences major for the BSc degree.

Professor and Head of Department:
M R Collins, BSc (Hons) *Stell* PhD *Cape Town* FECSS
Professors:
T S Douglas, BSc (Eng) MBA *Cape Town* MS *Vanderbilt* PhD *Strathclyde*
S H Kidson, BSc (Hons) MSc PhD *Wits* HDE *JCE*
E V Lambert, BA (PhysEd) MSc *South Carolina* PhD *Cape Town*
M I Lambert, BSc (Agric) *UKZN* BA (PhysEd) (Hons) *Rhodes* MSc *South Carolina* PhD *Cape Town*
G J Louw, BVSc DVSc *Pret*
Professor and NRF/DST South African Research Chair in Brain Imaging:
E Meintjes, BSc(Hons) MSc *UKZN* MS PhD *Oregon State*
Honorary Professors:
J L Jacobson, MA PhD *Harvard*
W van Mechellen, MD PhD *VU Amsterdam* FACSM
Emeritus Professors:
L A Kellaway, BSc (Hons) MSc PhD *Cape Town*
A G Morris, BSc (WLU) PhD *Wits*
T D Noakes OMS, MBChB MD DSc (Med) *Cape Town* FACSM (Hon) FFSEM *UK*
V A Russell, BSc (Hons) MSc *Cape Town* PhD *Stell*
Associate Professors:
A N Bosch, BSc *UKZN* BA (PhysEd) (Hons) MA *Rhodes* PhD *Cape Town*
L Davids, BSc(Hons) MSc(Eng) *UKZN* PhD *Cape Town*
T Franz, PhD *Bremen*
D M Lang, Dr rer nat *Konstanz Germany*
E Ojuka, BSc (Med) *Makerere* PhD *Brigham Young*
S Prince, BSc (Hons) HDE PhD *Cape Town*
Honorary Associate Professors:
J H Goedecke, BSc (Med) (Hons) Nutrit&Dietetics PhD *Cape Town* RD(SA)
R P Lamberts, BSc(Physiotherapy) MSc(Pedagogics/Human Movement Science) *Netherlands* PhD *Cape Town* FECSS
Senior Lecturers:
K Bugarith, BSc (Hons) *UKZN* PhD *Washington State*
G Gunston, MBChB *Cape Town*
A Gwanyanya, MBChB DA *SA* MMed (Anaesthetics) *Zimbabwe* PhD *Leuven*
M Jankiewicz, PhD (Phys) *Vanderbilt* MSc (Phys) *Copernicus*
V Naidoo, BSc *UKZN* BSc (Hons) *Pret* MMedSc *UKZN* PhD *Michigan State Univ*
M A J Poluta, BSc (Eng) *Wits*
D Shamley, BSc PhD *Wits*
S Sivarasu, PhD(Biomed Eng) *VIT University India*
C P Slater, MBChB MPhil *Cape Town* FFRad(T) *SA*
E L van der Merwe, BSc (Med) (Hons) MSc PhD *Cape Town*

C M R Warton, MBChB *Zimbabwe*
Honorary Senior Lecturers:
J de Beer, MBChB MMed (Orthop) *Pret*
J Gray, BSc (Physio) *Wits* BSc Med (Hons) Exercise Science PhD *Cape Town*
T L Kolbe-Alexander, BA *UWC* BSc Med (Hons) MPH PhD *Cape Town*
W Van der Merwe, MBChB *UFS* BSc Med (Hons) Sport Science *Cape Town* FCS (Ortho)
Lecturers:
A Abrahams, BSc (Hons) PhD *Cape Town*
E Badenhorst, BA (Hons) *Stell*
R Ballo, MSc PhD *Cape Town*
J Friedling, MSc PhD *Cape Town*
S A Jimoh, BSc *Ilorin* MSc *Ibadan* PhD *Wits*
J Kroff, BSc (Human Movement Science) BHons (Biokinetics) MSc (Medical Physiology) PhD *Stell*
T Mutsvangwa, BScEng MSc (Med) PhD (Biomedical Engineering) *Cape Town*
Honorary Lecturers:
D T Crombie, BA (Hons) (Industrial Relations) BA (Hons) (Industrial Psychology) PhD (Management theory) PhD (Exercise Science) *Cape Town*
L K Micklesfield, BA (Human Movement Studies) *Rhodes* BSc (Med) (Hons) Biokinetics MSc (Med) PhD *Cape Town*
 M K Patrick, MA *Cape Town*
Associate Professor and Chief Research Officer:
A V September, BSc (Med) (Hons) (Human Genetics) MSc (Medicine) (Human Genetics) PhD *Cape Town*
Senior Research Officers:
Y Albertus-Kajee, BSc (Med) (Hons) Exercise Science PhD *Cape Town*
C Draper, BSocSc (Hons) (Psych) MA (Psych) PhD *Cape Town*
T Kohn, BSc (Hons) (Biochemistry) PhD *Stell*
M Posthumus, BSc (Med) (Hons) Exercise Science PhD *Cape Town*
D Rae, BA (Human Movement Studies) *AUS* BSc (Med) (Hons) Exercise Science PhD *Cape Town*
Research Officers:
M Jankiewicz, MS *Nicolas Copernicus* PhD *Vanderbilt*
M Nglazi, BSc (Microbiology) *Zambia* MPH *Cape Town*
L Rauch, BSc (Physiology) BSc(Med)(Hons) Exercise Science PhD *Cape Town*
J Smith, PhD *Cape Town*
Honorary Research Associates:
N J Bergman, MBChB *Cape Town* DCH *Sweden* MPH *Zimbabwe*
J Swart, MBChB MPhil (Sports Medicine) PhD *Cape Town*
Principal Technical Officers:
S Cooper, BSc BMedSc (Hons) BEd MMedSc MBA *UFS*
B R Dando, Dip (MedTech) *Zimbabwe*
C Harris, NTC *Athlone Tech Coll*
Chief Technical and Scientific Officers:
D A Bouwers, BSc (Hons) *Cape Town* MSc *Stell*
G de Bie, BSc *Rhodes* BSc (Hons) *UFS* MPhil *Stell*
I Fakier, NDElectricEng *CPUT*
V Fourie
M Petersen, Dip (MedTech) BTech *CPUT*
H Victor, Dip (Datametrics) *UNISA*
Senior Technical and Scientific Officers:
M Cassar
S Jordaan, MSc *Stell*
S Rayise, MSc *UWC*
P Steyn BSc (Hons) MSc PhD *Stell*

Technical Officers:
D Abrahams
N Kariem, BSc (Hons) *Cape Town*
Clinical Research Sister:
M Blackaller-Smal, BCur PgDNS (Clinical Nursing, Community) PgDNS (Nursing Management)

HUB2019F   INTEGRATED ANATOMICAL AND PHYSIOLOGICAL SCIENCES PART A

Entrance is limited to 80 students.
24 NQF credits at HEQSF level 6
Convener: Associate Professor E Ojuka
Course entry requirements: BIO1000W (or equivalent), CEM1000W (or equivalent).
Course outline:
HUB2019F course integrates human physiology, anatomy and histology. It includes studies of cells and tissues, embryology, osteology, skeletal muscle, body fluids, endocrinology, digestion, absorption and metabolism. The course consists of lectures, practical sessions and tutorials. At the end of this course, students will be able to describe structure-function relationships of body systems coved in the course; apply concepts and principles taught in lectures and practical sessions to solve theoretical or real-life problems posed in tutorials, tests and examinations; follow and implement instructions in computer-simulated physiology experiments and interpret result; identify micro-anatomical organisations of organs under a microscope or in monographs; identify and name structures in anatomical specimens; and design simple experiments to determine physiologic parameters such as blood type, fluid compartment volumes, enzyme activities etc.
DP requirements: Attendance at all practical sessions and 40% average in class tests.
Assessment: The breakdown of course marks is as follows: Class tests 30%, practical write-up 15%, assignments or tutorials 5%. Final examinations (50%) as follows: Theory examination 30%, practical examination 20%. The pass mark for the course is 50%. Supplementary examinations, in the form of written, practical or oral assessment, may be offered to students whose overall score is 45-49%.

HUB2021S   INTEGRATED ANATOMICAL AND PHYSIOLOGICAL SCIENCES PART B

Entrance is limited to 60 students
24 NQF credits at HEQSF level 6
Convener: Dr E van der Merwe (Department of Human Biology, Faculty of Health Sciences)
Course entry requirements: HUB2019F, CEM1000W (or equivalent).
Course outline:
The course covers the physiology, anatomy and histology of organ systems in the human body, including the nervous system, excretory and thermoregulation, respiratory, cardiovascular, lymphatic and immune, and reproductive systems. Students are also introduced to bone forensics and to concepts of aging and disease. Students work in small groups using computers and other equipment to study the physiology and anatomy of the nervous system; the electrical events in the contraction of cardiac muscle; the mechanics of the respiratory system; the immune system; excretion and temperature regulation; reproduction, and parts of the human body from cadavers and histological sections under a microscope. At the end of this course students will have a thorough grounding in the physiological mechanisms of the nervous, urinary, cardiovascular, respiratory, reproductive, and immune systems. They will have an understanding of the basic anatomy and microanatomical organisation (histology) of key organs within the above bodily systems; will be able to integrate the concepts above in terms of understanding structure-function relationships, so as to understand the basic key elements that impact on the physiology of organs during ageing and that lead to disease processes; and will be able to interpret data obtained from the various practicals.
DP requirements: Attendance at all practicals, 40% average in class tests and an average of 50% for all assignments.

Assessment: The final mark comprises class tests (30%); practicals, assignments and tutorials (20%); and final examinations (50%), consisting of a written theory exam (30%) and a practical (20%). An oral examination may be required in the case of selected students.

Third-Year Courses

HUB3006F   APPLIED HUMAN BIOLOGY
36 NQF credits at HEQSF level 7
Convener: Associate Professor A Bosch
Course entry requirements: HUB2019F, HUB2021S
Course outline:
The semester theme is "Living, working and playing". Topics dealt with include metabolism and homeostasis, sports nutrition and metabolism, obesity and diabetes, muscle physiology, cardio-respiratory physiology, sporting performance, exercise physiology, thermoregulation, and physiology in extreme environments. At the end of the course students should have a good understanding of the physiology related to movement, sport and exercise. They should understand physiological control, the basics of the physiological components underlying athletic performance, and energy balance and key components of sports nutrition. In addition, they should have a good understanding of the cardiovascular system, muscle function, and the effect of exercise on health, particularly diabetes and obesity. Students will prepare a seminar topic which will be presented as a PowerPoint presentation towards the end of the semester, during the "practical" time slot.
DP requirements: Attendance at all practicals, (including tutorials and seminar presentations held during the "practical" time slot), 40% average in class tests and an average of 50% for all assignments.
Assessment: Class test (30%); assignments/seminar presentation (5%); practicals (15%); and examinations (written theory and practical theory) (50%). An oral examination may be required in the case of selected students.

HUB3007S   HUMAN NEUROSCIENCES
36 NQF credits at HEQSF level 7
Convener: Dr A Gwanyanya
Course entry requirements: HUB2013S, CEM1000W (or equivalent), e.g. a result of at least 60% in HUB2017H. Exceptions are at the discretion of the convener
Course outline:
This course offers theoretical and practical instructions on advanced concepts in neuroscience, such as embryological development and repair of the nervous system, histological and gross anatomical appearances of the brain, electrophysiology, principles of electrical and morphological brain imaging, neuronal signalling, signal transduction in sensory, motor and autonomic nervous systems, vision and pain perception, eating disorders, mechanisms of learning and the development of memory. At the end of the course students should be able to apply knowledge gained and practical skills acquired to solve problems in neurophysiology; read and critically evaluate neuroscience literature; apply knowledge of human physiology in medical fields in the general market place; use acquired skills in assisting with undergraduate practical demonstrations; and teach basics of human physiology.
DP requirements: Attendance at all practicals, 40% average mark for class tests and an average of 50% for all assignments.
Assessment: Class tests (30%); tutorial assignments (5%); practical experiments (15%); and examinations (theory and practical) (50%). An oral examination may be offered in case of selected students.

DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

The Department is housed in the Mathematics Building, 7 University Avenue
Telephone (021) 650-3191 Fax (021) 650-2334. The website address is http://www.mth.uct.ac.za
The Departmental abbreviation for Mathematics and Applied Mathematics is MAM.

Professor and Head of Department:
H- P A Künzi, MSc PhD *Berne*
South African Research Chair in Computational Mechanics:
B D Reddy, BSc (Eng) *Cape Town*, PhD *Cantab* FRSSAf, MASSAf, OMB
Professors:
I V Barashenkov, MSc *Moscow* PhD *Dubna*
B A Bassett, MSc *Cape Town* PhD *Trieste*
P K S Dunsby, BSc PhD *London*
G Janelidze, MSc PhD *Tbilisi Georgia* DSc *St Petersburg*
Senior Scholar and Emeritus Distinguished Professor of Complex Systems:
G F R Ellis, BSc Hons BCom (Hons) *Cape Town* PhD *Cantab* DSc (h.c) *Natal, Haverford*
Emeritus Professors:
R I Becker, BSc Hons *Cape Town* PhD *MIT*
G C L Brümmer, MSc *Stell* Docts Math *Amsterdam* PhD *Cape Town*
D S Butterworth, MSc *Cape Town* PhD *London*
K A Driver, BSc Hons *Wits* MSc *Stanford* PhD *Wits*
J H Webb, BSc Hons *Cape Town* PhD *Cantab*
Associate Professors:
P V Bruyns, MA DPhil *Oxon* LRSM MSc *Cape Town*
C A Clarkson, BSc Hons *Edinburgh* PhD *Glasgow*
C W Hellaby, BSc Hons *St Andrews* MSc PhD *Queen's (Ontario)*
A B Ianovsky, MSc *Sofia* PhD *Dubna*
J Murugan, MSc PhD *Cape Town*
Emeritus Associate Professors:
R W Cross, MA *St Andrews* PhD DSc *London*
C R A Gilmour, MSc PhD *Cape Town*
Honorary Research Associates:
V Brattka, MSc PhD *HagenGermany*
E E Plagányi-Lloyd, BSc *Natal* MSc PhD *Cape Town*
R A Rademeyer, MSc PhD *Cape Town*
F D Richardson, BSc (Agric) *Nottingham* PhD *London* PhD *Cape Town*
Senior Lecturers:
NV Alexeeva, MSc *Sofia* PhD *Cape Town*
F Ebobisse Bille, PhD *Pisa*
D J Erwin, MSc *Natal* PhD *Western Michigan*
J L Frith, MSc PhD *Cape Town*
H de G Laurie, BA *Stell* BSc *Unisa* BSc Hons PhD *Cape Town*
N R C Robertson, MSc PhD *Cape Town*
F Russo, MSc PhD *Naples Federico II*
A Schauerte, BSc Hons *Natal* MSc *Cape Town* PhD *McMaster*
H Skokos, BSc PhD *Athens*
A Weltman, BSc Hons *Cape Town* PhD *Columbia*
Lecturers:
T Chinyoka, MSc *Zimbabwe* PhD *Virginia Tech*
Á de la Cruz-Dombriz, MSc PhD *Madrid*
E Fredericks, MSc PhD *Wits*

T Janelidze-Gray, MSc *Tbilisi* PhD *Cape Town*
R Martin, BSc *Guelph* MSc PhD *Waterloo*
B Mongwane, BSc *Limpopo* BSc Hons *PU* MSc PhD *Cape Town*
R Moolman, BSc Hons MSc *Johannesburg*
J Ratzkin, BA *Berkeley* PhD *Washington*
J Sánchez Ortega, MSc PhD *Málaga*
J P Shock, MPhys *Bristol* PhD *Southampton*
H Spakowski, PhD *Heinrich-Heine Germany*
C S Swart, MSc *Natal* MSc PhD *London*
T C van Heerden, MSc *Cape Town* MASt *Cantab*
Visiting Professor and Principal Research Officer:
R Maartens, PhD *Cape Town*
Senior Research Officers:
A D G Brandao, BSc *Wits* MSc PhD *Cape Town*
C L de Moor, PhD *Imperial College, London*
S J Holloway, MSc PhD *Cape Town*
Administrative Manager:
H S Leslie, BA (Hons) *UPE*
Administrative Assistants:
T Hannival
T Jansen
G McBride
A Willis-Thomas
Senior Secretary:
K Peters
Departmental Assistants:
S Allie
J M Steenveld

RESEARCH IN MATHEMATICS AND APPLIED MATHEMATICS
Research activities in the Department cover the spectrum of mathematics, and there are groups which are active in areas as diverse as Topology, Analysis, Discrete Mathematics and Theoretical Computer Science, General Relativity and Cosmology, Biological Modelling, and Continuum Mechanics. Fields of research of staff members include:
Functional Analysis, Operator Theory (J J Conradie, R W Cross, F Ebobisse, R Martin, N R C Robertson, J H Webb)
Financial Mathematics (R Becker)
Dynamical Systems (A B Ianovsky)
General Relativity and Cosmology (B A Bassett, C A Clarkson, Á de la Cruz-Dombriz, P K S Dunsby, G F R Ellis, C W Hellaby, B Mongwane, J Murugan, J P Shock, A Weltman)
Group Theory, Universal Algebra, Set Theory and Model Theory (P V Bruyns, H-P A Künzi, F Russo)
Industrial Mathematics (H de G Laurie)
Discrete Mathematics, Combinatorics, Computational Complexity, Cryptography, Graph Theory (D J Erwin, F Russo, H Spakowski, C S Swart)
Marine Population Dynamics (A Brandao, D S Butterworth, C de Moor, S J Holloway)
Mathematical Ecology (H de G Laurie)
Mathematics Education (J J Conradie, G F R Ellis, J L Frith, C R A Gilmour, H de G Laurie, R Moolman, K Rafel, J H Webb)
Nonlinear Dynamics and Mathematical Physics (I V Barashenkov, N V Alexeeva)
Partial Differential Equations of Mechanics, Numerical Analysis, Dynamical Systems (F Ebobisse-Bille, B D Reddy)
Approximation theory, special functions (K Driver)
Geometric Analysis (J Ratzkin)

Sampling theory, operator algebras (R Martin)
Computational Fluid Dynamics (T Chinyoka)
Stochastic Ordinary Differential Equations (E Fredericks)
Rangeland Systems Modelling (F D Richardson)
National Astrophysics & Space Science Programme (B A Bassett, C A Clarkson, P K S Dunsby, G F R Ellis, C W Hellaby, J Murugan, P A Whitelock, J P Shock, A Weltman)
Topology and Category Theory (J L Frith, C R A Gilmour, G Janelidze, H P A Künzi, F Russo, A Schauerte, G C L Brümmer)
String Theory and Quantum Gravity (J Murugan, J P Shock, A Weltman)
Category Theory (G Janelidze, T Janelidze-Gray)
Nonlinear dynamical systems, chaotic dynamics and Computational Mathematics (H Skokos)
Leavitt Path Algebras, Non-Associative Algebra, Ring Theory, Computer Algebra, Linear and Multilinear Algebra, Algebraic Combinatorics, Dialgebras (J Sanchez-Ortega)
Further information may be found in the Department's website at http://www.mth.uct.ac.za.

Courses Offered by the Department

For convenience and ease of reference, the undergraduate courses have been grouped separately under Applied Mathematics and Mathematics. All postgraduate courses offered by the Department are listed together.
1. All students registered for a course in the Department will be required to attend the lectures and tutorial classes prescribed for that course.
2. Most syllabi indicate the contents of the various courses as recently given. All courses are subject to revision without advance notice.
3. For courses offered by the Department to Engineering and Commerce Faculty students refer to the relevant Faculty Handbooks.
4. In exceptional cases, the usual course entry requirements may be waived with special permission of the Head of Department.

Undergraduate Courses in Applied Mathematics

Recommended course selection
The following are recommended course selections emphasising particular interests:
Mathematical Modelling/Mechanics:
MAM1043H, MAM1044H, MAM2046W, MAM3040W with courses in Mathematics, Oceanography, Statistics and Computer Science.
Mathematical Physics:
MAM1043H, MAM1044H, MAM2046W (or MAM2047H+MAM2004H), MAM3040W with courses in Physics, Astronomy and Mathematics.
Biomathematics and Life Sciences:
MAM1043H, MAM1044H, STA1006S, MAM2046W, MAM3041H (modules 3ND and 3AN) with courses in the Life Sciences or Environmental & Geographical Science.

Prerequisites for 2nd and 3rd year courses
Students wishing to register for the module 2BP (in the 2nd year applied mathematics course MAM2046W) must obtain a final mark of at least 50% for the module 2OD. Students planning to take modules in the third year applied mathematics course MAM3040W must obtain a final mark of 50% or higher for each of the prerequisite modules shown below:

		Semester	Prerequisites
3MP	Methods of Mathematical Physics	1	2AC, 2OD, and 2ND
3CV	Methods of Functions of Complex Variables	1	2RA
3AN	Advanced Numerical Methods	2	2LA and 2NA

| 3GR | Introduction to General Relativity | 2 | 2AC |
| 3FD | Fluid Dynamics | 2 | 2AC, 2OD, and 2BP |

First-Year Courses in Applied Mathematics

The Mathematics Hot Seat in Room 210 on level 2 in the Mathematics Building is open for several hours every day and students in the courses MAM1042S, MAM1043H and MAM1044H are encouraged to go there for help with their mathematics problems.

Undergraduate Courses

First-Year Courses

MAM1043H   MODELLING & APPLIED COMPUTING

This course can be taken in conjunction with MAM1044H as lectures are arranged so that this is possible.

18 NQF credits at HEQSF level 5

Convener: Dr H de G Laurie

Course entry requirements: MAM1000W (corequisite)

Co-requisites: MAM1000W (corequisite)

Course outline:

The aim of this course is to introduce Applied Mathematics and Mathematical Modelling including approximations and estimation theory, numerical methods, dynamical systems and modelling and simulation of discrete and continuous processes with MATLAB. Exposure to research methodology and mathematical communication is provided.

Lecture times: First Semester: 2nd period Monday, Wednesday, Friday. Second Semester: 2nd period Tuesday, Thursday.

DP requirements: A class record of 30% or more.

Assessment: Class record counts 50%; one 3-hour examination written in October/November makes up the balance.

MAM1044H   DYNAMICS

This course can be taken in conjunction with MAM1043H as lectures are arranged so that this is possible.

18 NQF credits at HEQSF level 5

Convener: Professor P K S Dunsby

Course entry requirements: MAM1000W (corequisite)

Course outline:

The aim of this course is to introduce the elements of mechanics. Topics covered include: Kinematics in three dimensions. Newton's laws of motion, models of forces (friction, elastic springs, fluid resistance). Conservation of energy and momentum. Simple systems of particles, including brief introduction to rigid systems. Orbital Mechanics with applications to the planning of space missions to the outer planets.

Lecture times: First semester: 2nd period Tuesday, Thursday. Second semester: 2nd period Monday, Wednesday, Friday.

DP requirements: A class record of 30% or more.

Assessment: Class record counts up to 33%; one 3-hour examination written in October/November makes up the balance.

Second-Year Courses

MAM2046W   APPLIED MATHEMATICS 2046

The course MAM2046W consists of four modules and students must take all of these. Students wishing to register for the module 2BP must obtain a final mark of at least 50% for 2OD. Students planning to take MAM3040W should be aware that registration for some of the modules in that course requires a final mark of 50% or higher in some of the modules in MAM2046W

48 NQF credits at HEQSF level 6
Convener: Dr N Alexeeva
Course entry requirements: MAM1043H, MAM1044H and MAM1000W
Co-requisites: Modules 2LA and 2AC of MAM2000W/2004H
Course outline:
This course will provide students with fundamental topics in Applied Mathematics. It consists of the following four modules:
2NA: NUMERICAL ANALYSIS (MAM2053S in EBE)
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.
2OD: ORDINARY DIFFERENTIAL EQUATIONS
First order equations; existence and uniqueness of solutions. Linear equations of the n-th order; systems of n linear first-order equations. Nonhomogeneous linear equations and systems; variation of parameters; qualitative theory of nonlinear equations; phase plane analysis; externally and parametrically driven oscillators; resonances; application to the theory of nonlinear vibrations. Calculus of variations.
2BP: BOUNDARY-VALUE PROBLEMS (MAM2050S in EBE)
Boundary-value problems, Sturm-Liouville problems, Green's function. Variational calculus, applications to Lagrangean and Hamiltonian mechanics. Diffusion, Laplace's and wave equation. Solution by separation of variables.
2ND: NONLINEAR DYNAMICS
Fixed points, bifurcations, phase portraits. Conservative and reversible systems. Index theory, Poincáre-Bendixson theorem, Liénard systems, relaxation oscillators. Hopf bifurcations, quasiperiodicity and Poincaré maps. Applications. Chaos on a strange attractor, Lorentz map, logistic map, Hénon map, Lyapunov exponents. Fractals.
Lecture times: Monday - Friday, 3rd period
DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: For each module the class record counts 30% and one no longer than 2-hour examination paper counts 70%.

MAM2047H   APPLIED MATHEMATICS 2047

24 NQF credits at HEQSF level 6
Convener: Dr N Alexeeva
Course entry requirements: MAM1043H, MAM1044H and MAM1000W
Co-requisites: Modules 2LA and 2AC of MAM2000W/2004H
Course outline:
The aim of this course is to introduce the student to a selection of fundamental topics in Applied Mathematics. This half-course consists of two modules from MAM2046W, one of which should be the module 2OD: ORDINARY DIFFERENTIAL EQUATIONS, which covers:
First order linear and nonlinear equations; existence and uniqueness of solutions. Linear equations of the n-th order and systems of n linear first order equations. Nonhomogeneous linear equations and systems; variation of parameters; qualitative theory of nonlinear equations; phase plane analysis;

externally and parametrically driven oscillators; resonances; application to the theory of nonlinear vibrations. Calculus of variations.
Lecture times: Depending on modules chosen, as for MAM2046W.
DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: Please refer to the MAM2046W examination requirement entry for the class record and examination weighting for each module.

MAM2048H   APPLIED MATHEMATICS 2048
24 NQF credits at HEQSF level 6
Convener: Dr N Alexeeva
Course entry requirements: MAM2047H
Course outline:
The aim of this course is to introduce the student to a selection of fundamental topics in Applied Mathematics. This course is for students who have already obtained credit for MAM2047H. It consists of two modules of MAM2046W which were not taken as MAM2047H. A student who takes both MAM2047H and MAM2048H may count the combination as equivalent to MAM2046W.
Lecture times: Depending on modules chosen, as for MAM2046W.
DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: Please refer to the MAM2046W examination requirement entry for the class record and examination weighting for each module.

Third-Year Courses

MAM3040W   APPLIED MATHEMATICS 3040
The course MAM3040W consists of five modules. Students must take four of these, including the compulsory module 3MP. With permission from the convenor and agreement from a suitable supervisor in the department, students may do a project. Some modules in MAM3040W have prerequisite (i.e., must be passed) modules in MAM2000W and MAM2046W. Details can be found in the handbook section Undergraduate Courses in Applied Mathematics.
72 NQF credits at HEQSF level 7
Convener: Professor I V Barashenkov
Course entry requirements: MAM2000W and either MAM2046W or both MAM2047H and MAM2048H
Course outline:
This course introduces students to advanced topics in Applied Mathematics.
3MP: METHODS OF MATHEMATICAL PHYSICS (MAM3043F in EBE)
Fourier-transform solution of linear PDEs on the line. Long-term asymptotic behaviour: methods of Laplace, stationary phase, steepest descents. Nonlinear waves: Riemann invariants. Effect of dissipation; Cole-Hopf transform for the Burgers equation; travelling fronts for the KPP equation. Effect of dispersion: KdV, sine-Gordon equation. Elliptic integrals, elliptic functions; cnoidal waves, solitons. Multisoliton solutions: Hirota method, Baecklund transformations.
3CV: METHODS OF FUNCTIONS OF COMPLEX VARIABLES
Complex calculus, calculus of residues, special functions, applications to physics.
3AN: ADVANCED NUMERICAL METHODS (MAM3050S in EBE)
Advanced methods for ODEs, boundary value problems, differential eigenvalue problems. Numerical solution of PDEs by methods of finite differences, finite elements and spectral methods.
3GR: INTRODUCTION TO GENERAL RELATIVITY (MAM3049S in EBE)
This course introduces special relativity, taught in a blended learning fashion (online lectures and tutorials) and general relativity including tensors, the metric tensor, symmetries, curvature, Einstein's field equations and solutions of Minkowski space and Black Holes.
3FD: FLUID DYNAMICS (MAM3054S in EBE)
Application, description of fluids, equations of fluid flow for simple fluids, analytical techniques.
Lecture times: Monday - Friday, 3rd period

DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: For modules 3GR and 3FD the year mark counts 25% and the examination counts 75%. For modules 3MP, 3AN and 3CV, the year mark counts 35% and the examination counts 65%. The examinations for module 3MP and 3CV are written in June and modules 3FD, 3GR and 3AN are written in October/November. All examinations are no longer than 2 hours, except 3GR which is no longer than 3 hours.

MAM3041H   APPLIED MATHEMATICS 3041
36 NQF credits at HEQSF level 7
Convener: Professor I V Barashenkov
Course entry requirements: MAM2000W and either MAM2046W or both MAM2047H and MAM2048H
Course outline:
The aim of this course is to introduce students to a selection of advanced topics in Applied Mathematics. This half course consists of two modules of MAM3040W, at least one of which should be 3MP: METHODS OF MATHEMATICAL PHYSICS (MAM3043S in EBE), the content of which may be found in the entry for MAM3040W.
Lecture times: Depending on modules chosen, as for MAM3040W.
DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: Please refer to the MAM3040W examination requirements entry for the class record and examination weighting for each module.

MAM3048H   APPLIED MATHEMATICS 3048
36 NQF credits at HEQSF level 7
Convener: Prof I V Barashenkov
Course entry requirements: MAM3041H
Course outline:
This course is for students who have already obtained credit for MAM3041H. It consists of two modules of MAM3040W which were not taken as MAM3041H and which, together with MAM3041H, would constitute the contents of MAM3040W. A student who takes both MAM3041H and MAM3048H may count the combination as equivalent to MAM3040W, provided a written project is completed.
Lecture times: Depending on modules chosen, as for MAM3040W
DP requirements: A class record of 30% or more is required in each module of the course.
Assessment: Please refer to the MAM3040W examination requirements for the class record and examination weighting for each module.

Undergraduate Courses in Mathematics

In 2016, students who are registered for the courses MAM1000W, MAM1004F/S, MAM1005H, MAM1010F/S, MAM1012F/S, MAM1110F/H, and MAM1112S will be able to access an EBook version of the prescribed textbook at no extra cost (i.e., students in these courses do <u>not</u> have to buy the textbook).

First-Year Courses in Mathematics
One full course in Mathematics at first-year level is offered in the Science Faculty, MAM1000W. (The courses MAM1010F/S and MAM1012F/S are intended for Commerce students and the courses MAM1020F/S and MAM1021F/S for Engineering students. Details of these can be found in the Handbooks for the Faculty of Commerce and the Faculty of Engineering & the Built Environment respectively). Credit equivalent to MAM1000W can be obtained by passing MAM1005H and MAM1006H. In special cases MAM1004F or MAM1004S may be taken in place of MAM1005H; detailed rules are given under the entry for MAM1006H.

Students who intend to major in Mathematics must obtain credit for the half course MAM1019H at some point in their undergraduate career. It is recommended that students take MAM1019H as soon as possible.

No student may register for more than one of MAM1000W, MAM1004F, MAM1004S, MAM1005H and MAM1006H simultaneously. Credit will not be given for more than one of MAM1004F, MAM1004S and MAM1005H. Credit for any first-year half course in Mathematics falls away on obtaining credit for MAM1000W.

The course STA1001F/S carries no credit in the Faculty of Science.

The Mathematics Hot Seat in Room 210 on level 2 in the Mathematics Building is open for several hours every day and students in all first year courses are encouraged to go there for help with their mathematics problems.

Prerequisites for 2nd and 3rd year courses:
Students planning to take modules in the 2nd or 3rd year mathematics courses MAM2000W and MAM3000W must obtain a final mark of 50% or higher for each of the prerequisite modules shown below:

		Semester	Prerequisites
2LA	Linear Algebra	1	-
2AC	Advanced Calculus	1	-
2IA	Introductory Algebra	2	2LA
2RA	Real Analysis	2	-
2DE	Differential Equations	2	2LA and 2AC
3AL	Modern Abstract Algebra	1	2LA and 2IA
3DM	Discrete Mathematics	1	-
3MS	Metric Spaces	1	2RA
3CA	Complex Analysis	2	2RA
3TA	Topics in Algebra	2	3AL
3TN	Topics in Analysis	2	3MS

Undergraduate Courses

First-Year Courses

MAM1000W   MATHEMATICS 1000
36 NQF credits at HEQSF level 5
Convener: Dr J P Shock
Course entry requirements: A pass in NSC Mathematics with at least 70%, or at least a D symbol at A-level.
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 MAM1005H from week 7.
Course outline:
The aim of this course is to introduce students to the fundamental ideas in calculus, linear algebra and related topics. It includes differential and integral calculus of functions of one variable, differential equations, partial derivatives, vector geometry, matrix algebra, complex numbers, Taylor polynomials. This course is necessary for entry into second year mathematics.
Lecture times: Five lectures per week, Monday - Friday, 1st or 3rd period.
DP requirements: Minimum of 30% for class tests, minimum 30% for weekly online tests, and satisfactory tutorial work.
Assessment: Year mark counts 33.3%; two no longer than 3-hour papers written in October/November make up the balance.

MAM1004F   MATHEMATICS 1004

18 NQF credits at HEQSF level 5
Convener: T C van Heerden
Course entry requirements: At least 70% in NSC Mathematics, or at least an E symbol at A-level.
Students who fail MAM1004F are expected to register for MAM1004S in the 2nd semester
Course outline:
The aim of this course is to provide mathematics for applications, particularly in the Life and Earth sciences. The syllabus covers the following topics: Functions and graphs. Straight lines, power functions, polynomials, exponential and logarithmic functions, trigonometric functions (radians). Discrete-time dynamical systems. Stability and equilibria. Rates of change. Limits, derivatives. Maxima and minima. Concavity. Asymptotes and curve sketching. Antiderivatives and integrals. Mathematical modelling. Separable and linear differential equations.
Lecture times: Monday - Friday, 1st period
DP requirements: Minimum of 30% in class tests, and at least 80% attendance at tutorials.
Assessment: Year mark counts up to 40%; one 3-hour examination (written in June for MAM1004F, written in November for MAM1004S) makes up the balance.

MAM1004S   MATHEMATICS 1004

18 NQF credits at HEQSF level 5
Convener: Associate Professor C R A Gilmour
Course entry requirements: At least 70% in NSC Mathematics, or at least an E symbol at A-level.
Students who fail MAM1004F are expected to register for MAM1004S in the 2nd semester
Course outline:
The aim of this course is to provide mathematics for applications, particularly in the Life and Earth sciences. The syllabus covers the following topics: Functions and graphs. Straight lines, power functions, polynomials, exponential and logarithmic functions, trigonometric functions (radians). Discrete-time dynamical systems. Stability and equilibria. Rates of change. Limits, derivatives. Maxima and minima. Concavity. Asymptotes and curve sketching. Antiderivatives and integrals. Mathematical modelling. Separable and linear differential equations.
Lecture times: Monday - Friday, 1st period
DP requirements: Minimum of 30% in class tests, and at least 80% attendance at tutorials.
Assessment: Year mark counts up to 40%; one 3-hour examination (written in June for MAM1004F, written in November for MAM1004S) makes up the balance.

MAM1005H   MATHEMATICS 1005

18 NQF credits at HEQSF level 5
Convener: Mr R Moolman
Course entry requirements: At least 70% in NSC Mathematics, or at least an E symbol at A-level. The permission of the Dean or Head of Department is required prior to registration for this course.
NOTES:1) This course only begins in week 7 and is intended for students who have been advised to transfer to this course after initially registering for MAM1000W (see entry for MAM1000W). 2) The course places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 3) MAM1005H + MAM1006H is equivalent to MAM1000W in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
Similar to the full-year course MAM1000W, the aim of this course is to introduce the fundamental ideas in calculus, linear algebra and related topics. It will cover the topics in the first half of MAM1000W including differential and integral calculus of functions of one variable, but extended over the full year.
Lecture times: Monday - Thursday, 1st or 3rd period; Workshops: Monday, 6th and 7th period.
DP requirements: Minimum of 35% for class record and very satisfactory attendance at all lectures, workshops and tutorials.

Assessment: Year mark counts up to 40%; one 2-hour examination written in October/November makes up the balance.

MAM1006H   MATHEMATICS 1006
18 NQF credits at HEQSF level 5
Convener: Professor N Heideman
Course entry requirements: MAM1005H or a pass with at least 65% in MAM1004F/S. Students who have passed MAM1004F/S with less than 65% and who wish to register for MAM1006H will be required to write and pass the examination paper for MAM1005H in November or the supplementary examination paper in January before they are allowed to register for MAM1006H. Such students are required to inform the course co-ordinator for MAM1005H by 1 September or 1 December, respectively, of their intention to write the examination and at the same time obtain information about the reading to be done as preparation for the examination.
NOTES: 1) This course follows on from MAM1005H and also places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning.2) MAM1005H + MAM1006H is equivalent to MAM1000W in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
Similar to the full-year course MAM1000W, the aim of this course is to introduce the fundamental ideas in calculus, linear algebra and related topics. This course consists of those topics in the MAM1000W syllabus that were not covered in MAM1005H the previous year, including differential equations, partial derivatives, vector geometry, matrix algebra, complex numbers, Taylor series.
Lecture times: First period, three days per week.
DP requirements: Minimum of 35% in class tests and very satisfactory attendance at lectures and tutorials.
Assessment: Year mark counts up to 40%; one 2-hour examination written in October/November makes up the balance.

MAM1019H   FUNDAMENTALS OF MATHEMATICS
18 NQF credits at HEQSF level 5
Convener: Dr D J Erwin
Course entry requirements: At least 70% NSC Mathematics or a D symbol at A-level.
Course outline:
The aim of this course is to familiarise students with the most fundamental concepts and tools of modern mathematics at an elementary level. These include: fundamentals of logic and set theory, concepts of a function, of relations, of equivalence and order relations as well as some basic algebraic structures and the fundamental number systems.
Lecture times: Five lectures every two weeks in meridian.
DP requirements: Minimum of 30% in year mark.
Assessment: Year mark counts up to 40%; one 2-hour examination paper written in November makes up the balance.

Second-Year Courses
Students may not simultaneously register for MAM1000W and any of MAM2000W, MAM2001H, MAM2004H, and MAM2002S.

MAM2000W   MATHEMATICS 2000
The course MAM2000W consists of five modules. Students must take four of these, including the compulsory module 2LA and at least one of 2IA and 2RA (students intending to do MAM3000W should take both). Some modules in MAM2000W are prerequisites (i.e., must be passed) for other modules in MAM2000W, MAM3000W, and MAM3040W. Details can be found in the handbook

sections Undergraduate Courses in Mathematics and Undergraduate Courses in Applied Mathematics.
48 NQF credits at HEQSF level 6
Convener: Dr F Ebobisse Bille
Course entry requirements: MAM1000W or equivalent.
Course outline:
This course aims to introduce students to the fundamentals of mathematics.
2AC: ADVANCED CALCULUS
Multivariable calculus. Curves and surfaces in three dimensions, change of coordinates. Line integrals, surface integrals. Stokes'. Green's and divergence theorems.
2DE: DIFFERENTIAL EQUATIONS (for Actuarial and Business Science students)
Topics from: First and second-order difference equations. Linear differential equations, constant coefficients. Laplace transforms. Nonlinear equations, phase plane analysis. Parabolic partial differential equations, separation of variables, boundary value problems. Black-Scholes equation. Stochastic differential equations
2IA: INTRODUCTORY ALGEBRA
Introduction to groups, rings, fields, and number theory
2LA: LINEAR ALGEBRA
Vector spaces, linear independence, spans, bases, row space, column space, null space. Linear maps. Eigenvectors and eigenvalues. Inner product spaces, orthogonality.
2RA: REAL ANALYSIS
Axioms of the real numbers, supremum and infimum. Countable sets. Sequences and series. Open and closed sets, compactness. Limits, continuity, differentiability. Sequences and series of functions, uniform convergence, power series. Integration.
Lecture times: Monday - Friday, 5th period with options in 4th period.
DP requirements: Minimum of 30% in class record.
Assessment: Year mark counts up to 40%; the examination mark makes up the balance. The examination consists of four papers of up to 2 hours each. First semester modules will be examined in June and second semester modules in October/November.

MAM2001H   MATHEMATICS 2001
This course will not be offered in 2015.
24 NQF credits at HEQSF level 6
Convener: Dr F Ebobisse Bille
Course entry requirements: MAM1000W (or equivalent).
Course outline:
The aims of these half courses are to introduce the student to a selection of fundamental topics in mathematics. Each half course consists of two modules. A student may register for a half course in the same year as MAM2000W or in a subsequent year. Refer to the MAM2000W course outline for the module details.
Lecture times: For MAM2004H, MAM2002S: 5th period Monday - Friday, with some modules in 4th period; all students must have 5th period free.
DP requirements: Minimum of 30% in class record.
Assessment: As for MAM2000W except that the examination consists of two papers of up to 2 hours each.

MAM2002S   MATHEMATICS 2002
MAM2002S is a half-course in Mathematics at second-year level. It is usually taken by students who are doing it in addition to either MAM2000W or MAM2004H.
24 NQF credits at HEQSF level 6
Convener: Dr F Ebobisse Bille
Course entry requirements: MAM1000W (or equivalent).
Course outline:

The aims of these half courses are to introduce the student to a selection of fundamental topics in mathematics. Each half course consists of two modules. A student may register for a half course in the same year as MAM2000W or in a subsequent year. Refer to the MAM2000W course outline for the module details.

Lecture times: For MAM2004H, MAM2002S: 5th period Monday - Friday, with some modules in 4th period; all students must have 5th period free.

DP requirements: Minimum of 30% in class record.

Assessment: As for MAM2000W except that the examination consists of two papers of up to 2 hours each.

MAM2004H   MATHEMATICS 2004

MAM2004H is a half-course in Mathematics at second-year level. It is also the minimum co-requisite for MAM2046W and for PHY2014F, in which case modules 2LA and 2AC are compulsory.
24 NQF credits at HEQSF level 6
Convener: Dr F Ebobisse Bille
Course entry requirements: MAM1000W (or equivalent).
Course outline:
The aims of these half courses are to introduce the student to a selection of fundamental topics in mathematics. Each half course consists of two modules. A student may register for a half course in the same year as MAM2000W or in a subsequent year. Refer to the MAM2000W course outline for the module details.

Lecture times: For MAM2004H, MAM2002S: 5th period Monday - Friday, with some modules in 4th period; all students must have 5th period free.

DP requirements: Minimum of 30% in class record.

Assessment: As for MAM2000W except that the examination consists of two papers of up to 2 hours each.

Third-Year Courses

MAM3000W   MATHEMATICS 3000

The course MAM3000W consists of six modules. Students must take four of these, including at least one of 3AL and 3MS. Some modules in MAM3000W are prerequisites (i.e., must be passed) for other modules in MAM3000W, and some MAM3000W modules have prerequisite modules in MAM2000W. Details can be found in the handbook section Undergraduate Courses in Mathematics. MAM3000W students who are considering continuing to MAM4000W (Honours in Mathematics) should consult the website www.mamhonours.uct.ac.za and consider which 3rd year modules will best prepare them for their future studies. Students who are interested in taking Honours courses in Algebra should take the 3rd year modules 3AL and 3TA. Students who are interested in taking Honours courses in Analysis, Geometry, and Topology should take the 3rd year modules 3MS and 3TN or 3CA. Students who are interested in taking Honours courses in Discrete Mathematics and Theoretical Computer Science should take the 3rd year module 3DM.
72 NQF credits at HEQSF level 7
Convener: Associate Professor A B Ianovsky
Course entry requirements: MAM2000W. MAM1019H required as a pre- or co-requisite from 2012
Course outline:
This course aims to introduce students to advanced topics in mathematics.
3AL: MODERN ABSTRACT ALGEBRA
Group Theory (Isomorphism Theorems, p-Groups, Sylow Theory, Direct Products and finitely generated Abelian Groups). Further Linear Algebra (Primary decomposition, Jordan normal forms, Bilinear forms).
3CA: COMPLEX ANALYSIS

Field of complex numbers. Power series. Analytic functions. Complex integration. Liouville's theorem, Fundamental Theorem of Algebra. Maximum Modulus Theorem. Index of a closed curve. Cauchy's Integral Formula. Counting Zeros and Open Mapping Theorems. Goursat's Theorem. Singularities. Laurent series. Residues.

3DM: DISCRETE MATHEMATICS

Logic, counting, discrete probability, difference equations, graph theory, algorithms, applications.

3MS: METRIC SPACES

Metric spaces and topology; applications

3TA: TOPICS IN ALGEBRA

Ring Theory (Isomorphism Theorems, Fields of Fractions of Domains, maximal, prime and principal ideals, Euclidean and Principal Ideal Domains, unique factorization, rings of algebraic integers). Field Theory (characteristic and prime subfields, extensions, finite fields, adjoining roots of polynomials). Further Group Theory (nilpotent and solvable groups, some finite simple groups).

3TN: TOPICS IN ANALYSIS

Compactness in metric spaces, normed spaces, linear continuous mappings between normed spaces, Hilbert spaces, orthogonal projection, differential calculus on normed spaces, review of the Riemann integral and its limitations.

Lecture times: Monday - Friday, 5th period

DP requirements: A class record of 30% or more.

Assessment: Year mark counts up to 40%; the examination mark counts at least 60% of the final mark; a project and test on additional reading, where applicable, may also contribute to the overall final mark. The examination consists of four papers of up to 2 hours each. First-semester modules will be examined in June and second-semester modules in October/November.

MAM3001W   MATHEMATICS 3001

72 NQF credits at HEQSF level 7
Convener: Associate Professor A B Ianovsky
Course entry requirements: MAM2000W
Course outline:
The aim of this course is to introduce the student to a selection of advanced topics in mathematics. The modules offered are the same as those for MAM3000W. A second-year module may be selected with the course co-ordinator's approval. MAM3001W is a third-year senior course for students selecting four modules which do not satisfy the requirements for the major course MAM3000W. No project is required for this course. Refer to the MAM3000W course outline for the module details.
Lecture times: Monday - Friday, 5th period
DP requirements: A class record of 30% or more.
Assessment: Year mark counts up to 40%; the examination mark accounts for the balance. The examination consists of four papers of up to 2 hours each. First-semester modules will be examined in June and second-semester modules in October/November.

MAM3002H   MATHEMATICS 3002

MAM3002H is a half course for students who register at the beginning of the year.
36 NQF credits at HEQSF level 7
Convener: Associate Professor A B Ianovsky
Course entry requirements: MAM2000W
Course outline:
These half courses may consist of any two third-year modules. Either half course may be taken instead of a full course or in addition to it. A student who takes both MAM3002H and MAM3003S may count the combination as a major only if the four modules studied would be acceptable for MAM3000W and if the necessary project is completed. Otherwise the combination may be equivalent to MAM3001W. A second-year module may be taken as part of a third-year half course with the course co-ordinator's approval.
Lecture times: Monday - Thursday, 5th period with options in 4th period.
DP requirements: A class record of 30%.

Assessment: As for MAM3000W, except that the examination consists of two papers of up to 2 hours each.

MAM3003S   MATHEMATICS 3003
MAM3003S is a half course for those who register in the second semester, or those who have already obtained credit for MAM3002H.
36 NQF credits at HEQSF level 7
Convener: Associate Professor A B Ianovsky
Course entry requirements: MAM2000W
Course outline:
These half courses may consist of any two third-year modules. Either half course may be taken instead of a full course or in addition to it. A student who takes both MAM3002H and MAM3003S may count the combination as a major only if the four modules studied would be acceptable for MAM3000W and if the necessary project is completed. Otherwise the combination may be equivalent to MAM3001W. A second-year module may be taken as part of a third-year half course with the course co-ordinator's approval.
Lecture times: Monday - Thursday, 5th period with options in 4th period.
DP requirements: A class record of 30%.
Assessment: As for MAM3000W, except that the examination consists of two papers of up to 2 hours each.

Postgraduate Courses

There are a number of Honours courses available to students who have completed senior courses in Applied Mathematics and Mathematics. Details can be found on the website www.mamhonours.uct.ac.za. Those interested should email the Honours Program Convenor Dr D J Erwin..

MAM4000W   MATHEMATICS HONOURS
Since the code MAM4000W will not carry an NQF credit value, students will be concurrently registered for MAM4013W (coursework component of 130 NQF credits) and MAM4014W (research project of 30 NQF credits). Students registered for MAM4000W are expected to tutor in the Department of Mathematics and Applied Mathematics.
160 NQF credits at HEQSF level 8
Convener: Dr D J Erwin
Course entry requirements: Normally a BSc degree with MAM3000W, or equivalent. In all cases acceptance is subject to individual approval by the Head of Department.
Course outline:
This course provides an introduction to some topics that are basic to a professional mathematician. Students take a project and seminar, at least three of the four core modules in Algebra, Analysis, Differential Geometry, and Topology, and other modules for a total of at least 160 credits (most modules are 21 credits; the project and seminar are 30 credits total). Students have some flexibility in selecting their other modules but all curricula must be approved by the convenor. The decision about which modules will be offered is made by the Department, but typically includes (in addition to the previously mentioned core modules) a selection from such topics as Algebraic Geometry, Category Theory, Computational Complexity, Cryptology, Differential Topology, Functional Analysis, Graph Theory, Homological Algebra, Lie Algebras, Measure Theory, Number Theory, Operator Theory, Partial Differential Equations, and Theory of Hamiltonian Groups. Students may, with permission from the convenor and with agreement from a suitable supervisor in the Department, pursue reading courses on topics that are not offered as modules.
Assessment: The project and seminar together count 18.75% of the final mark and must be passed (with 50%). On average, the examination counts at least 50% of the balance of the final mark for the course. Three core modules together count 39.375% of the final mark. The remaining 41.875% of

the final mark is calculated using the student's best marks in their other modules. These component parts of the course will be combined in a final overall mark which will be reflected against the course code MAM4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

MAM4001W   APPLIED MATHEMATICS HONOURS

Since the code MAM4001W will not carry an NQF credit value, students will be concurrently registered for MAM4015W (coursework component of 120 NQF credits) and MAM4016W (research project of 40 NQF credits). Students registered for MAM4001W are expected to tutor in the Department of Mathematics and Applied Mathematics.
160 NQF credits at HEQSF level 8
Convener: Dr D J Erwin
Course entry requirements: Normally a BSc degree with MAM3040W, or an equivalent. In all cases acceptance is subject to individual approval by the Head of Department.
Course outline:
This course provides an introduction to a selection of topics in applied mathematics. Students do a project and seminar and modules for a total of at least 160 credits (most modules are 21 credits; the project and seminar are 40 credits total). Each student's curriculum must be approved by the convenor and must include a minimum of 110 credits from Applied Mathematics modules and related subjects. That having been said, there is considerable flexibility in the structure of individual curricula and students are encouraged to include suitable modules from MAM4000W and from cognate departments (for example: Computer Science, Physics, Statistics, Economics, Oceanography). The decision about which modules will be offered is made by the Department, but typically includes a selection from such topics as Advanced Mathematical Methods, Continuum Mechanics, Finite Element Analysis, Mathematical Biology, General Relativity and Cosmology, and String Theory. Students may, with permission from the convenor and with agreement from a suitable supervisor in the Department, pursue reading courses on topics that are not offered as modules.
Assessment: The project and seminar together count 25% of the final mark and must be passed (with 50%). On average, the examination counts at least 50% of the balance of the final mark for the course. The remaining 75% of the final mark is calculated using the student's best marks in their modules. These component parts of the course will be combined in a final overall mark which will be reflected against the course code MAM4001W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

MAM4007W   MATHEMATICS OF COMPUTER SCIENCE HONOURS

This course will not be offered in 2016.
160 NQF credits at HEQSF level 8
Course entry requirements: Normally a BSc degree with a major in either Computer Science or Mathematics and at least second-year level in the other, but in all cases subject to individual approval by the Heads of both departments.
Course outline:
This Honours degree is offered jointly by the Departments of Computer Science and Mathematics & Applied Mathematics. Its subject matter involves logical and mathematical theories and structures relevant to computer science, together with their applications. Students will be required to do approximately half their work in each department, including course work in both departments for the course. Courses that are offered typically include some of the following: Computational Complexity, Cryptography, Enumerative Combinatorics, and Graph Theory. Every syllabus must be approved by the Heads of both departments. Each student will be required to do a research project. Completion of this degree could yield admission to Master's studies in either Mathematics or Computer Science.
Assessment: The project counts 18.75% of the final mark for the course and must be passed (with 50%). On average, the examination counts at least 50% of the balance of the final course mark.

AST4007W   ASTROPHYSICS & SPACE SCIENCE HONOURS

Since the code AST4007W will not carry a NQF credit value, students will be concurrently registered for AST4008W (coursework component of 128 NQF credits) and AST4009W (research project of 32 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Dr K van der Heyden
Course entry requirements: AST3002F and AST3003S or PHY3004W (or PHY3021F and PHY3022S) or MAM3040W or equivalent. Candidates with an Engineering background will also be considered. Enrollments are limited to 20 students. Candidates must satisfy the Steering Committee that they have sufficient background in Mathematics and Physics. Admission is subject to the approval of the Steering Committee and an application must be made before 30th September of the preceding year. Late applications will also be considered.
Course outline:
The Honours course in Astrophysics & Space Science consists of courses presented by distinguished South African researchers from research institutions participating in NASSP. There is a theory component which includes courses in spectroscopy, electrodynamics, general relativity, general astrophysics, galaxies, computational physics, astrophysical fluid dynamics and computational methods, as well as an observational techniques component which includes optical and infrared astronomy and radio astronomy. In addition students will complete a mini research project as well as a main research project and go on a number of fieldtrips to the national facilities.
DP requirements: Satisfactory lecture attendance (minimum 50%); class record of at least 40%.
Assessment: The assessment of the coursework is based on the class records and examinations for each of the modules. In general they are made up from tests, oral presentations, projects and a final examination. Examinations count 40%, class record 40% and research project 20% of the final result. The project component must be passed at 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code AST4007W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

AST5003F   ASTROPHYSICS & SPACE SCIENCE COURSEWORK

(National Astrophysics & Space Science Programme (NASSP); for further details see entry under Department of Astronomy)
90 NQF credits at HEQSF level 9
Convener: Dr K van der Heyden
Course entry requirements: This course is open to Honours graduates in Astronomy and Space Science (AST4007W), Physics (PHY4000W, PHY4001W, PHY4002W) or equivalent, and Engineering. Entrance is subject to a minimum pass mark of 60% in the Honours degree.
Course outline:
This course consists of a selection of advanced topics presented by distinguished South African researchers from research institutions participating in NASSP. The courses vary from year to year but usually include cataclysmic variables, extragalactic astronomy, space technology, hot topics in cosmology, advanced general relativity, high energy astrophysics, observational cosmology, geomagnetism and aeronomy, plasma physics and magnetohydrodynamics.
Assessment: On average, examinations of individual modules count 60% of the final result, and marked practical work counts 40%.

MAM5000W   MATHEMATICS DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance

with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

MAM5001W   APPLIED MATHEMATICS DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
The course will consist of the investigation of one or two topics chosen for intensive study by the candidate and approved by the Head of Department. Examination will be by dissertation. An oral examination may be required. The Department has research programmes in four particular areas of Applied Mathematics, namely (i) general relativity and astrophysics, (ii) mathematical modelling of biological, ecological and environmental systems, (iii) continuum mechanics, applied analysis and finite elements, and (iv) nonlinear evolution equations and non-integrable systems. See also 'Research in Mathematics & Applied Mathematics'. Candidates will be particularly encouraged to take part in one of these programmes. General rules for this degree may be found in the front of the handbook.

MAM5005W   ASTROPHYSICS & SPACE SCIENCE MINOR DISSERTATION
(National Astrophysics & Space Science Programme (NASSP); for further details see entry under Department of Astronomy)
90 NQF credits at HEQSF level 9
Course entry requirements: AST5003F
Assessment: Students will work on an approved research topic on which a minor dissertation must be presented for formal examination.

MAM6000W   MATHEMATICS THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the general rules for the PhD as set out in Book 3, General Rules and Policies.

MAM6001W   APPLIED MATHEMATICS THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront

in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the general rules for the PhD as set out in Book 3, General Rules and Policies.

DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

The Department is housed in the Molecular Biology Building, 22 University Avenue
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The Departmental abbreviation for Molecular and Cell Biology is MCB.

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J P Hapgood, BSc Hons PhD *Cape Town*
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E P Rybicki, MSc PhD *Cape Town*
Emeritus Professors:
H Klump, Dr rer nat habil Dipl Chem *Freiberg*
J A Thomson, BSc *Cape Town* MA *Cantab* PhD *Rhodes*
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M D Krige, MSc *Stell*
P Ma, MSc *Cape Town*
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Principal Technical Officer:
N Bredekamp
Chief Technical Officers:
U R Mutzeck
D September
Department Manager:
Y L Burrows
HR/Postgraduate Administrator:
E J Liebenberg
Finance Administrator:
C Saunders

Procurement Administrator:
G Spannenberg
SAP Purchaser:
P Louw
Departmental Assistants:
M Andreas
K Diedericks
C Fulani
C Hendrickse
M Jacobs
J Solomons
F Stuurman

RESEARCH IN MOLECULAR AND CELL BIOLOGY

The Department has interests and expertise in diverse areas of biology. Plant desiccation research (Professors Farrant and Illing): the problem of desiccation in plants is being tackled by a combination of physiological and molecular approaches. Plant biotechnology (Professor Rybicki, Associate Professor Roden and Drs Ingle and Rafudeen): research is focussed on developing virus-resistant and drought-tolerant crops, and optimising transient and transgenic expression of pharmaceutically-relevant proteins. Signal transduction in *Arabidopsis thaliana* is being studied during plant-pathogen and plant-insect interactions, as well as in the control of flowering time. Eukaryotic gene expression (Professors Hapgood and Illing, Associate Professor Roden and Dr Oelgeschläger): projects include regulation of transcription by steroid receptors, the role of chromatin modifications in regulating the onset of flowering, the regulation of gene transcription in the malaria parasite Plasmodium, and the regulation of gene expression during neuronal differentiation. Evolutionary genetics (Dr O'Ryan): projects focus on the evolution of neutral DNA markers to address population-genetics questions. Molecular virology (Professor Rybicki): studies focus on the expression of antigens from human and animal viruses in plants and insect cells for use as human and animal vaccines, and on the genetic diversity and molecular biology of single-stranded DNA viruses. Research in biochemistry (Professor Hapgood and Drs Oelgeschläger and Woodman): includes investigating the structure, function and posttranslational modification of HIV proteins and their interactions with host proteins with a view to understanding mechanisms of viral pathogenesis and drug development, and studies into the structure, assembly, function and regulation of the transcription initiation machinery in *Plasmodium falciparum*, the causative agent of severe malaria. Research in marine biotechnology (Associate Professor Coyne): includes the development of vaccines for farmed kob, genomic and proteomic studies of the effect of stress and disease on the abalone immune system, and the role of marine microorganisms in abalone nutrition and disease resistance. Research in microbiology (Associate Professor Reid and Dr Meyers): includes molecular-genetic investigations of industrially and medically important anaerobic bacteria such as *Corynebacterium, Bifidobacterium* and fibre-degrading bacteria in the ostrich gut. South African soil and marine actinomycete bacteria are being screened for novel antibiotics and strains of *Clostridium acetobutylicum* are being optimised for biofuel production. Analytical services: the Department runs a DNA synthesis facility and a Proteomics/Metabolomics platform.

Undergraduate Courses

Second-Year Courses

MCB2020F   BIOLOGICAL INFORMATION TRANSFER
Entrance is limited to 140 students.
24 NQF credits at HEQSF level 6
Convener: Dr R Ingle
Course entry requirements: CEM1000W or equivalent, BIO1000F and BIO1004S (or equivalent).
Course outline:
This course introduces students to concepts of molecular genetics that are fundamental to molecular and cell biology. Topics covered include genome organisation and gene structure of viruses, plasmids, bacteria (including plasmids), transposons, plants and animals; horizontal gene transfer; mechanisms of heredity; prokaryotic and eukaryotic gene structure and information transfer as applied to viruses, plasmids, bacteria, plants and animals; basic cell signalling in bacteria, plants and animals; and principles of evolutionary genetics.
Lecture times: Monday - Friday, 4th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests and assignments count 40%; practicals count 10%; one three-hour paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB2021F   MOLECULAR BIOSCIENCE
Entrance is limited to 140 students.
24 NQF credits at HEQSF level 6
Convener: Dr T Oelgeschläger
Course entry requirements: CEM1000W (or equivalent), BIO1000F and BIO1004S (or equivalents)
Course outline:
This course will introduce students to the concepts of biological chemistry fundamental to molecular biology as a basis to understanding the distinctive properties of microbial and eukaryotic living systems. Properties of biological molecules and macromolecules will be discussed, as well as recombinant DNA technology and energy production in cells. Students will also learn basic molecular techniques and experimental design.
Lecture times: Monday - Friday, 5th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests and assignments count 40%; practicals count 10%; one three-hour paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB2022S   METABOLISM & BIOENGINEERING
Entrance is limited to 140 students.
24 NQF credits at HEQSF level 6
Convener: Associate Professor L Roden
Course entry requirements: MCB2020F and MCB2021F (or at least 40% subminimum for the examinations and a final mark of 45% (supplementary) for these courses)
Course outline:
This course will introduce students to some key aspects of metabolic energy production and how this can be exploited in developing renewable energy production. It aims to raise awareness of issues at the forefront of the discipline and give students the ability to dissect problems in order to identify solutions. Specific topics covered will include the metabolic diversity in Bacteria and Archaea e.g. nitrogen fixation, methane production; anoxygenic photosynthesis will be considered and well as how the growth of microorganisms can be controlled by physical, chemical, mechanical, or biological means. The harnessing of photosynthesis in plants and algae for renewable energy production, as well as the conversion of biomass to other fuels, will also be discussed.

Lecture times: Monday - Friday, 5th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests and assignments count 40%; practicals count 10%; one three-hour paper written in November counts 50%. A subminimum of 40% in the examination is required.

MCB2023S   FUNCTIONAL GENETICS
Entrance is limited to 140 students
24 NQF credits at HEQSF level 6
Convener: Professor N Illing
Course entry requirements: MCB2020F and MCB2021F (or at least a 40% subminimum for the examinations and a final mark of 45% (supplementary) for these courses
Course outline:
The course lays the foundation for the major in genetics, and shows how the tools of classical and molecular genetics can be applied to understanding the regulation of gene expression, cell differentiation and patterning in bacteria and eukaryotes. Concepts covered include forward and reverse genetics; the genetics of mitochondria and chloroplasts; human genetics; the genetic analysis of cell cycle regulation and axis determination in Drosophila; microbial genetics, including regulation of the lac operon; and lysogeny and lysis of bacteriophage lambda.
Lecture times: Monday - Friday, 4th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests and assignments count 40%; practicals count 10%; one three-hour paper written in November counts 50%. A subminimum of 40% in the examination is required.

Third-Year Courses

NOTE: All MCB majors must complete MCB3012Z (Research project in Molecular and Cell Biology) during the second semester. This course replaces practical classes for all third year second semester MCB courses.

MCB3012Z   RESEARCH PROJECT IN MOLECULAR & CELL BIOLOGY
0 NQF credits at HEQSF level 7
Convener: Dr S Murray
Course entry requirements: MCB3025F or MCB3026F (or concurrent registration in, MCB3023S or MCB3024S).
Course outline:
Groups of students will select and perform a research project two afternoons per week by arrangement. The work will be written up in the form of a research paper. This course replaces practical classes for all the third year second semester MCB courses.
DP requirements: None
Assessment: Project counts 100%

MCB3023S   MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT
36 NQF credits at HEQSF level 7
Convener: Dr S Murray
Course entry requirements: MCB2020F, MCB2021F
Course outline:
This course provides advanced level studies in the area of molecular evolutionary genetics and development. The topics covered include: Molecular data used in evolutionary genetics: neutral theory of evolution; behavioural genetics. Principles of mouse molecular genetics applied to vertebrate eye, limb and neural development. Evolution of development; evolution of sex; interactions between the environment and development.
Lecture times: Monday - Friday, 4th period
DP requirements: 40% test average

Assessment: Tests count 40%; one 3-hour examination written in November counts 60%. A subminimum of 40% in the examination is required.

MCB3024S   DEFENCE & DISEASE
36 NQF credits at HEQSF level 7
Convener: Associate Professor V Coyne
Course entry requirements: MCB2020F, MCB2021F
Course outline:
This course will introduce the vertebrate immune system and its components such as MHC cell structure and pathogen recognition. The immune systems of invertebrates and plants will then be examined. The focus will switch to the three major disease challenges in South Africa, HIV, TB and malaria, and host-pathogen interactions. Finally, the course will focus on strategies to produce vaccines that enable immunity to viral infection.
Lecture times: Monday - Friday, 5th period
DP requirements: 40% test average
Assessment: Tests count 40%; one 3-hour examination written in November counts 60%. A subminimum of 40% in the examination is required.

MCB3025F   STRUCTURAL & CHEMICAL BIOLOGY
Entrance is limited to 90 students.
36 NQF credits at HEQSF level 7
Convener: Professor J Hapgood
Course entry requirements: MCB2020F, MCB2021F
Course outline:
This course addresses how modern techniques of structural and chemical biology are being used to solve biological problems. It draws on multiple aspects of macromolecular biochemistry including nucleic acid structure and interactions, signalling proteins and membrane proteins, and demonstrates how this knowledge can be used in drug discovery and protein design in biotechnology. Topics include: mechanisms of reversible and irreversible enzyme inhibitors, ligand binding, protein folding, molecular basis for protein function, regulation of protein activity, cell signalling and proteomics.
Lecture times: Monday - Friday, 5th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests count 40%; practicals, tutorials essays and assignments count 10%; one 3-hour examination written in June counts 50%. A subminimum of 40% in the examination is required.

MCB3026F   MOLECULAR GENETICS AND GENOMICS
Entrance is limited to 90 students.
36 NQF credits at HEQSF level 7
Convener: Dr S Rafudeen
Course entry requirements: MCB2020F, MCB2021F
Course outline:
This course introduces students to new cutting edge technologies such as bioinformatics tools, phylogenetic analysis and the use of data from the next generation sequencing in metagenomic projects. Topics covered include genetic and physical maps; cloning by complementation (bacteria yeast); primer design; DNA sequence analysis, assembly, annotation, databases, BLAST, bioinformatics. Genome projects: evolution of the human genome; metagenomics: DNA sequence analysis of microbes/viruses in sea water, soil samples, human gut; microarrays, RNA-seq analysis; phylogenetic analysis; transgenic plants; blocking gene expression with antisense RNA.
Lecture times: Monday - Friday, 4th period
DP requirements: 40% test average; 50% average for assignments; attendance at practicals.
Assessment: Tests count 40%; practicals, tutorials, essays and assignments count 10%; one 3-hour examination written in June counts 50%. A subminimum of 40% in the examination is required.

Postgraduate Courses

MCB4002W   MOLECULAR & CELL BIOLOGY HONOURS
Since the code MCB4002W will not carry a NQF credit value, students will be concurrently registered for MCB4003W (coursework component of 96 NQF credits) and MCB4004W (research project of 64 NQF credits). Entrance is limited to 30 students.
160 NQF credits at HEQSF level 8
Convener: Associate Professor S Reid
Course entry requirements: BSc degree with a major in Biochemistry, Biotechnology, Genetics or Microbiology. Molecular-based courses are highly recommended. Preference may be given to UCT graduates. Entrance is limited to 30 students, dependent on availability of supervisors and funding. Acceptance will be at the discretion of the Head of Department who will consider quality of senior course results and material covered in the undergraduate curriculum.
Course outline:
The first part of this course consists of a ten-week techniques course including gel electrophoresis, recombinant DNA technology, PCR, sequencing, bioinformatics, gene expression, protein isolation and analysis, confocal and electron microscopy, and large data set analysis. After successful completion of the techniques course, a six-month research project on a specific topic will be undertaken.
DP requirements: Techniques examination must be passed at 50% to continue course.
Assessment: Two 3-hour techniques examinations written in May, and the techniques course assignments, count 20%; essays count 15%; oral presentations count 20%; statistics module 1%, one 4-hour examination written in November counts 10%; project counts 34%. The research project must be passed at 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code MCB4002W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

MCB5005W   MOLECULAR & CELL BIOLOGY DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook

MCB6002W   MOLECULAR & CELL BIOLOGY THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront

in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies

DEPARTMENT OF OCEANOGRAPHY

The Department is housed in the RW James Building, Residence Road
Telephone (021) 650-3277 Fax (021) 650-3979
The Departmental abbreviation for Oceanography is SEA.

Associate Professor and Head of Department:
I J Ansorge, BSc *Plymouth* MSc PhD *Cape Town*
South African Research Chair in Modelling of the Coupled Ocean-Land-Atmosphere Phenomena Related to Climate:

Professor:
C J C Reason, BSc Hons *Cape Town* MPhil *City* MSc PhD *British Columbia*
Honorary Professor in Oceanography:
L V Shannon, MSc PhD *Cape Town* FRSSAf
Senior Scholar:
J G Field, BSc Hons PhD *Cape Town* FRSSAf
Emeritus Professors:
G B Brundrit, BSc Hons PhD *Manchester*
F A Shillington, BSc Hons *Wits* MSc PhD *Cape Town*
Associate Professors:
M Rouault, MSc PhD *Aix-Marseille*
M Vichi, MSc *Bologna* PhD *Oldenburg*
Senior Lecturer:
H N Waldron, BSc Hons *Swansea* MSc PhD *Cape Town*
Lecturer:
S Fawcett, BA Hons *Harvard* MA PhD *Princeton*
Honorary Research Associates:
B Bakeburg, PhD *Cape Town*
S Bernard, BSc *Soton* PhD *Cape Town* (CSIR)
N Burls, MSc PhD *Cape Town*
J Deshayes, PhD *Paris*
N Fauchereau, PhD *Bourgogne*
S Herbette, PhD *Uni de Bretagne Occidentale*
J Hermes, BSc *Bangor* PhD *Cape Town* (SAEON)
M Krug, MSc PhD *Cape Town*
T Lamont, PhD *Cape Town*
A Mavume, PhD *Cape Town*
P M S Monteiro, MSc PhD *Cape Town* (CSIR)
S Pous, PhD *Uni de Bretagne Occidentale*
P Penven, PhD *Uni de Bretagne Occidentale*
S Swart, PhD *Cape Town*
S Thomalla, PhD *Cape Town*
Departmental Librarian:
N Jabaar, ND (Cost accounting) *CPUT*
Principal Technical Officer:
P Truter, BSc *Stell*
Chief Scientific Officer:
R Roman, MSc PhD *Cape Town*
Administrative Officer:
C Karriem, Dipl Office Administration *Rosebank College*

NANSEN-TUTU CENTRE FOR MARINE ENVIRONMENTAL RESEARCH:
B Backeberg, BSc Hons PhD *Cape Town*
M Rouault, MSc PhD *Aix-Marseille*

F A Shillington, BSc Hons *Wits* MSc PhD *Cape Town*
M Vichi, MSc *Bologna* PhD *Oldenburg*

MARINE RESEARCH INSTITUTE (MA-RE)
The Department of Oceanography is affiliated to the Marine Research Institute. For more information refer to the "Inter-Faculty Units" section, further on in this handbook.

RESEARCH IN OCEANOGRAPHY AND ATMOSPHERIC SCIENCE
Oceanography: Ocean and atmospheric modelling, coastal oceanography, air-sea interaction, shelf dynamics, marine climatology, climate change and variability, marine and coastal meteorology, extreme events, regional oceanography, marine biogeochemistry (Professor C J C Reason, Associate Professors M Rouault, M Vichi, and I J Ansorge, and Drs S Fawcett and H N Waldron).

Undergraduate Courses

Second-Year Courses

SEA2004F   PRINCIPLES OF OCEANOGRAPHY
24 NQF credits at HEQSF level 6
Convener: Dr H N Waldron
Course entry requirements: BIO1004F/S or GEO1009F.
Course outline:
An introduction to the principles of oceanography, including an introduction to physical, biological and chemical oceanography, marine geology, and the ocean atmosphere system. The course comprises six 2-week modules, which cover the above topics. Oceanographic instrumentation and methods of data analysis will be covered in the tutorials and practicals.
Lecture times: Monday - Friday, 4th period
DP requirements: Attendance at tutorials and practicals and a class mark of at least 40%.
Assessment: Tutorials/practicals and tests count 40%; one 3-hour examination written in June counts 60%. A subminimum of 40% in the examination is required.

SEA2005S   MARINE SYSTEMS
24 NQF credits at HEQSF level 6
Convener: Dr S Fawcett
Course entry requirements: BIO1004F/S or GEO1009F, SEA2004F
Course outline:
Building on the principles of oceanography, this more advanced course will cover the main ocean and atmosphere systems. This includes an introduction to Earth system dynamics and the study of interactions between physical processes and major biogeochemical cycles. The physical forcing and ecosystem responses will be quantitatively illustrated for upwelling systems, oligotrophic systems, coastal systems around South Africa, the Southern Ocean and polar systems. Emphasis will be on treating the systems as a whole. The course comprises six 2-week modules, which cover the above topics. Methods of data sampling and analysis will be covered in the tutorials and practicals.
Lecture times: Monday - Friday, 4th period
DP requirements: Attendance at tutorials and practicals, and a class mark of at least 40%.
Assessment: Tutorials/practicals and tests count 40%; one 3-hour examination written in June counts 60%. A subminimum of 40% in the examination is required.

Third-Year Courses

SEA3004F   OCEAN & ATMOSPHERE DYNAMICS

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available from the department. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
36 NQF credits at HEQSF level 7
Convener: Associate Professor M Vichi
Course entry requirements: PHY1031F or equivalent, BIO1004S or GEO1009F, SEA2004F, SEA2005S.
Course outline:
The Ocean & Atmosphere dynamics course will begin to specialise in advanced material related to physical oceanography, atmospheric science and climate. These topics will include a quantitative approach to ocean/atmosphere dynamics, theories of circulation and the development of ocean and atmospheric weather systems, coupled ocean/atmosphere processes, interactions and feedbacks with the carbon cycle in the earth system and climate change. Methods of analysis of both observations and model data will be covered in the tutorials and practicals.
Lecture times: Monday - Friday, 4th period
DP requirements: Attendance at tutorials and practicals, and a class mark of at least 40%.
Assessment: Tutorials/practicals and tests count 40%; one 3-hour examination written in October counts 60%. A subminimum of 40% in the examination is required.

Postgraduate Courses

SEA4001W   OCEAN & ATMOSPHERE SCIENCE HONOURS

Since the code SEA4001W will not carry a NQF credit value, students will be concurrently registered for SEA4003W (coursework component of 112 NQF credits) and SEA4004W (research project of 48 NQF credits).
160 NQF credits at HEQSF level 8
Convener: Associate Professor I J Ansorge, Professor C J C Reason
Course entry requirements: A BSc degree with a major/specialisation in Ocean & Atmosphere Science or in a related discipline. Acceptance will be at the discretion of the Head of Department who will consider quality of final year results, material covered in the undergraduate curriculum, and possibly referee reports. Preference may be given to UCT graduates who meet the course entry requirements.
Course outline:
Honours students intending careers in ocean and atmosphere science will complete a full set of modules and a research project. Honours students from Environmental & Geographical Science, Applied Mathematics, and other physical science and engineering departments, are encouraged to attend selected modules. The curriculum includes lecture-tutorials, seminars and practical work in advanced oceanography, meteorology and climate, an introduction to modelling and data analysis. Practical work includes fieldwork at sea and may include dive training (class 4 diving qualification, at the students own cost if they choose to do the dive course). Student performance in each module may be assessed by project work, seminar presentations, written assignments and examinations, together making up 70% of the final mark. In the second half of the year the research project will take priority. Students will be expected to present a seminar on their projects at the year's end.
Assessment: Module assessment by submission of a research portfolio, which includes fieldtrip reports, skills examination and formal test results. A weighted average of the continuous assessment of reports and tests counts 70% of the final mark; the research project counts 30% of the final mark. The research project must be passed at 50%. These component parts of the course will be combined in a final overall mark which will be reflected against the course code SEA4001W, with PA (pass)

entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

SEA5000W   OCEAN & ATMOSPHERE SCIENCE DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

SEA5001W   PHYSICAL OCEANOGRAPHY DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

SEA5009H   OCEAN & CLIMATE SCIENCE COURSEWORK

Students will enrol (and pay fees) for both courses SEA5009H and SEA5010W in their first year of registration; where the minor dissertation is not submitted by the February deadline of the subsequent year, the student will be required to enrol (and pay fees) for the minor dissertation component in the subsequent year/s.
90 NQF credits at HEQSF level 9
Convener: Professor C J C Reason
Course entry requirements: BSc Honours degree in Ocean and Atmosphere Science or equivalent
Course outline:
A one year intensive programme that deals with key topics in understanding the ocean component of the climate system and how the ocean interacts with the atmosphere, cryosphere and terrestrial components. These topics will include ocean modelling and data analysis, climate dynamics, biogeochemistry, marine remote sensing and instrumentation, and participation in an oceanic research cruise and associated observational analyses.
DP requirements: Essays and tests count 50%; one 3-hour examination in November counts 50%. A sub-minimum of 40% is required for the examination.
Assessment: This component will be assessed through module assessments and examinations.

SEA5010W   OCEAN & CLIMATE SCIENCE MINOR DISSERTATION
90 NQF credits at HEQSF level 9
Convener: Professor C J C Reason
Course entry requirements: SEA5009H
Course outline:
A research project must be completed and submitted as a dissertation for formal examination, which addresses a particular aspect of Ocean & Climate Dynamics. Students are expected to complete the dissertation by the end of the academic year.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

SEA6000W   OCEAN & ATMOSPHERE SCIENCE THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF PHYSICS

The Department is housed in the R W James Building, 9 University Avenue
Telephone (021) 650-3326 Fax (021) 650-3342 Website: www.phy.uct.ac.za

The Departmental abbreviation for Physics is PHY.

Professor and Head of Department:
A Buffler, MSc PhD HDE *Cape Town*
Professor:
A Peshier, MA PhD *Dresden*
Senior Scholars:
J W A Cleymans, MSc D en Sc *Louvain* FRSSAf
C A Dominguez, MSc PhD *Buenos Aires* FRSSAf
Emeritus Professors:
D G Aschman, BSc Hons *Cape Town* DPhil *Oxon*
D T Britton, MSc PhD *London*
R D Viollier, Dipl Phys Dr phil nat *Basel* FRSSAf
Associate Professors:
M S Allie, MSc PhD *Cape Town* (CHED)
M D Blumenthal, BSc *Wits* Dipl Phys *Bonn* PhD *Cantab*
H W G Weigert, Dipl Phys Dr rer nat habil *Regensburg*
Emeritus Associate Professors:
C M Comrie, MSc *Natal* PhD *Cantab*
R W Fearick, BSc Hons PhD *Wits*
M Härting, Dipl Phys *Regensberg* Dr. Ing BW *München*
P E Spargo, BSc (Eng) MSc *Wits* Cert Ed *Cantab* FRSSAf
G N v d H Robertson, BSc Hons *Cape Town* DPhil *Oxon*
Senior Lecturers:
A Hamilton, MSc PhD *Alberta*
W A Horowitz, MA MSc PhD *Columbia*
G Leigh, HDE MSc *Cape Town*
S W Peterson, MA PhD *Wisconsin*
D L Taylor, BSc Hons HDE *UKZN* MSc PhD *Wits* (CHED)
S M Wheaton, MSc PhD *Cape Town*
Lecturers:
T Dietel, Dipl Phys *Heidelberg* Dr philnat *Frankfurt am Main*
T Leadbeater, MSc PhD *Birmingham*
S Yacoob, MSc *Cape Town* PhD *Northwestern*
Honorary Research Associates:
J A Ayala, PhD *Minnesota*
M Loewe, PhD *Hamburg*
F E Lubben, MSc *Delft* MA *York* PGCE *Delft*
K Schilcher, PhD *Vienna*
M Spiesberger, PhD *Mainz*
Principal Scientific Officer:
J E Fearon, MSc PhD *Cape Town*
Adjunct Research Officer:
C J Lee
Principal Technical Officers:
J Dickson
G K Fowle
K J Ontong

Chief Technical Officer:
C J J Sadler
Senior Technical Officer:
M Christians
Department Administrator:
N Lovric
Senior Secretaries:
J Patel
K Salman
Laboratory Attendant:
L Oliver
Laboratory Assistant:

Departmental Assistant:

RESEARCH IN PHYSICS
The Department of Physics is accommodated in the R W James Building, which houses laboratories equipped for nuclear physics, solid state and nanophysics, ultracold physics, and physics education research. Additional facilities available to the Department are provided by iThemba Laboratories for Accelerator Based Sciences (200 MeV cyclotron and a 5 MeV Van de Graaff accelerator).
Major areas of interest at present include:
1. Experimental nuclear physics at iThemba LABS (D G Aschman, A Buffler, R W Fearick, T Leadbeater) comprising: (a) Gamma ray spectroscopy with the AFRODITE array; (b) Giant resonance reactions with the magnetic spectrometer; (c) Fast neutron physics, (d) radiation detection and measurement.
2. Theoretical Physics (J W A Cleymans, C A Dominguez, W A Horowitz, A Peshier, H W G Weigert, and R D Viollier), comprising: (a) Research within the Centre for Theoretical and Mathematical Physics; (b) Structure of elementary particles; (c) Neutrino physics and astrophysics (d) Quantum field theory, quantum electrodynamics and chromodynamics in free space, in the cavity and at extreme temperatures and pressures; (e) Renormalization group equations, both linear and nonlinear (Color Glass Condensate); (f) Nonlinear effects in QCD at high densities; (g) Phenomenology of heavy ion reactions; (h) Quark gluon plasma.
3. Experimental high energy physics (J W A Cleymans, T Dietel, A Hamilton, S Yacoob), comprising:
(a) Research within the UCT-CERN Research Centre; (b) Relativistic heavy ion collisions within the ALICE collaboration at CERN; (c) High energy proton-proton collisions within the ATLAS collaboration at CERN.
4. Nanophysics and solid state physics (M D Blumenthal and C M Comrie), comprising: (a) Research within the Nano Electronics Laboratory; (b) Structural and electrical properties of thin films; (c) Single electron transport and interactions.
5. Applied Physics (A Buffler, T Leadbeater, S W Peterson, S M Wheaton), comprising: (a) Positron Emission Particle Tracking at PEPT Cape Town, iThemba LABS and the Position Imaging Centre, University of Birmingham, UK; (b) Particulate flow and interaction characterization in engineering and biological systems by computational and mechanistic modelling; (c) Radiation transport modelling in industrial and medical systems; (d) Applied nuclear physics and engineering.
6 Tertiary physics education (M S Allie, A Buffler and D L Taylor), comprising: (a) Curriculum design and evaluation; (b) Role of language; (c) Understanding of measurement and uncertainty; (d) Modelling and visualization.

Undergraduate Courses

Credit will not be given for both PHY1023H and PHY1031F. Credit can be given for both of PHY1023H and PHY1004W.

Undergraduate Courses

First-Year Courses

PHY1004W   MATTER & INTERACTIONS

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.phy.uct.ac.za. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
36 NQF credits at HEQSF level 5
Convener: Professor A Buffler
Course entry requirements: At least 60% for NSC Physical Science. MAM1000W (or equivalent) must have been passed or be taken concurrently. *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 PHY1031F or PHY1023H from week 7.*
Course outline:
PHY1004W is an advanced calculus-based introductory course for Science students intending to continue with second-year Physics. It features the modelling of physical systems from fundamental principles, and computational problem solving using VPython. The course includes the following topics: Modern mechanics: Conservation laws, the momentum principle, atomic nature of matter, conservation of energy, energy in macroscopic systems, energy quantization, multi-particle systems, exploring the nucleus, angular momentum, entropy, kinetic theory of gases, efficiency of engines. Electric and magnetic interactions: Electric fields, electric potential, magnetic fields, electric circuits, capacitance, resistance, magnetic force, Gauss' law, Ampere's law, Faraday's law, induction, electromagnetic radiation, waves and particles.
Lecture times: Monday - Friday, 3rd period
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 2-hour examination in June counts 25%; one 2-hour examination in November counts 25%.

PHY1023H   PRINCIPLES OF PHYSICS

Students passing PHY1023H may proceed into PHY1032F. Students who pass PHY1023H and then register for and pass PHY1004W will gain credit for both courses.
18 NQF credits at HEQSF level 5
Convener: Dr D L Taylor
Course entry requirements: At least 60% for NSC Physical Science. The permission of the Dean or Head of Department is required prior to registration for this course.
NOTES:1) This course only begins in week 7 and is intended for students who have been advised to transfer to this course after initially registering for PHY1004W or PHY1031F (see entries for these courses). 2) The course places an emphasis on the strengthening of foundational concepts and skills, the carefully-paced introduction of new material, and the development of sound approaches to effective learning. 3) PHY1023H + PHY1032F/S is equivalent to PHY1004W in level, credit value towards the degree and as prerequisite for certain other courses.
Course outline:
PHY1023H is an algebra-based introductory course for Science students. Some calculus may be used. The course includes the following topics: Tools and skills: Essential mathematical, diagrammatic and conceptual tools and skills for Physics, co-ordinate systems, vectors, rates of change, the fundamental forces, mathematical techniques and their relationship with physical phenomena. Mechanics: kinematics, forces, dynamics, momentum, impulse, work, energy, power, collisions, rotation, rotational dynamics, torque, angular momentum, static equilibrium, gravitation. Properties of matter: elasticity, hydrostatics, hydrodynamics. Vibrations and waves: simple

harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, superposition, standing waves, sound waves, sound intensity, Doppler Effect.
Lecture times: Monday - Friday, 3rd period
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 2-hour written examination in November counts 50%.

PHY1031F   GENERAL PHYSICS A
18 NQF credits at HEQSF level 5
Convener: Dr S M Wheaton
Course entry requirements: At least 60% for NSC Physical Science
NOTE: Students registered for this course will be assessed in week 5; if it is judged that they are not coping with the level and pace of the course, and would benefit from an opportunity to strengthen foundational concepts and learn new material at a slower pace, they will be required to transfer to PHY1023H from week 7.
Course outline:
PHY1031F is an algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used. The course includes the following topics: Mechanics: vectors, kinematics, forces, dynamics, momentum, impulse, work, energy, power, collisions, rotation, rotational dynamics, torque, angular momentum, static equilibrium, gravitation. Properties of matter: elasticity, hydrostatics, hydrodynamics. Vibrations and waves: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, superposition, standing waves, sound waves, sound intensity, Doppler Effect.
Lecture times: Monday - Friday, 3rd period
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 2-hour written examination in June counts 50%.

PHY1032F   GENERAL PHYSICS B
18 NQF credits at HEQSF level 5
Convener: To be advised
Course entry requirements: PHY1031F or PHY1023H
Course outline:
PHY1032F is an algebra-based introductory course usually taken by Science students who have completed PHY1023H. Some calculus may be used. The course includes the following topics: Electricity and magnetism: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents. Thermal physics: temperature, heat, kinetic theory of gases, first and second laws of thermodynamics. Optics: Geometrical optics, polarization, electromagnetic waves, interference, diffraction. Modern physics: atomic structure, quantum physical phenomena, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.
Lecture times: Monday - Friday, 3rd period
DP requirements: Minimum of 40% 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 in June counts 50%.

PHY1032S   GENERAL PHYSICS B
18 NQF credits at HEQSF level 5
Convener: Dr T Dietel
Course entry requirements: PHY1031F or PHY1023H
Course outline:

PHY1032S is an algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used. The course includes the following topics: Electricity and magnetism: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot Savart law, Ampere's law, electromagnetic induction, inductance, alternating currents. Thermal physics: temperature, heat, kinetic theory of gases, first and second laws of thermodynamics. Optics: Geometrical optics, polarization, electromagnetic waves, interference, diffraction. Modern physics: atomic structure, quantum physical phenomena, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.

Lecture times: Monday - Friday, 3rd period
DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.
Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination in November counts 50%.

Second-Year Courses

PHY2004W   INTERMEDIATE PHYSICS

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.phy.uct.ac.za. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.
48 NQF credits at HEQSF level 6
Convener: Dr S Yacoob
Course entry requirements: PHY1004W, a full first-year course in Mathematics, and MAM2000W or (MAM2004H and MAM2047H) as co-requisite.
Course outline:
PHY2004W develops the foundations of a major in Physics and allows continuation to third-year Physics. The theory component features a set of intermediate topics, and the laboratory component develops both experimental and computational skills. The course includes the following topics:
Mechanics: Review of Newton's laws, inertial and non-inertial frames, transformations, equations of motion for 1D systems, oscillations, resonance, non-linear systems, Euler's equation, Lagrange's equation, generalized co-ordinates and constrained systems, Hamiltonian formalism, phase space and Liouville's theorem, effective potentials, planetary motion, systems of particles, angular momentum, collisions, rigid bodies, simple harmonic motion, resonance, coupled oscillators, wave equation, special relativity, relativistic mechanics.
Electromagnetism: Vector calculus (div, grad, curl), electrostatics, special techniques for potentials, electric fields in matter, magnetostatics, magnetic fields in matter, current, Ohm's law, circuits, electromagnetic induction, electrodynamics, Maxwell's equations.
Quantum mechanics: The basic assumptions of quantum mechanics, solutions of Schrödinger's equation, properties of wave functions and operators, one-dimensional applications, angular momentum in quantum mechanics, three-dimensional applications, the hydrogen atom, approximate methods.
Laboratory: Practical and computational tasks designed to develop advanced skills of experimentation and problem solving within the context of Mechanics, Electromagnetism and Quantum Mechanics.
Lecture times: Monday - Friday, 4th period
DP requirements: Minimum of 40% in class record; completion of all laboratory reports and 75% of tutorial work and problem sets; attendance at all tests.
Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; one 2-hour examination in June counts 20%; one 3-hour examination in November counts 30%. A subminimum of 40% is required for the weighted average of the two examinations.

Third-Year Courses

PHY3004W   ADVANCED PHYSICS

Each student registered for this course is required to have a laptop for use during class sessions as well as after hours. The minimum specifications of the laptop are available at www.phy.uct.ac.za. (A tablet or "netbook" will not be suitable). The course convenor will provide details of additional software (open source) required.

72 NQF credits at HEQSF level 7

Convener: Dr A Hamilton

Course entry requirements: PHY2004W, and 40% in MAM2000W or (MAM2004H and MAM2047H).

Course outline:

This course completes the major in Physics. The theory component aims to develop advanced skills in problem solving within physics, and includes the following topics:

Electromagnetism: Maxwell's equations in vacuum and matter, momentum and angular momentum in electromagnetic fields, electromagnetic waves, wave guides, gauge transformations, retarded potentials, electric and magnetic dipole radiation, special relativity, relativistic kinematics and electrodynamics, electromagnetic field tensor.

Thermodynamics and statistical physics: temperature, heat and work, laws of thermodynamics, ensembles and entropy, Boltzmann distribution and Helmholtz free energy, thermal radiation, chemical potential and Gibbs distribution, Fermi-Dirac statistics, electrons in metals, Bose-Einstein statistics, phonons, photons and the black-body distribution, the Bose-Einstein condensate, applications to classical and quantum systems.

Applications of Quantum Mechanics: Atomic physics (atomic structure and spectra, selection rules, spin, fine structure, Zeeman effect, time dependent and independent perturbation theory); nuclear and particle physics (properties of nuclei, nuclear forces, structure, reactions and models, nuclear models, interactions of elementary particles, quarks and leptons, symmetries and the gauge forces); and solid state physics (crystal structure, lattice vibrations, electron states in solids, energy band theory, semiconductor physics and devices).

The laboratory component includes practical and computational tasks to develop advanced skills of experimentation and scientific report writing.

Lecture times: Monday - Friday, 4th period

DP requirements: Minimum of 40% in class record; attendance at all tests; completion of all laboratory reports, completion of the project and completion of 75% of tutorials and problem sets.

Assessment: Class record (tests, weekly problem sets, laboratory work and project) counts 50%; two x 2-hour examinations in June counts 25%; two x 2-hour examinations in November counts 25%. A subminimum of 40% exists in the weighted average of the four examinations.

Postgraduate Courses

PHY4000W   PHYSICS HONOURS

Since the code PHY4000W will not carry a NQF credit value, students will be concurrently registered for PHY4006W (coursework component of 120 NQF credits) and PHY4007W (research project of 40 NQF credits).

160 NQF credits at HEQSF level 8

Convener: Professor A Peshier

Course entry requirements: The entrance requirement is a BSc degree with a major in Physics. Acceptance will be at the discretion of the Head of Department who will consult the Honours course co-ordinator. Criteria for acceptance include a pass of 60% in PHY3021F and PHY3022S, or equivalent; and a pass of 60% in MAM2000W or MAM2046W or equivalent; and in cases where the Head of Department deems it necessary, favourable referee reports. Enrolment is limited to 15 students. Preference may be given to UCT graduates who meet the course entry requirements.

Course outline:

The Honours course in Physics consists of several modules comprising at least 12, but not more than 14 units. The compulsory modules are: Research Project (3 units), Electromagnetism 1, Electromagnetism 2, Quantum Mechanics 1, Quantum Mechanics 2, and Statistical Physics. At least three further modules must be chosen from: Classical Mechanics, Computational Physics, Particle Physics, Nuclear Physics, Relativistic Quantum Mechanics, Quantum Field Theory, and Solid State Physics. The course starts with a compulsory non-credit bearing module dealing with mathematical tools and skills, and aspects of physics education. Furthermore, the course can be complemented by physics-related modules offered by the Departments of Astronomy, and Mathematics and Applied Mathematics. The choice of modules and research project must be approved by the Head of Physics in consultation with the Honours co-ordinator. Details appear on the Physics website: www.phy.uct.ac.za.

DP requirements: 30% for class tests and problem sets, and suitable progress in the Research Project.

Assessment: The pass mark is 50% and is based on an aggregation of the results of all modules, and is further subject to the subminimum criteria of obtaining a minimum mark of 50% in the Research Project, passing two thirds of all modules, and achieving a mark of at least 35% in all but two of the compulsory modules. The Research Project will count 25% of the final mark. These component parts of the course will be combined in a final overall mark which will be reflected against the course code PHY4000W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

PHY5000W   PHYSICS DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

PHY5001W   THEORETICAL PHYSICS DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

PHY5003W   ASTROPHYSICS & SPACE SCIENCE MINOR DISSERTATION

(National Astrophysics & Space Science Programme (NASSP); for further details see entry under Department of Astronomy)
90 NQF credits at HEQSF level 9
Course entry requirements: AST5003F
DP requirements: None.
Assessment: Students will work on an approved research topic on which a minor dissertation must be presented for formal examination.

PHY5006W   TERTIARY PHYSICS EDUCATION DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the front of the handbook.

PHY6000W   PHYSICS THESIS

360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

PHY6001W   TERTIARY PHYSICS EDUCATION THESIS

360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

DEPARTMENT OF STATISTICAL SCIENCES

The Department is housed in the P D Hahn Building, Level 5
Telephone (021) 650-3219 Fax (021) 650-4773
The Departmental abbreviation for Statistical Sciences is STA.

Associate Professor and Head of Department:
F Little, MSc PhD *Cape Town*
Professors:
G D I Barr, MSc PhD *Cape Town*
D J Bradfield, MSc PhD *Cape Town* HED *Unisa*
Senior Scholar:
T J Stewart, BSc (Chem Eng) *Cape Town* MSc (OR) PhD *Unisa* FRSSAf
Emeritus Professors:
T T Dunne, BA (Hons) BSc Hons UED BEd *Natal* PhD *Cape Town* CStat
L M Haines, BA MA *Cantab* BSc Hons *Natal* MPhil *UCL* PhD *Unisa*
Associate Professors:
R Altwegg, PhD *Zurich*
S Lubbe, MCom PhD *Stell*
C Thiart, BSc Agric (Hons) *Stell* MSc PhD *Cape Town*
Honorary Research Associate:
A Antoniadis, PhD DSc *Grenoble I*
Emeritus Associate Professor:
J M Juritz, BSc Hons *UNISA*, MSc PhD *Cape Town*
Senior Lecturers:
B Erni, BSc Hons MSc *Cape Town* PhD *Basel*
F N Gumedze, MSc PhD *Cape Town*
M J P Lacerda, MSc *Cape Town* PhD *Galway*
J C Nyirenda BSc *Newcastle Upon Tyne* PhD *Cantab*
LD Scott, MSc PhD *Cape Town*
K Stielau, BSc Hons *Natal*
M Varughese, BSc Hons MSc *Wits* DipAc&Tech *Edinburgh* PhD *Cape Town*
Adjunct Associate Professor:
I Durbach, MSc PhD *Cape Town*
Lecturers:
S Britz, MSc *UFS*
A Clark, MSc *Cape Town*
G Distiller, BCom (Hons) MSc *Cape Town*
S Er, PhD *Istanbul*
C Huang, MSc *UKZN* MASt *Cantab*
D Katshunga, BSc Hons *DRC* MSc *Cape Town*
S Silal, MSc *Cape Town*
B J Stray, MSc *Arizona State* PhD *Stell*
N Watson, MSc *Cape Town*
Principal Scientific Officers (Consultants):
U Galal, MSc *Wits*
R Kassanjee, PhD *Wits*
Administrative Manager:
B King, HDE *UWC*
Administrative Assistants:
C Jansen-Fielies
N Maqubela
Financial Officer:
S Meyer, BComm *UNISA*

Senior Clerk:
K Jeptha

CENTRE FOR STATISTICS IN ECOLOGY, ENVIRONMENT AND CONSERVATION (SEEC)
Director:
R Altwegg, PhD *Zurich*
Core members:
A E Clark, MSc *Cape Town*
B Erni, BSc Hons MSc *Cape Town* PhD *Basel*
G Distiller, MSc *Cape Town*
A C Jarre, PhD *Bremen*
I L Macdonald, PhD *Cape Town*
P G Ryan, PhD *Cape Town*
L G Underhill, PhD *Cape Town*
M M Varughese, PhD *Cape Town*
H Winker, PhD *Rhodes*

RESEARCH IN STATISTICAL SCIENCES
The department focuses on research in statistics, operations research and decision modelling and the underlying methodology and application of these methods to ecology, medicine, finance and Big data. Specific research areas that fall into these groupings include:
OPERATIONAL RESEARCH and MULTICRITERIA DECISION SUPPORT: The development of interactive decision aids, to assist in the analysis of decision problems with multiple and conflicting objectives, with particular reference to natural resource management and others; combinatorial optimisation; application to decision making and planning in private and public sectors (T J Stewart, L Scott, J Nyirenda, J Stray, N Watson).
BAYESIAN DECISION THEORY: General principles of Bayesian statistical analysis; applications in sequential stochastic optimisation and other fields (T J Stewart, T T Dunne).
FINANCIAL MODELLING: Econometric techniques are being used to test theories related to the South African economy in the fields of finance, monetary economics, interest rate theory and stock market research. Time series, portfolio construction and risk management (G D I Barr, L M Haines, D Bradfield, A Clark, C Huang).
BIOSTATISTICS: Medical applications of statistics (T T Dunne, F Little, L M Haines, J M Juritz, F Gumedze, S Silal). The objectives of the Biostatistics Interest Group are to develop statistical methodology motivated by medical problems.
SPATIAL AND GIS MODELING: Statistics of large geoscience datasets. Geographic information systems (GIS). Geostatistics and spatial modeling (C Thiart, M M Varughese). Mixed models with spatial data (B Erni).
MULTIVARIATE ANALYSIS: Detection of outliers and influential observations (T T Dunne, C Thiart, F Gumedze); multivariate distribution theory; multidimensional scaling, correspondence analysis and cluster analysis (S Lubbe); robust regression procedures (C Thiart); classification and discrimination procedures; graphical displays of multivariate data (S Lubbe).
EDUCATIONAL APPLICATIONS: Statistical examination of data pertaining to schools, disadvantaged students and to science education (T T Dunne, L Scott, G Barr).
MIXED EFFECTS LINEAR MODELS: Longitudinal data analysis, analysis of repeated measures data, generalized linear (mixed) models, hierarchical generalized linear mixed models (robust estimation and diagnostics) (F Gumedze, C Thiart, J M Juritz, T T Dunne, F Little).
SOCIAL SCIENCE STATISTICS: Research surveys; local government support; analysis of poverty and development, structural equation modelling (T T Dunne, S Er).
OPTIMAL DESIGN: The design of experiments in agriculture, biology and engineering which are in some sense optimal (L M Haines).
ASTROSTATISTICS: The application of statistical techniques to problems in astronomy (M M Varughese).

BIOINFORMATICS: The application of statistical and computational techniques to problems in genetics and molecular biology (M J P Lacerda).

STATISTICS IN ECOLOGY: Applications of statistics to biological and environmental data (B Erni, G Distiller, R Altwegg, M Varughese, A Clark)

Undergraduate Courses

NOTE: Students who intend to specialise in Statistics are strongly advised to include Computer Science in their curriculum.

First-Year Courses

STA1000F   INTRODUCTORY STATISTICS

(No first year students) STA1000F and STA1000S are identical courses offered in first and second semesters. Owing to the mathematics prerequisites, first-year students can only register for STA1000S in the second semester and STA1000F on completion of the mathematics prerequisite. Workshops: One short workshop per week during Monday, 2nd, Wednesday 1st or Friday 3rd period and one long workshop per week, Tuesday or Thursday during 6th and 7th period. Not compulsory but recommended.

18 NQF credits at HEQSF level 5

Convener: Dr L. Scott

Course entry requirements: A pass in any of MAM1004F/S or MAM1005H or MAM1000W or MAM1006H or MAM1020F/S or MAM1010F/S or STA1001F. In addition students will be admitted to STA1000F if they have failed but obtained a DP for any of the above courses and are concurrently registered for an equivalent Mathematics course during the first semester.

Course outline:

This is an introductory statistics course aimed at exposing students to principles and tools to support appropriate quantitative analysis. The aim is to produce students with a functional sense of statistics. We introduce students to statistical modelling and also cover exploratory data analysis. Appropriate tools for display, analysis and interpretation of data are discussed. This is a service course offered predominantly, but not exclusively, to Commerce students. The aim is to give a foundation to students who will encounter and apply statistics in their other courses and professions. Topics covered include: Exploratory data analysis and summary statistics; probability theory; random variables; probability mass and density functions; binomial, Poisson, exponential, normal and uniform distributions; sampling distributions; confidence intervals; introduction to hypothesis testing (including various tests on means); determining sample sizes; simple linear regression and measures of correlation. Students are assessed on their knowledge of the topics covered and their ability to perform simple and appropriate statistical analyses using spreadsheet functions.

This course is offered in a blended learning format. Students make use of online learning and have the option to attend face to face workshops.

DP requirements: A class record of at least 35%.

Assessment: The class record counts 30% (consists of the following components (and their contribution): Class test 1 (25%), class test 2 (25%), Excel test (30%) and weekly tutorial tests (20%). One 3-hour examination counts 70%.

STA1000S   INTRODUCTORY STATISTICS

STA1000F and STA1000S are identical courses offered in first and second semesters. Owing to the mathematics prerequisites, first-year students can only register for STA1000S in the second semester and STA1000F on completion of the mathematics prerequisite. Workshops: One short workshop per week during 2nd (Monday, Tuesday, Thursday or Friday) or 4th (Tuesday or Thursday) period and a long workshop per week, Tuesday and Thursday during 6th and 7th period. Not compulsory but recommended.

18 NQF credits at HEQSF level 5

Convener: Dr L Scott

Course entry requirements: A pass in any of MAM1004F/S or MAM1005H or MAM1020F/S or MAM1010F/S or STA1001F. In addition students will be admitted to STA1000S if they (1) are concurrently registered for MAM1000W, or (2) are concurrently registered for MAM1005H, or (3) have failed but obtained a DP for MAM1010F, MAM1004F, MAM1020F or STA1001F and are concurrently registered for an equivalent Mathematics course during the second semester, or (4) have a supplementary examination for MAM1010F, MAM1004F, MAM1020F or STA1001F that will be written in November of the year of registration.

Course outline:
This is an introductory statistics course aimed at exposing students to principles and tools to support appropriate quantitative analysis. The aim is to produce students with a functional sense of statistics. We introduce students to statistical modelling and also cover exploratory data analysis. Appropriate tools for display, analysis and interpretation of data are discussed. This is a service course offered predominantly, but not exclusively, to Commerce students. The aim is to give a foundation to students who will encounter and apply statistics in their other courses and professions. Topics covered include: Exploratory data analysis and summary statistics; probability theory; random variables; probability mass and density functions; binomial, Poisson, exponential, normal and uniform distributions; sampling distributions; confidence intervals; introduction to hypothesis testing (including various tests on means); determining sample sizes; simple linear regression and measures of correlation. Students are assessed on their knowledge of the topics covered and their ability to perform simple and appropriate statistical analyses using spreadsheet functions.

The course is offered in a blended learning format. Students make use of online learning and have the option to attend face to face workshops.

DP requirements: A class record of at least 35%.

Assessment: The class record counts 30% (consists of the following components (and their contribution): Class test 1 (25%), class test 2 (25%), Excel test (30%) and weekly tutorial tests (20%). One 3-hour examination counts 70%.

STA1000P/L INTRODUCTORY STATISTICS
(offered during summer and winter terms)
18 NQF credits at HEQSF level 5
Convener: Dr L Scott
Course entry requirements: Students should preferably have obtained a DP for either STA1000F/S.
Course outline:
This is an introductory statistics course aimed at exposing students to principles and tools to support appropriate quantitative analysis. The aim is to produce students with a functional sense of statistics. We introduce students to statistical modelling and also cover exploratory data analysis. Appropriate tools for display, analysis and interpretation of data are discussed. This is a service course offered predominantly, but not exclusively, to Commerce students. The aim is to give a foundation to students who will encounter and apply statistics in their other courses and professions. Topics covered include: exploratory data analysis and summary statistics; probability theory; random variables; probability mass and density functions; Binomial, Poisson, Exponential, Normal and Uniform distributions; sampling distributions; confidence intervals; introduction to hypothesis testing (including various tests on means); determining sample sizes; simple linear regression and measures of correlation. Students are assessed on their knowledge of the topics covered and their ability to perform simple and appropriate statistical analyses using spreadsheet functions. The course is presented in online format.

DP requirements: A class record of at least 35%.

Assessment: The class record counts 30% (consists of the following components (and their contribution): Class test 1 (25%), class test 2 (25%), Excel test (30%) and assignment mark (20%). One 3-hour examination counts 70%.

STA1006S   MATHEMATICAL STATISTICS I

18 NQF credits at HEQSF level 5
Convener: Dr F Gumedze
Course entry requirements: At least 70% in NSC Mathematics; concurrent registration on MAM1000W, or MAM1006H or MAM1012S or MAM1021S
Course outline:
This is an introduction to statistics: the study of collecting, analysing, and interpreting data. It is the key entry-point into a Mathematical Statistics major and hence it is compulsory for students intending to major in Mathematical Statistics. This course provides foundation knowledge in statistical theory, and is useful for any student who wishes for an introduction to the fundamentals of statistics, from a mathematical perspective. Topics covered include: Types of data variables. Exploratory data analysis. Grouping and graphing of data. Set theory and counting rules. Probability: conditional probabilities, independence. Bayes theorem. Random variables and values, probability mass and density functions, cumulative distribution functions. Population models and parameters: binomial, Poisson, geometric, negative binomial, hypergeometric. Uniform, exponential, Gaussian, expectation. Coefficient of variation. Sampling: sampling distribution t, Chi-square, F and their tables. Point and interval estimation. Sample size estimation. Hypotheses testing: Z-test and T-test (proportions, difference between two proportions, means, difference between two (means, difference between means: for independent samples and dependent samples). F-test (ratio of two independent variances). Chi-squared-test. Meaning of p-values. Bivariate data: scatterplot, simple linear regression and correlation.
Lecture times: There will be five lectures per week, Monday to Friday, 1st and 4th period
DP requirements: Attendance and completion of all tests/assignments; minimum 90% average for quizzes; class record of 35%
Assessment: Class record counts 30% (comprising of two tests counting 45% each and weekly tutorial tests counting 10% in total). One 3-hour examination counts 70%.

STA1007S   BIONUMERACY

18 NQF credits at HEQSF level 5
Convener: G Distiller
Course entry requirements: A pass in any of MAM1004F/S or MAM1005H. In addition students will be admitted to STA1007S if they (1) are concurrently registered for MAM1000W, or (2) are concurrently registered for MAM1005H or (3) have failed but obtained a DP for MAM1004F and are concurrently registered for an equivalent Mathematics course during the second semester, or (4) have a supplementary examination for MAM1004F that will be written in November of the year of registration.
Course outline:
This course aims to provide an introduction to statistics for Science students, and the topics covered include: exploratory data analysis and summary statistics. Set theory. Probability: conditional probabilities, independence, Bayes theorem. Random variables. Probability mass and density functions. Binomial, Poisson, exponential, normal and uniform distributions. Sampling distributions. Confidence intervals. Hypothesis testing: Z-test and t-test (means, difference between means for independent and dependent samples). Chi-square test for independence and for Goodness-of-fit. Meaning of p-values. Determining sample size. Simple linear regression and measures of correlation. Practical data analysis will be taught using R. The course is the equivalent of STA1000S, in a biological setting.
Lecture times: Five lectures per week, Monday to Friday, 1st period.
DP requirements: Attendance and completion of all tests; class record of 35%.
Assessment: Coursework 30%, made up of two tests (60%), tutorial (20%) and R test (20%). One 3-hour examination counts 70%.

Second-Year Courses

STA2004F   STATISTICAL THEORY & INFERENCE
24 NQF credits at HEQSF level 6
Convener: Associate Professor C Thiart
Course entry requirements: (MAM1000W or MAM1012S) and STA1006S
Course outline:
STA2004F is a rigorous introduction to the foundation of the mathematical statistics and aims to provide students with a deeper understanding of the statistical concepts covered in STA1006S. The course is intended for students studying Mathematical Statistics or Actuarial Science. STA2004F is divided into two broad sections: (1) Distribution theory and (2) Statistical Inference. During the first part of the course, students will learn to derive the distributions of random variables and their transformations, and explore the limiting behaviour of sequences of random variables. The last part of the course covers the estimation of population parameters and hypothesis testing based on a sample of data.
Distribution Theory:Univariate and bivariate distributions. Conditional distributions. Moments. Generating functions (moment, probability and cumulative). Convergence in distribution and central limit theorem. Transformations of random variables. Sampling distributions from the normal distribution (chi-squared, t, F). Order statistics.
Statistical Inference: Parameter estimation. Methods of moments. Maximum likelihood. Asymptotic theory. Efficiency and sufficiency. The exponential family. Hypothesis testing. Confidence intervals.
Lecture times: Five lectures per week, Monday to Friday, 1st period.
DP requirements: Attendance at all tests, attendance at 85% of tutorials, 50% average for tutorial tests, class record of at least 35%.
Assessment: Class record counts 30% (comprising of two tests counting 50% each. One 3-hour examination counts 70%.

STA2005S   LINEAR MODELS
24 NQF credits at HEQSF level 6
Convener: Dr B Erni
Course entry requirements: DP certificate for STA2004F.
Course outline:
This course gives an introduction to statistical modelling and the theory of linear statistical models. The student is introduced to the principles of experimental design, statistical software and practical data analysis through weekly computer practicals and the exposure to many data sets. The course has three sections:
Regression: The multivariate normal distribution; quadratic forms; the linear model; maximum likelihood; estimates of parameters in the linear model; the Gauss-Markov theorem; variable selection procedures; analysis of residuals.
Design and analysis of experiments: Introduction to the basic design principles, basic experimental designs (completely randomised design, the randomised block design, latin square design,) factorial experiments, analysis of variance, the problem of multiple comparisons, power and sample size calculations, introduction to random effects and repeated measures.
Nonparametric statistics: Introduction to nonparametric tests and methods, including Mann-Whitney U, Kruskal Wallis, Friedman and randomisation tests.
Lecture times: Five lectures per week, Monday to Friday, 1st period.
DP requirements: Attendance and completion of all tests/assignments, minimum 80% average for quizzes, class record of 35%.
Assessment: Class record counts 30%. The class record is made up of two tests, and two assignments, contributing equally towards the class record. Either or both of the assignments may be group work (hence group work can count up to 50% of class record). One 3-hour examination counts 70%.

STA2007H   STUDY DESIGN & DATA ANALYSIS FOR SCIENTISTS

This course is offered in blended learning format. Students make use of online learning workshops. One introductory workshop at the beginning of each semester. One tutorial per week.
24 NQF credits at HEQSF level 6
Convener: Associate Professor R Altwegg
Course entry requirements: (STA1000F/S or STA1006S or STA1007S) and (MAM1000W or MAM1004F/S or MAM1005H or MAM1010F/S or MAM1020F/S or STA1001F)
Course outline:
The course aims to equip students with practical experience and skills in analysing data, using statistical techniques frequently used in the sciences. The skills include designing experiments, choosing appropriate statistical methods for visual display and statistical modelling of data, model checking, interpretation and reporting of statistical results, and understanding of limitations of statistical methods and data. By the end of the course the student should have gained enough confidence to transfer these skills to new problems or data sets in their own profession. Topics covered include: Introduction to statistical notation, linear regression, design and analysis of experiments, generalized linear models. There will be strong emphasis on the practical application of the above methods, using open-source statistical software such as R.
There will be a one-day face-to-face workshop at the beginning of the first semester and a one-day face-to-face workshop at the beginning of the second semester. Students must attend one of these workshops before being given access to the online material. They can elect to do the online material in their own time and at their own pace subject to assignment and quiz deadlines being met. Communication with lecturers will be through an online forum. Students can choose to write the examination (at UCT) either at the end of the first or second semester.
DP requirements: At least 35% for class record and satisfactory completion of all projects (subminimum of 40% for each project).
Assessment: Class record counts 40% (equally divided between tests and projects). One 2-hour examination counts 60%.

STA2020F   APPLIED STATISTICS

24 NQF credits at HEQSF level 6
Convener: N Watson
Course entry requirements: (MAM1000W or MAM1004F/S or MAM1005H or MAM1010F/S or MAM1020F/S or STA1001F) <u>and</u> (STA1000F/S/P/L or STA1006S or STA1007S)
Course outline:
This is designed to extend the student's basic knowledge acquired in STA1000F/S/P/L. The emphasis of the course is on applying statistical methods and modelling techniques to data rather than focusing on the mathematical rigor underpinning these methods. Topics covered include: Analysis of variance and experimental design; revision and extension of simple linear regression; multiple regression; time series analysis; and non-parametric statistics. Students will continue to analyse data using Excel.
Lecture times: Monday to Thursday, 1st or 5th period
DP requirements: At least 35% for class record and at least 50% for the project.
Assessment: Class record counts 40%. The class record consists of the following components (and their contribution): Class test 1 (35%), Class test 2 (35%) and Project (10%) and Tutorial test average (10%) and Practical test average (10%). One 3-hour examination counts 60%.

STA2020S   APPLIED STATISTICS

24 NQF credits at HEQSF level 6
Convener: N Watson
Course entry requirements: (MAM1000W or MAM1004F/H/S or MAM1005H or MAM1010F/S or MAM1020F/S or STA1001F) <u>and</u> (STA1000F/S/P/L or STA1006S or STA1007S)

Course outline:
This is designed to extend the student's basic knowledge, acquired in STA1000F/S. The emphasis of the course is on applying statistical methods and modelling techniques to data rather than focusing on the mathematical rigor underpinning these methods. Topics covered include: Analysis of variance and experimental design; revision and extension of simple linear regression; multiple regression; time series analysis; and non-parametric statistics. Students will continue to analyse data using Excel.
Lecture times: Monday to Thursday, 7th period
DP requirements: At least 35% for class record and at least 50% for the project.
Assessment: Class record counts 40%. The class record consists of the following components (and their contribution): Class test 1 (35%), Class test 2 (35%) and Project (10%) and Tutorial test average (10%) and Practical test average (10%). One 3-hour examination counts 60%.

STA2030S   THEORY OF STATISTICS
24 NQF credits at HEQSF level 6
Convener: D Katshunga
Course entry requirements: STA2020F/S; MAM1000W is strongly recommended
Course outline:
This course explores aspects of probability theory that are particularly relevant to statistics. Such aspects include the notions of random variables, joint probability distributions, expected values and moment generating functions. The course content includes univariate distributions and moments of univariate distributions, moments of bivariate distributions, distributions of sample statistics and introduction to GLMs.
Lecture times: Monday to Thursday, 1st period
DP requirements: Class record of at least 35%.
Assessment: Class record counts 30% (made up of two tests, each contributing 45% towards class record and tutorial mark (average of all tutorials) contributing 10% towards class record). One 3-hour examination counts 70%.

Third-Year Courses

STA3022F   RESEARCH AND SURVEY STATISTICS
36 NQF credits at HEQSF level 7
Convener: Dr S Er
Course entry requirements: STA2020F/S or STA2005S
Course outline:
The aim of this course is to create a practical working familiarity with analysis of the data, focusing on multivariate methods as applied in areas such as marketing and social science research. Topics covered include classification trees, correspondence analysis, principal components and factor analysis, cluster analysis, discriminant analysis and structural equations modelling.
Lecture times: Monday to Thursday, 4th period
DP requirements: Attendance and completion of all tests/assignments, class record of at least 35%.
Assessment: Class record counts 30%. The class record is made up of test 1 (34%), test 2 (34%) and assignments and spot tests (32%). One 3-hour examination counts 70%.

STA3030F   INFERENTIAL STATISTICS
36 NQF credits at HEQSF level 7
Convener: Dr J Nyirenda
Course entry requirements: STA2030S; MAM1000W is strongly recommended
Course outline:
This course forms part of the third-year major in Applied Statistics. The aim of the course is to provide students with the main intellectual and practical skills required in the use of inferential statistics. The course consists of modules: estimation and simulation. The estimation module

introduces students to the methods used in the estimation of distribution parameters. Topics covered include: bias and efficiency of estimators; method of maximum likelihood; method of moments; asymptotic theory; Bayesian methods; decision theory; hypothesis testing and likelihood ratio tests. The simulation module introduces students to the use of computer simulation and data re-sampling techniques (bootstrap) to investigate the following problems: one and two sample tests of means and variances; one and two way analysis of variances; moments and other properties of distributions; theory of distributions derived from normal distribution.
Lecture times: Monday to Thursday, 1st period
DP requirements: Attendance and completion of all tests/assignments, class record of at least 35%.
Assessment: Class record counts 30% (made up of two tests, each contributing 30% towards class record and practical work contributing 40% towards class record). One 3-hour examination counts 70%.

STA3036S   OPERATIONAL RESEARCH TECHNIQUES
36 NQF credits at HEQSF level 7
Convener: Dr S Silal
Course entry requirements: STA2030S; STA3030F is recommended
Course outline:
This course forms part of the third-year major in Applied Statistics. It is an introduction to the study of Operational Research (OR) and explores fundamental quantitative techniques in the OR armamentarium with a strong focus on computer-based application. The course is intended for students in the applied statistics stream but may be taken as an elective by students in the mathematical statistics stream. Topics covered include linear and non-linear programming where students will learn to find optimal solutions by characterising problems in terms of objectives, decision variables and constraints, Decision making under uncertainty through decision trees, decision rules and scenario planning, Queueing Theory simulation through modelling the operation of real world systems as they evolve over time.
Lecture times: Monday to Thursday, 3rd period
DP requirements: Attendance and completion of all tests/assignments, class record of at least 35%.
Assessment: Class record counts 30% comprising 2 tests (33% each) and 2 assignments (17% each). One 3-hour examination counts 70%.

STA3041F   MARKOV PROCESSES & TIME SERIES
36 NQF credits at HEQSF level 7
Convener: A Clark
Course entry requirements: STA2004F and STA2005S; MAM2000W is strongly recommended (linear algebra and advanced calculus modules)
Course outline:
This course forms part of the third-year major in Mathematical Statistics. It consists of two modules. The aim of the Stochastic Processes module is to provide grounding for theory and basic applications in financial modelling while the aim of the Time Series module is to introduce students to the foundations of the Box-Jenkins methodology with the intention of applying the techniques using statistical software. The content of the modules are as follows:
Stochastic processes: The modules cover the general theory underlying stochastic processes and their classifications, definitions and applications of discrete Markov chains. Branching processes are examined for extinction or survival. Probabilities associated with multiple events are derived and applications presented. Counting processes in discrete and continuous time are modelled with a view to establishing methods of forecast and backcast. Ruin theory and reinsurance themes are insurance of continuous time processes. Ruin and loss are considered in a framework covering single claims for losses or insured events. Students are also introduced to run-off triangles.
Time series analysis: Topics that are covered include: global and local models of dependence, stationary ARMA processes, unit root processes as well as a brief introduction to univariate Volatility models as well as cointergration.
Lecture times: Five lectures per week, Monday to Friday, 1st period

DP requirements: Attendance and completion of all tests; class record of at least 35%.
Assessment: Class record counts 30% (made up of two tests contributing equally towards the class record). One 3-hour examination counts 70%.

STA3043S   DECISION THEORY & GLM
36 NQF credits at HEQSF level 7
Convener: C Huang
Course entry requirements: STA2004F and STA2005S; MAM2000W is strongly recommended (linear algebra and advanced calculus modules).
Course outline:
This course forms part of the third-year major in Mathematical Statistics. It consists of two modules: The Generalised Linear Models module introduces students to the theory and application of fitting linear models to different types of response variables with different underlying distributions. The Decision and Risk Theory module is an introduction to the structure of decision making under uncertainty. The content of the modules are as follows:
Generalized linear modules: Topics covered include: the exponential family of distributions, the GLM formulation, estimation and inference, models for continuous responses with skew distributions, logistic regression, Poisson regression and loglinear models.
Decision theory: Topics covered include: game theory and non-probabilistic decision criteria; probabilistic decision criteria; expected value and utility; use of Bayes' theorem; value of information; Bayesian statistical analysis for Bernoulli and normal sampling; empirical Bayes and credibility theory; loss and extreme value distributions; Monte Carlo method.
Lecture times: Five lectures per week, Monday to Friday, 1st period.
DP requirements: Attendance and completion of all tests and assignments; class record of at least 35%.
Assessment: Class record counts 30% (made up of two tests, each contributing 30% towards class record and practical work contributing 40% towards class record). One 3-hour examination counts 70%.

STA3045F   ADVANCED STOCHASTIC PROCESSES
36 NQF credits at HEQSF level 7
Convener: Dr M Varughese
Course entry requirements: STA2004F, STA2005S, MAM2000W and concurrent registration for STA3041F
Course outline:
This course is a third-year module for students studying Actuarial Science or Mathematical Statistics, though not a requirement for a major in Mathematical Statistics. The course gives a theoretical overview of stochastic processes with the models covered spanning both discrete and continuous time as well as discrete and continuous state-space. Though the emphasis is on the theoretical properties of the models, the application of the methods to real-world problems is also explored at length. Topics covered include: Poisson processes, continuous-time Markov chains, random walks, probability theory, discrete-time martingale processes, Brownian motion and diffusion processes.
Lecture times: Five lectures per week, Monday to Friday, 2nd period.
DP requirements: Attendance of all tests and tutorials; class record of at least 35%.
Assessment: Class record counts 30% (made up of two tests, each contributing 50% towards the class record). One 3-hour examination counts 70%.

Postgraduate Courses

STA4007W   STATISTICAL SCIENCES HONOURS

Since the code STA4007W will not carry a NQF credit value, students will be concurrently registered for STA4022W (coursework component of 120 NQF credits) and STA4023W (research project of 40 NQF credits). Entrance is limited to 24 students for the combined Honours courses made up of STA4007W, STA4019H, STA4006W and STA4010W

160 NQF credits at HEQSF level 8

Convener: Dr M Lacerda

Course entry requirements: The minimum requirements are MAM1000W (MAM1010 and MAM1012) plus one of the following two sets of 3rd year courses: Applied Statistics stream: STA3030F + STA3036S; OR Mathematical Statistics Stream: STA3041F, STA3043S; Applicants fulfilling the minimum requirements above with an average of 65% or more for their 3rd year courses (at first attempt) can be confident of admission into the programme. Students who do not achieve the 65% level will be considered on a case-by-case basis, taking into consideration performance in other courses.

Course outline:

This Honours programme covers theoretical and applied statistics and operations research. It aims to give students a good theoretical basis and statistical computing skills through the teaching of core modules (81 NQF credits). It further exposes students to the practical application of statistics in different areas through the offering of elective modules (39 NQF credits). It provides training in research through supervised project work (40 NQF credits). Elective modules vary from year to year, but typically include Econometrics, Portfolio Theory, Time Series Analysis, Biostatistics, Decision Modelling, Spatial Statistics, Multivariate Analysis and Analytics.

DP requirements: Attendance of 85% of departmental seminars.

Assessment: Each coursework module comprises tests, assignments and a final examination. The relative weighting placed on the year work within different modules varies between 30% and 50%. The final grade for STA4007W as a whole is a weighted average (3: 1) of the combined final marks for each coursework module (weighted by the number of credits), and the individual project. The student is required to obtain a mark of at least 50% in all core modules and for the individual project. The student may fail at most one elective module provided that a mark of at least 40% is obtained for that module. These component parts of the course will be combined in a final overall mark which will be reflected against the course code STA4007W, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

STA4019H   STATISTICAL SCIENCES FOR ACTUARIES

Since the code STA4019H will not carry a NQF credit value, students will be concurrently registered for STA4024W (coursework component of 64 NQF credits) and STA4025W (research project of 40 NQF credits). Entrance is limited to 24 students for the combined Honours courses made up of STA4007W, STA4019H, STA4006W and STA4010W

104 NQF credits at HEQSF level 8

Convener: Dr M Lacerda

Course entry requirements: Completion of STA2004F, STA2005S, STA3041F, STA3043S, or their deemed equivalents, at a satisfactory level (an average of 65% or more in the 3rd year courses at first attempt), as well as a pass in MAM2000W. In addition, admission to STA4019H requires that the student is admitted by the Actuarial Science Division of the School of Management Studies to BUS4027W and BUS4028F. Acceptance will be at the discretion of the Head of Department who will consider quality of final year results, material covered in the undergraduate curriculum, and possibly referee reports. Preference may be given to UCT students who meet the course entry requirements.

Course outline:
This course covers theoretical and applied statistics and operations research. It constitutes 65% of the 160 HEQSF credit requirements for the BSc Hons in Actuarial Science. Students are required to complete Statistical Computing and Matrix Methods (25 credits) and a research project (40 credits). The remaining 39 credits are obtained by selecting from the core and elective modules of STA4007W, which typically includes Theory of Statistics, Operations Research, Econometrics, Portfolio Theory, Time Series Analysis, Biostatistics, Decision Modelling, Spatial Statistics, Multivariate Analysis and Analytics.
Assessment: Each coursework module comprises tests, assignments and a final examination. The relative weighting placed on the year work within different modules varies between 30% and 50%. The final grade for STA4019H as a whole is a weighted average (5: 3) of the combined final marks for each coursework module (weighted by the number of credits), and the individual project. In addition, the student is required to obtain a mark of at least 50% in all core courses, at least 40% in best 39 credits for elective modules and at least 50% for the individual project. In addition the courses BUS4027W and BUS4028F must also be passed for the degree to be awarded. These component parts of the course will be combined in a final overall mark which will be reflected against the course code STA4019H, with PA (pass) entered against the coursework and project codes; each of these components must be passed separately for the award of the degree.

STA5000W   STATISTICS DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the beginning of the handbook.

STA5001W   OPERATIONAL RESEARCH DISSERTATION
180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the beginning of the handbook.

STA5003W   ADVANCED ANALYTICS COURSEWORK

90 NQF credits at HEQSF level 9

Convener: Associate Professor S Lubbe

Course entry requirements: An honours degree in Statistics or a four-year Bachelor's degree of equal standard to the UCT honours degree in Statistical Sciences with a mark of at least 65% in the 4th year of study at first attempt or a mark of at least 65% (on first attempt during 4th year of study) for an honours degree in another discipline that involved a substantial component of quantitative training, as assessed by Head of Statistical Sciences Department, plus successful completion of pre-courses including, introductory calculus, linear algebra and statistical inference, and R programming, as deemed necessary.

Course outline:

This coursework component of the Master's degree in Advanced Analytics and Decision Modelling aims to train students in more advanced statistical methodology needed for the analysis of data from Commerce, Science and Health Sciences. Students need to complete 6 modules chosen from, Advanced Topics in Regression, Multivariate Statistics, Simulation and Optimisation, Machine Learning, Longitudinal Data Analysis, Bayesian Decision Analysis, Biological Statistics (Biostatistics, Bioinformatics or Ecological Statistics), Advanced Portfolio Management, Financial Statistics, Problem Structuring and Project Management, Operation Research Case Studies. Students are also allowed to choose a maximum of two modules from other departments or Honours level courses.

The course is structured to allow for a focus on Data Analytics through the choice of the first four modules mentioned above together with modules from Computer Science or other programming modules and the choice of a topic in the area of Big Data Analytics for the minor dissertation component (STA5004W). Through the combination of modules in Operations Research, Statistics and Decisions Modelling, the master's degree offers a qualification in Decision Sciences. In addition it allows for streaming in the popular areas of Biological or Financial Statistics.

On completion of this course, students will be able to: (1) be a professional data analyst in industry; (2) perform the tasks of a Data Scientist with respect to the analysis of large datasets; (3) conduct collaborative research in the health and biological sciences, or (4) conduct independent research in Statistical methodology, depending on their choice of modules and dissertation topic.

Assessment: The coursework component of the degree will be assessed through class assignments and examinations for each module taken. The overall mark for the coursework component will be a weighted average (based on contribution towards total credit count) of the marks obtained for the individual modules. Students who fail the coursework component will not be allowed to reregister in a subsequent year.

STA5004W   ADVANCED ANALYTICS MINOR DISSERTATION

90 NQF credits at HEQSF level 9

Convener: Associate Professor S Lubbe

Course entry requirements: STA5003W

Course outline:

On successful completion of the coursework component, students will undertake an individual, supervised research project on a suitable topic, the results of which are to be written up as a minor dissertation.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

STA5010W   OPERATIONAL RESEARCH IN DEVELOPMENT COURSEWORK

This course may not be offered in 2016
90 NQF credits at HEQSF level 9
Convener: Dr L Scott
Course entry requirements: Entry to the course requires a good Honours degree including a strong quantitative component (normally at least two years of Mathematics at a tertiary level). In selecting candidates for admission to the course, consideration will also be given to recommendations from at least two referees who are able to attest to the applicants' academic abilities and suitability.
Course outline:
The aim of this one year course is to provide a broad professional training in the principles and tools of operational research (OR), with particular emphasis on application in the context of development and the developing world. OR has been defined as the discipline of applying advanced analytical methods (system analysis, and computer and mathematical models) to help make better decisions. The OR in Development programme focuses on preparing graduates for a career in applying OR to the unique problems of the developing world, such as conflicting objectives in balancing, for example, socio-economic development and corrective actions, less reliable infrastructures, and a post-colonial need for community participation in all levels of planning.. The first academic year is based primarily on coursework, supplemented by group discussions and case studies. The coursework includes the basic techniques of operational research and statistics, specific developmental issues, problem structuring and decision analysis.
Assessment: This component will be assessed through class assessments and examinations. A pass for this coursework requires an average of 50% over all modules, as well as a minimum of 50% for certain modules designated as core material.

STA5011W   OPERATIONAL RESEARCH IN DEVELOPMENT MINOR DISSERTATION

This course may not be offered in 2016
90 NQF credits at HEQSF level 9
Convener: Dr L Scott
Course entry requirements: STA5010W
Course outline:
On successful completion of the coursework component, students will undertake an individual, supervised applied research project on a suitable topic, the results of which are to be written up as a minor dissertation. In some cases, the project might be undertaken on a local problem at the student's home base.
Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each count 50% towards the degree; each must be passed separately for the award of the degree.

STA5013W   STATISTICAL ECOLOGY DISSERTATION

180 NQF credits at HEQSF level 9
Course outline:
This course consists of an investigation of an approved topic chosen for intensive study by the candidate (student), culminating in the submission of a dissertation. The dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research and an appropriate acquaintance with the relevant literature. It must be clearly presented and conform to the standards of the department and faculty. The dissertation will usually consist of a report detailing the conduct, and analysis of the results of, research performed under the close guidance of a suitably qualified supervisor/s. The dissertation should be well-conceived and acknowledge earlier research in the field. It should demonstrate the ability to undertake a substantial and informed piece of research, and to collect, organise and analyse material. General rules for this degree may be found in the beginning of the handbook.

STA5014Z STATISTICAL METHODS

0 NQF credits at HEQSF level 9

Convener: Associate Professor F Little

Course entry requirements: An honours degree in a relevant discipline such as Biology, Medicine, Actuarial Science, Finance and Engineering that involved a substantial component of quantitative training, as assessed by Head of Statistical Sciences Department.

Course outline:

The aim of this course is to allow students to take statistical modules that will prepare them for entry into a Master's program in Statistical Sciences. Modules may include training in Calculus for Statistics, Matrix Methods, Statistical Computing, Statistical Theory and Inference, Statistical Modelling.

Assessment: Essays and tests count 50%; one 3-hour examination in November counts 50%. A sub-minimum of 40% is required for the examination.

STA5057W BIOSTATISTICS COURSEWORK

90 NQF credits at HEQSF level 9

Convener: Associate Professor F Little

Course entry requirements: A mark of at least 65% for an honours degree in Statistics of equal standard to the UCT honours degree in Statistical Sciences or a mark of at least 65% for an honours degree in a Biological or Medical discipline that involved a substantial component of quantitative training, as assessed by Head of Statistical Sciences Department, plus successful completion of pre-courses including, introductory calculus, linear algebra and statistical inference, and R programming, as deemed necessary.

Course outline:

The course work component of the MSc degree in Biostatistics aims to train students in more advanced statistical methodology needed for the analysis of data from the Health and Biological Sciences. Students complete 6 modules, of which 4 are compulsory and include Multivariate Statistics, Longitudinal Data Analysis, Survival Analysis and Design and Analysis of Experiments in the Health Sciences. The remaining two electives are chosen from among others, Generalized Linear Models for the Health Sciences (honours level), Epidemiology, Advanced Topics in Regression, Simulation and Optimisation, Machine Learning, Bayesian Decision Analysis, Infectious Disease Modelling, Ecological Statistics and Structural Equation Modelling. Each module accounts for 15 HEQF credits on level 9 and students need to complete 90 credits with the option of completing a maximum of 30 credits in a different department or faculty or from level 8 Statistics courses. Not all modules will be offered every year; the course will be tailored to the interests and needs of the particular students and the resources available in the department.

Assessment: The coursework component of the degree will be assessed through class assignments and examinations for each module taken. The overall mark for the coursework component will be a weighted average (based on contribution towards total credit count) of the marks obtained for the individual modules. Students who fail the coursework component will not be allowed to reregister in a subsequent year.

STA5058W BIOSTATISTICS MINOR DISSERTATION

90 NQF credits at HEQSF level 9

Convener: Associate Professor F Little

Course entry requirements: Successful completion of the coursework component (STA5057W) of the Master's degree in Biostatistics.

Course outline:

This course presents the research component of the Master's degree in Biostatistics. The research component of the degree is based on a 90 credit dissertation. The topic of the research will be based on methodological or applied problems from the Health or Biological Sciences. Students may be based in a research unit from where the problem has originated for the duration of their research. On

completion of the research component, and the preceding coursework component, students will be able to: (1) conduct collaborative research in the health sciences, (2) conduct independent research in statistical methodology for the health sciences, (3) act as statistical consultants for health sciences research, (4) be able to also work with researchers in the biological sciences.

Assessment: The minor dissertation must be presented for formal examination. The coursework and minor dissertation each counts 50% towards the degree; each must be passed separately for the award of the degree.

STA5059Z   TOPICS IN BIOSTATISTICS A

15 NQF credits at HEQSF level 9

Convener: Associate Professor F Little

Course entry requirements: Previous exposure to quantitative training that will enable the student to cope with the material in the chosen module plus successful completion of pre-courses deemed necessary for the module, as assessed by Head of the Statistical Sciences Department and the module convener.

Course outline:

The aim of this module is to allow students to register for a single module that forms part of the MSc in Biostatistics. Possible modules include Multivariate Statistics, Longitudinal Data Analysis, Survival Analysis and Design and Analysis of Experiments in the Health Sciences, Advanced Topics in Regression, Simulation and Optimisation, Machine Learning, Bayesian Decision Analysis, Infectious Disease Modelling and Structural Equation Modelling. Students will acquire skills and knowledge of statistical methodology relevant to Health Sciences Research.

Assessment: Class assignments 50%; one 3-hour examination counts 50%. A sub-minimum of 40% is required for the examination and the class assignments.

STA5060Z   TOPICS IN BIOSTATISTICS B

15 NQF credits at HEQSF level 9

Convener: Associate Professor F Little

Course entry requirements: Previous exposure to quantitative training that will enable the student to cope with the material in the chosen module plus successful completion of pre-courses deemed necessary for the module, as assessed by Head of the Statistical Sciences Department and the module convener.

Course outline:

The aim of this module is to allow students to register for a single module that forms part of the MSc in Biostatistics. Possible modules include Multivariate Statistics, Longitudinal Data Analysis, Survival Analysis and Design and Analysis of Experiments in the Health Sciences, Advanced Topics in Regression, Simulation and Optimisation, Machine Learning, Bayesian Decision Analysis, Infectious Disease Modelling and Structural Equation Modelling. Students will acquire skills and knowledge of statistical methodology relevant to Health Sciences Research.

Assessment: Class assignments 50%; one 3-hour examination counts 50%. A sub-minimum of 40% is required for the examination and the class assignments.

STA6001W   STATISTICAL SCIENCES THESIS

360 NQF credits at HEQSF level 10

Course outline:

The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant

field. Candidates are referred to the rules for this degree as set out in book 3, General Rules and Policies.

STA6002W   STATISTICAL ECOLOGY THESIS
360 NQF credits at HEQSF level 10
Course outline:
The PhD is a research degree on an advanced topic under supervision which can be taken in any of the departments in the Faculty. Examination is by thesis alone. A candidate shall undertake doctoral research and advanced study under the guidance of a supervisor/s appointed by Senate. The thesis must constitute a substantial contribution to knowledge in the chosen subject, must show evidence of original investigation and give a full statement of the literature on the subject. The PhD degree demands that the candidate is able to conduct independent research on his/her own initiative. Through the thesis the candidate must be able to demonstrate that he/she is at the academic forefront in the topic selected, that the work is original and that it advances our knowledge in the relevant field. Candidates are referred to the rules for this degree as set out in book 3, General Rules and Policies.

INTER-FACULTY UNITS

AFRICAN CLIMATE AND DEVELOPMENT INITIATIVE (ACDI)

Director and Professor:
M New, MPhil PhD *Cantab*
Masters Course Convener:
M A Baudoin, PhD *Brussels*
Research Consortium Manager, Adaptation in semi-arid regions:
L Scodanibbie, MSc *British Columbia*
Research Fellow, Cities and Climate Change:
L Pasquini, PhD *Sheffield*
Research Fellow, Adaptation in semi-arid regions:
D Spear, MSc *Cape Town* PhD *Stell*
Science Communicator, Adaptation in semi-arid regions:
T Hoffman, PhD *Cape Town*
Project Manager:
S Midgely, PhD *Cape Town*
Project Coordinator:
K Nortje, MPhil *Cape Town*
Project Development and Research Officers:
L Cobban, MSc *Rhodes*
Z Visser, MSocSci *Cape Town*
Administrative Manager:
K Fosseus, BNur *Cape Town*
Administrative Assistant:
R Karriem
Communications and Marketing Assistants:
K Claassens
A Okeyo
Senior Secretary, Adaptation in semi-arid regions and PA to Director:
A Pingelly

The African Climate & Development Initiative (ACDI) is the University of Cape Town's (UCT) active response to the climate change and development challenge. The ACDI was set up in 2011 by the University of Cape Town's (UCT) Vice-Chancellor Max Price as one of four strategic initiatives, each contributing to UCT's mission to tackle key issues in the social and natural worlds. It is also one of the Vice-Chancellor's signature themes; which have been chosen to drive research in a strategic manner at the University. To achieve this, these themes are grounded in existing areas of internationally-recognized excellence at UCT, whilst being aligned to institutional, regional and national priorities. Uniquely, the ACDI merges climate change issues with development issues, bringing together UCT's breadth and depth of research and teaching in these areas, which previously were conducted largely in isolation within a variety of departments and research centres. Its interdisciplinary focus provides a multi-layered perspective on climate change and development that merges interdisciplinary expertise from specialists working in collaboration to solve complex problems within these fields.

Research Partnerships
In addition to cross-university activities, the ACDI support innovative research in partnership with government, business and civil society. For example, the Climate Change Think Tank is a partnership between ACDI, the African Centre for Cities, and the City of Cape Town, where researchers work with the city to improve understanding of key mitigation and adaptation issues that

the City of Cape Town is faced with, and to incorporate these research insights into city policy. Similarly, the ACDI's Climate Knowledge Network, based in the Bergrivier Municipality, brings together a network of academics, practitioners and civil society members working within the Bergrivier territory, to facilitate knowledge sharing, relationship building and applied interdisciplinary research on issues of climate change and development.

Staying within the Western Cape region, the ACDI's efforts expand to the Sustainable Economic Development in Water Constrained Catchments Project, which is a partnership between the ACDI and Green Cape, a Sector Development Agency established by the Western Cape Provincial Government and The City of Cape Town. The project is co-funded by the Water Research Commission and Green Cape. This project partnership explores the water resource use and management within catchments in the Western Cape, using Saldanha Bay as a case study, and ultimately aims to develop and test a set of tools and methods that better allow for integration of water planning into development planning, and vice versa.

A further testament to the ACDI's of cross-sectoral reach is its partnership with the Green Skills Project. Led by Rhodes University, the project includes partnerships with, University of Western Cape (UWC), University of the Witwatersrand (Wits), Department of Environmental Affairs (DEA), the Wildlife and Environment Society of South Africa (WESSA), the World Wide Fund for Nature (WWF), GreenMatter, and the South African National Biodiversity Institute (SANBI). Green Skills is a project of the National Environmental Skills Planning Forum and the Green Fund. The Green Skills project works to facilitate a more proactive approach to green skills planning in South Africa, focusing on a system-based approach to capacity building.

The ACDI is also actively engaged in internationally affiliated projects such as the Climate Impact Research Capacity and Leadership Enhancement in Sub-Saharan Africa (CIRCLE) programme. The CIRCLE programme is an initiative of the Department for International Development (DFID) of the United Kingdom (UK) to develop the skills and research output of early career African researchers in the field of climate change and its local impacts on development. The programme was implemented in 2014 by the Association of Commonwealth Universities (ACU) and the African Academy of Sciences (AAS), and will continue until 2018 under the same management. As part of the CIRCLE programme, the University of Cape Town, through the ACDI and the University's Research Office (specifically the Emerging Researcher Programme), hosted 3 visiting research fellows in 2015 and will host 3 more in 2016, each supervised by a UCT academic staff member, and undertaking unique research projects under the broad theme of climate change impacts in Africa.

Further, the ACDI is the lead partner in a consortium of southern African universities that aim to develop a master's curriculum in Climate Change and Sustainable Development for universities in the SADC region. The project aims to create a curriculum that gives masters graduates the knowledge and skills to either study further or to enter into the workplace in any relevant sector. It is envisioned that the curriculum will be tailored to local needs and delivered across SADC countries. The University Delivery Consortium includes, (along with the University of Cape Town) Rhodes University, the University of Namibia, the University of Mauritius, Universidade Eduardo Mondlane, Sokoine University of Agriculture and the Open University of Tanzania. The consortium is supported by the Southern African Regional Universities Association (SARUA) and the Climate and Development Knowledge Network (CDKN).

Lastly, the ACDI aims to continue to forge new local and international partnerships, such as these in the future; between 2016 and 2018 the ACDI will partner with the University of East Anglia (UEA), to host a Doctoral Exchange Programme. This exchange programme will fund exchanges for up to 10 PhD students and selected members of academic staff, in the fields of climate science (e.g. Climate modelling, ocean science, atmospheric science), climate impacts (e.g. Social science, international development, human health, agriculture, fisheries) and adaptation strategies. UEA and

UCT are two universities with strong expertise in these disciplines. Researchers from these well established and complementary institutions will be brought together in a formal arrangement for the first time.

Graduate and Professional Training

The ACDI convenes a one-year coursework master's in Climate Change & Sustainable Development, which provides students with interdisciplinary training in climate change and sustainable development, with a specific focus on the issues of relevance to African development. The ACDI master's includes core modules focusing on Climate and Development, Mitigation and Adaptation, and optional courses across a spectrum of disciplines, including Business Sustainability, Biodiversity, Climate Prediction and Environmental Law. The ACDI supports masters and doctoral researchers through its Graduate Network, a forum for students from different departments to interact across disciplinary boundaries to explore innovative approaches to their research. Additionally, the ACDI is planning a trial implementation of a Post Graduate Training Programme in Climate Change and Development, in 2016. The goal is to offer students from across the university, who are commencing a PhD or research masters degree in a climate change related topic, a broader perspective on the field than that which is restricted to within their previous disciplines. A secondary goal is also to create a more integrated network of students who engage in climate change-related research across the University, leading to stronger peer group relations and collaborations.

For more information on the ACDI and its activities, see http://acdi.uct.ac.za/. The Department of Environmental & Geographical Sciences section in this Handbook can also be referred to for detailed course outlines.

ELECTRON MICROSCOPE UNIT

Electron Microscope Unit
Director:
Professor B T Sewell, MSc *Wits* PhD *Lond*
Principal Scientific Officer:
B W Weber, BSc Hons PhD *Cape Town*
Principal Technical Officers:
M A Jaffer, BSc Hons *Cape Town*
M A Woodward, BSc *Cape Town*
Principal Scientific Officer:
M E Waldron, BSc Hons *Swansea* MSc *Cape Town*
Chief Scientific Officer:
I Shuro, BSc *Zimbabwe* MSc PhD *Toyohashi Japan*
Technical Officer:
S Karriem

The Electron Microscope Unit is housed in the New Engineering Building, Madiba Circle and provides scanning, transmission and light microscopy facilities for staff and research students in all faculties. The Unit has two Scanning Electron Microscopes: the ultra high resolution FEI Nova Nano field emission gun (FEG)SEM with accessories including X-ray analyser and electron backscattered diffraction pattern analysis, and a Zeiss 1450, equipped with an X-ray analyser, backscatter detector and cryo facilities. The Unit also has two high resolution Transmission Electron Microscopes namely the 200 kV Tecnai TF20 (FEG)TEM and the Tecnai G²20 energy-filter (EF)TEM equipped with a LaB6 filament. The Unit also houses a FEI QEMSCAN and an X-Ray diffractometer. Preparative, darkroom, light microscopy, image analysis and library facilities are also provided.

Enquiries regarding the use of these facilities are welcome. The Unit is able to provide information and training on a wide range of microscopy related topics. More information is available at www.emu.uct.ac.za.

MARINE RESEARCH INSTITUTE (MA-RE)

Marine Research Institute (Ma-Re)
Director:
To be advised
Deputy Directors:
J G Field, BSc Hons PhD *Cape Town*
J Glazewski BCom LLB MA *Cape Town* LLM *London*
Science Director:
L Shannon, MSc PhD *Cape Town*
Manager:
To be advised
Communications Officer:
S Ragaller, BSocSc Hons MSocSc *Cape Town*
Administrative Assistant:
S Bosma, BA BSc Hons MSc *Cape Town*

Ma-Re is a virtual marine institute with an administrative unit based in the R W James Building, Residence Road. The Institute is an inter-departmental and cross-faculty network that links staff and students involved in all aspects of marine research. It aims to foster interdisciplinary research, conduct global change research under its own research project(s), link with other national and international marine institutions and groups, and raise funds for student bursaries and mentoring. It is associated with over forty tenured researchers from a range of units, departments and faculties and has over 160 postgraduates in its postgraduate network (please visit www.ma-re.uct.ac.za for more details). One of Ma-Re's primary functions is to provide administrative and other support to collaborative research projects within its remit of being an inter-faculty unit.

UCT Departments/units that have research staff affiliated with Ma-Re:
Department of Biological Sciences
Department of Economics
Department of Electrical & Computer Engineering
Department of Environmental & Geographical Sciences
Environmental Evaluation Unit
Department of Geological Sciences
Department of Historical Studies
Department of Mathematics & Applied Mathematics
Institute of Marine Environmental Law
Department of Mechanical Engineering
Department of Molecular & Cell Biology
Department of Oceanography
Department of Socio-Anthropology
Department of Sociology
(For details of affiliated staff members, visit http://ma-re.uct.ac.za/staff/academic-staff/)

Honorary Research Associates nominated by Ma-Re are hosted by various affiliated departments:
R Anderson, Hon Prof Cape Town (Biological Sciences, DAFF)
L Atkinson, MSc PhD Cape Town (Biological Sciences, SAEON)
R Barlow, MSc Natal PhD Cape Town (Biological Sciences)
S Bernard, MSc PhD Cape Town (Oceanography, CSIR)

A Cockcroft, MSc PhD UPE (DEA, Biological Sciences)
J C Hermes, PhD *Cape Town* (Oceanography, SAEON)
J Huggett, MSc PhD Cape Town (Biological Sciences, DEA)
P B Hulley, PhD Cape Town (Biological Sciences)
K Hutchings, BSc Hons PhD Cape Town (Biological Sciences)
L Hutchings, Hon Prof Cape Town (Biological Sciences)
S Kerwath, MSc Erlangen PhD Rhodes (Biological Sciences, DAFF)
T Lamont, PhD *Cape Town* (Oceanography, DEA)
A Mavume, PhD Cape Town (Oceanography, University Eduardo Mondlane, Mozambique)
P M S Monteiro, MSc PhD Cape Town (Oceanography, CSIR)
B Paterson, BSc Hons Natal PhD Cape Town (Biological Sciences)
G Pitcher, BSc Hons Natal PhD Cape Town (Biological Sciences, DAFF)
C Roy, PhD France (UBO, France)
T Samaai, BSc Hons IC London PHD UWC (Biological Sciences, DEA)
C Savage, MSc Cape Town PhD Stockholm (Biological Sciences)
S Thomalla, PhD *Cape Town* (Oceanography, CSIR)
C van der Lingen, MSc Rhodes PhD Cape Town (Biological Sciences, DEA)
H Verheye, MSc Ghent PhD Cape Town (Biological Sciences, DEA)
D Yemane Ghebrehewit, PhD *Cape Town* (Oceanography, DEA)

SCHEDULE OF COURSES

LECTURE PERIODS

The academic day is divided into lecture periods as follows:

Period 1	08h00 to 08h45	Meridian	13h00 to 13h45
Period 2	09h00 to 09h45	Period 6	14h00 to 14h45
Period 3	10h00 to 10h45	Period 7	15h00 to 15h45
Period 4	11h00 to 11h45	Period 8	16h00 to 16h45
Period 5	12h00 to 12h45	Period 9	17h00 to 17h45

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	COURSE ENTRY REQUIREMENTS
AGE1002S	ARCHAEOLOGY & OUR COMMMON HERITAGE	5 M to Th	By arrangement; F 5th	None
AGE1004S	INTRODUCTION TO EARTH & ENVIRONMENT SCIENCES	To be advised M to F	One prac per week, F 14h00-17h00	See departmental entry
AGE2011S	HUMAN EVOLUTION	2 M to Th	One per week, by arrangement	See departmental entry
AGE2012F	THE FIRST PEOPLE	2 M to Th	One per week, by arrangement	See departmental entry
AGE3006H	DIRECTED READING & RESEARCH	By arrangement	None	See departmental entry
AGE3011F	THE ROOTS OF RECENT AFRICAN IDENTITY	4 M to Th	One per week, by arrangement	See departmental entry
AGE3012S	GLOBAL DIASPORAS & THE ARCHAEOLOGY OF THE HISTORICAL PAST	4 M to Th	One 2-hour prac per week, by arrangement	See departmental entry
AGE3013H	ARCHAEOLOGY IN PRACTICE	See departmental entry	None	See departmental entry
AST1000F	INTRODUCTION TO ASTRONOMY	5 M to F	W 14h00-17h00	None
AST2002H	ASTROPHYSICS	2 M, W, F	W 14h00-17h00	See departmental entry
AST2003H	ASTRONOMICAL TECHNIQUES	2 T, Th	W 14h00-16h30	See departmental entry
AST3002F	STELLAR ASTROPHYSICS	2 M to F	W 14h00-16h00	See departmental entry
AST3003S	GALACTIC & EXTRAGALACTIC ASTROPHYSICS	2 M to F	W 14h00-16h30	See departmental entry

BIO1000F	CELL BIOLOGY	5 M to F	One prac a week, M,Tu,W or Th 14h00-17h00	See departmental entry
BIO1000H	CELL BIOLOGY	5 M to F	One prac a week, Th 14h00-17h00	See departmental entry
BIO1004F	BIOLOGICAL DIVERSITY	5 M to F	One prac a week, Th 14h00-17h00	See departmental entry
BIO1004S	BIOLOGICAL DIVERSITY	5 M to F	One prac a week, M,Tu,W, Th or F 14h00-17h00	See departmental entry
BIO2010F	PRINCIPLES OF ECOLOGY & EVOLUTION	1 M to F	M 14h00-17h00	BIO1000F/H, BIO1004F/S, STA1007S or STA1000F/S highly recommended.
BIO2011S	LIFE ON LAND: ANIMALS	3 M to F	M 14h00-17h00	BIO1000F/H, BIO1004F/S
BIO2012S	LIFE ON LAND : PLANTS	2 M to F	Th 14h00-17h00	BIO1000F/H, BIO1004F/S
BIO2013F	LIFE IN THE SEA	3 M to F	W 14h00-17h00	BIO1000F/H, BIO1004F/S
BIO3002F	MARINE ECOSYSTEMS	1 M to F	W 14h00-17h00	See departmental entry
BIO3013F	GLOBAL CHANGE ECOLOGY	2 M to F	M 14h00-17h00	BIO1000F or BIO1000H, BIO1004F/S, approved 2000-level semester Science course.
BIO3014S	CONSERVATION: GENES, POPULATIONS & BIODIVERSITY	2 M to F	M 14h00-17h00	See departmental entry
BIO3015F	ECOSYSTEM ECOLOGY	5 M to F	By arrangement	BIO2010F
BIO3016S	SYSTEMATICS AND MACROEVOLUTION	5 M to F	Tu 14h00-17h00	BIO2010F
BIO3017S	MARINE RESOURCES	3 M to F	F 14h00-17h00	See departmental entry
CEM1000W	CHEMISTRY 1000	2 or 4 M to W, F	Tu or Th or F, 14h00-17h00	See departmental entry
CEM1009H	CHEMISTRY 1009	4 W to F	W 14h00-17h00	See departmental entry
CEM1010H	CHEMISTRY 1010	4 M to W, F	Tu 14h00-17h00	CEM1009H

CEM2005W	CHEMISTRY II	3 M to F	Th 14h00-17h00	See departmental entry
CEM3005W	CHEMISTRY 3005	3 M to F	Two pracs per week W and F, 14h00-17h00	See departmental entry
CSC1010H	COMPUTER SCIENCE 1010	5 M to F	Th 14h00-17h30	See departmental entry
CSC1011H	COMPUTER SCIENCE 1011	4 M to Th	M 14h00-16h00	CSC1010H, MAM1005H
CSC1015F	COMPUTER SCIENCE 1015	4 or 5 M to F	M or Tu or W, 14h00-17h30	See departmental entry
CSC1016S	COMPUTER SCIENCE 1016	4 or 5 M to F	M or Tu or W, 14h00-17h30	CSC1015F
CSC2001F	COMPUTER SCIENCE 2001	2 M to F	One prac per week, M,Tu,W,Th or F 14h00-18h00	CSC1015F, CSC1016S or CSC1010H, CSC1011H, MAM1000W or equivalent
CSC2002S	COMPUTER SCIENCE 2002	2 M to F	One prac per week, M,Tu,W,Th or F 14h00-18h00	CSC2001F, MAM1000W or equivalent
CSC2003S	COMPUTER GAMES	3 M to F	One prac per week, M,Tu,W,Th or F 14h00-18h00	CSC2001F, MAM1000W or equivalent
CSC3002F	COMPUTER SCIENCE 3002	2 M to F	Two pracs per week, M,Tu,W,Th or F 14h00-18h00	CSC2001F and CSC2002S
CSC3003S	COMPUTER SCIENCE 3003	2 M to F	Two pracs per week, M,Tu,W,Th or F 14h00-18h00	As for CSC3002F
CSC3020H	THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN	3 M to F alternating with CSC3022H	By arrangement,	CSC2001F, CSC2002S and CSC2003S
CSC3022H	C++ WITH APPLICATIONS	3 M to F alternating with CSC3020H	By arrangement	CSC2001F, CSC2002S
EEE3078W	DIGITAL, EMBEDDED & ADAPTIVE SYSTEMS	See Departmental entry	See Departmental entry	See Departmental entry
EGS1003S	GEOGRAPHY, DEVELOPMENT & ENVIRONMENT	2 M to F	M or Tu or Th, 14h00-17h00	See departmental entry

EGS1004S *(not offered in 2015)*	INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES	None	One tut per week, F 14h00-17h00	DP in GEO1009F
EGS2013F	THE PHYSICAL ENVIRONMENT	5 M to F	F 14h00-17h00	GEO1009F or EGS1004S
EGS2014S	CONTEMPORARY URBAN CHALLENGES	5 M to F	F 14h00-17h00	See departmental entry
EGS3012S	ATMOSPHERIC SCIENCE	1 M to F	Tu or W, 14h00-17h00	See departmental entry
EGS3021F	SUSTAINABILITY & ENVIRONMENT	3 M to F	W 14h00-17h00	See departmental entry
EGS3022S	GEOGRAPHIC THOUGHT	4 M to F	W 14h00-17h00	EGS2014S
EGS3023F	ANTHROPOCENE ENVIRONMENTS IN PERSPECTIVE	5 M to F	Th 14h00-17h00	EGS2013F
GEO1006S	INTRO TO MINERALS, ROCKS & STRUCTURE	5 M to F	Th or F 14h00-17h00	See departmental entry
GEO1009F	INTRO TO EARTH & ENVIRONMENTAL SCIENCES	2 M to F	One prac a week, M or Tu or Th or F, 14h00-17h00	See departmental entry
GEO2001F	MINERALOGY & CRYSTALLOGRAPHY	2 M to F	W 14h00-17h00	See departmental entry
GEO2004S	PHYSICAL GEOLOGY	2 M to F	W 14h00-17h00	GEO2001F
GEO2005X	FIELD GEOLOGY & GEOLOGICAL MAPPING	None	See departmental entry	GEO1006S, GEO2004S (co-requisite)
GEO3001S	STRATIGRAPHY & ECONOMIC GEOLOGY	2 M to F	Two pracs per week Tu and Th 14h00-17h00	GEO2004S, DP in GEO3005F
GEO3005F	PETROLOGY & STRUCTURAL GEOLOGY	2 M to F	Two pracs per week Tu and Th 14h00-17h00	GEO2001F, GEO2004S,
HUB2019F	INTEGRATED ANAT & PHYSIO SCIENCES A	1 M to F	M or Tu, 14h00-17h00	CEM1000W (or equivalent), BIO1000W
HUB2021S	INTEGRATED ANAT & PHYSIO SCIENCES B	1 M to F	M or Tu, 14h00-17h00	HUB2019F or equivalent

HUB3006F	APPLIED HUMAN BIOLOGY	1 M to F	W or Th, 14h00-17h00	HUB2021S
HUB3007S	HUMAN NEUROSCIENCES	1 M to F	W or Th, 14h00-17h00	HUB3006F or equivalent
MAM1000W	MATHEMATICS 1000	1 or 3, M to F	One 2-hour tutorial per week	See departmental entry
MAM1004F	MATHEMATICS 1004	1 M to F	M or W 14h00-16h00	See departmental entry
MAM1004S	MATHEMATICS 1004	Meridian M to F	By arrangement M or W	See departmental entry
MAM1005H	MATHEMATICS 1005	1or 3 M to Th	F 8h00-9h00, M 14h00-16h00	See departmental entry
MAM1006H	MATHEMATICS 1006	1, three days per week	1, two days per week	See departmental entry
MAM1019H	FUNDAMENTALS OF MATHEMATICS	Meridian	W 13h00-14h00	See departmental entry
MAM1043H	MODELLING & APPLIED COMPUTING	2 M to F	One hour per week	See departmental entry
MAM1044H	DYNAMICS	2 M to F	Every second F 14h00-16h00	See departmental entry
MAM2000W	MATHEMATICS 2000	5 M to F with options in 4th	Th or F 14h00-16h00	MAM1000W or equivalent
MAM2001H, MAM2004H MAM2002S	MATHEMATICS 2001, 2004 & 2002	5 M to F with options in 4th	Th or F 14h00-16h00	MAM1000W or equivalent
MAM2046W	APPLIED MATHEMATICS 2046	3 M to F	Th 14h00-16h00	See departmental entry
MAM2047H	APPLIED MATHEMATICS 2047	See departmental entry	Th 14h00-16h00	MAM1043H, MAM1044H and MAM1000W
MAM2048H	APPLIED MATHEMATICS 2048	See departmental entry	Th 14h00-16h00	MAM2047H
MAM3000W	MATHEMATICS 3000	5 M to F with options in 4th	F 14h00-17h00	MAM2000W
MAM3001W	MATHEMATICS 3001	5 M to F with options in 4th	F 14h00-17h00	MAM2000W
MAM3002H and MAM3003S	MATHEMATICS 3002 & MATHEMATICS 3003	5 M to Th with options in 4th	F 14h00-17h00	MAM2000W
MAM3040W	APPLIED MATHEMATICS 3040	3 M to F	Th 14h00-16h00	See departmental entry
MAM3041H	APPLIED MATHEMATICS 3041	See departmental entry	Th 14h00-16h00	See departmental entry

MAM3048H	APPLIED MATHEMATICS 3048	See departmental entry	Th 14h00-16h00	MAM3040W
MCB3012Z	RESEARCH PROJECT IN MOLECULAR & CELL BIOLOGY	None	Two afternoons per week	See departmental entry
MCB2020F	BIOLOGICAL INFORMATION TRANSFER	4 M to F	Th or F 14h00-17h00	CEM1000W or equivalent, BIO1000F and BIO1004F/S
MCB2021F	MOLECULAR BIOSCIENCE	5 M to F	M or Tu 14h00-17h00	CEM1000W or equivalent, BIO1000F and BIO1004F/S
MCB2022S	METABOLISM AND BIOENGINEERING	5 M to F	M or Tu 14h00-17h00	MCB2020F, MCB2021F
MCB2023S	FUNCTIONAL GENETICS	4 M to F	Th or F 14h00-17h00	MCB2020F, MCB2021F
MCB3023S	MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT	4 M to F	One per week by arrangement	See departmental entry
MCB3024S	DEFENCE & DISEASE	5 M to F	One per week by arrangement	See departmental entry
MCB3025F	STRUCTURAL & CHEMICAL BIOLOGY	5 M to F	M or Tu 14h00-17h00	See departmental entry
MCB3026F	MOLECULAR GENETICS & GENOMICS	4 M TO F	Th or F 14h00-17h00	See departmental entry
PHY1004W	MATTER & INTERACTIONS	3 M to F	Tu 14h00-17h00	See departmental entry
PHY1023H	PRINCIPLES OF PHYSICS A	3 M to F	Tu 14h00-17h00	See departmental entry
PHY1032F	GENERAL PHYSICS B	3 M to F	W 14h00-17h00	PHY1023H or PHY1031F
PHY1031F	GENERAL PHYSICS A	3 M to F	M or W or Th, 14h00-17h00	See departmental entry
PHY1032S	GENERAL PHYSICS B	3 M to F	M or W or Th, 14h00-17h00	PHY1031F or PHY1023H
PHY2004W	INTERMEDIATE PHYSICS	4 M to F	Prac M 14h00-17h00 Tut Tu 14h00-16h00	See departmental entry
PHY3004W	ADVANCED PHYSICS	4 M to F	Prac M 14h00-17h00 Tut Tu 14h00-16h00	See departmental entry
SEA2004F	PRINCIPLES OF OCEANOGRAPHY	4 M to F	Tu 14h00-17h00	See departmental entry
SEA2005S	MARINE SYSTEMS	4 M to F	Tu 14h00-17h00	See departmental entry

SEA3004S	OCEAN & ATMOSPHERE DYNAMICS	4 M to F	M 14h00-17h00	See departmental entry
STA1000F AND STA1000S	INTRODUCTORY STATISTICS	See departmental entry	By arrangement	See departmental entry
STA1006S	MATHEMATICAL STATISTICS I	1 and 4 M to F	One per week by arrangement	See departmental entry
STA1007S	BIONUMERACY	1 M to F	One per week by arrangement	See departmental entry
STA2004F	STATISTICAL THEORY & INFERENCE	1 M to F	One per week by arrangement	MAM1000W and STA1006S
STA2005S	LINEAR MODELS	1 M to F	One per week by arrangement	DP for STA2004F
STA2007H	APPLIED STATISTICAL MODELLING	See departmental entry	One per week by arrangement	See departmental entry
STA2020F	APPLIED STATISTICS	1 or 5 M to Th	One per week by arrangement	See departmental entry
STA2020S	APPLIED STATISTICS	7 M to Th	F 08h00-09h00	See departmental entry
STA2030S	THEORY OF STATISTICS	1 M to Th	By arrangement	See departmental entry
STA3022F	RESEARCH & SURVEY STATISTICS	4 M to Th	By arrangement	See departmental entry
STA3030F	INFERENTIAL STATISTICS	1 M to Th	By arrangement	See departmental entry
STA3041F	MARKOV PROCESSES & TIME SERIES	1 M to F	Tutorials and practicals by arrangement	See departmental entry
STA3043S	DECISION THEORY & GLM	1 M to F	Two per week by arrangement	See departmental entry
STA3045F	ADVANCED STOCHASTIC PROCESSES	2 M to F	Two per week, by arrangement	See departmental entry
STA3036S	OPERATIONAL RESEARCH TECHNIQUES	3 M to Th	By arrangement	See departmental entry

SCIENCE FACULTY COURSES ARRANGED BY LECTURE PERIOD

COURSE CODE	COURSE TITLE	LECTURE PERIOD	PRACTICAL/ TUTORIAL TIMES
First period, first semester			
BIO2010F	PRINCIPLES OF ECOLOGY & EVOLUTION	1	M 14h00-17h00
BIO3002F	MARINE ECOSYSTEMS	1	W 14h00-17h00
HUB2019F	INTERGRATED ANATOMY & PHYSIO SCIENCES A	1	M or Tu, 14h00-17h00
HUB3006F	APPLIED HUMAN BIOLOGY	1	W or Th, 14h00-17h00
MAM1000W	MATHEMATICS 1000, two days per week, two days per week	1/3	One 2-hour tutorial per week
MAM1004F	MATHEMATICS 1004	1	M or W, 14h00-16h00
MAM1005H	MATHEMATICS 1005	1/3	M 14h00-17h00 F 08h00-09h00
MAM1006H	MATHEMATICS 1006	1	One hour per week
STA1000F	INTRODUCTORY STATISTICS	1	One per week by arrangement
STA2004F	STATISTICAL THEORY & INFERENCE	1	One per week by arrangment
STA2020F	BUSINESS STATISTICS	1	By arrangement
STA3041F	MARKOV PROCESSES & TIME SERIES	1	By arrangement

COURSE CODE	COURSE TITLE	LECTURE PERIOD	PRACTICAL/ TUTORIAL TIMES
First period, second semester			
EGS3012S	ATMOSPHERIC SCIENCE	1	Tu or W, 14h00-17h00
HUB2021S	INTERGRATED ANATOMY & PHYSIO SCIENCES B	1	M or Tu, 14h00-17h00
HUB3007S	HUMAN NEUROSCIENCES	1	W or Th, 14h00-17h00
STA1000S	INRODUCTORY STATISTICS	1	One per week by arrangement
STA1006S	MATHEMATICAL STATISTICS I	1	One per week by arrangement
STA1007S	BIONUMERACY	1	One per week by arrangement
STA2005S	LINEAR MODELS	1	One per week by arrangement
STA2030S	THEORY OF STATISTICS	1	By arrangement
STA3043S	DECISION THEORY & GLM	1	Two tutorials per week by arrangement

Second period, first semester			
AGE2012F	THE FIRST PEOPLE	2	One per week by arrangement
AST2002H	ASTROPHYSICS	2	W 14h00-17h00
AST2003H	ASTRONOMICAL TECHNIQUES	2	W 14h00-16h30
AST3002F	STELLAR ASTROPHYSICS	2	W 14h00-16h00
BIO3013F	GLOBAL CHANGE ECOLOGY	2	M 14h00-17h00
CEM1000W	CHEMISTRY 1000	2/4	Tu, Th or F 14h00-17h00
CSC2001F	COMPUTER SCIENCE 2001	2	M to F 14h00-18h00
CSC3002F	COMPUTER SCIENCE 3002	2	M to F 14h00-18h00
GEO1009F	INTRO TO EARTH & ENVIRONMENTAL SCIENCES	2	M, Tu, Th or F 14h00-17h00
GEO2001F	MINERALOGY & CRYSTALLOGRAPHY	2	W 14h00-17h00
GEO3005F	PETROLOGY & STRUCTURAL GEOLOGY	2	Tu and Th, 14h00-17h00
MAM1043H	MODELLING & APPLIED COMPUTING	2	By arrangement
MAM1044H	DYNAMICS	2	By arrangement
PHY1025F	PHYSICS 1025	2	M to F
STA2007H	APPLIED STATISTICAL MODELLING	2	By arrangement
STA3045F	MARKOV PROCESSES & ADVANCED TIME SERIES	2	By arrangement

Second period, second semester			
AGE2011S	HUMAN EVOLUTION	2	By arrangement
AST3003S	GALACTIC & EXTRAGALACTIC ASTROPHYSICS	2	W 14h00-16h30
BIO2012S	LIFE ON LAND : PLANTS	2	Th 14h00-17h00
BIO3014S	CONSERVATION: GENES, POPULATIONS & BIODIVERSITY	2	M 14h00-17h00
CSC2002S	COMPUTER SCIENCE 2002	2	M to F 14h00-18h00
CSC3003S	COMPUTER SCIENCE 3003	2	M to F 14h00-18h00
EGS1003S	GEOGRAPHY, DEVELOPMENT & ENVIRONMENT	2	M, Tu or Th 14h00-17h00
GEO2004S	PHYSICAL GEOLOGY	2	W 14h00-17h00
GEO3001S	STRATIGRAPHY & ECONOMIC GEOLOGY	2	Tu and Th, 14h00-17h00
MCB3022S	ADVANCED BIOTECHNOLOGY	2	W 14h00-17h00

Third period, first semester			
BIO2013F	LIFE IN THE SEA	3	W 14h00-17h00
CEM2005W	CHEMISTRY II	3	Th 14h00-17h00
CEM3005W	CHEMISTRY 3005	3	W and F, 14h00-17h00
CSC3020H	THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN	3	By arrangement
CSC3022H	C++ WITH APPLICATIONS	3	By arrangement
EGS3021F	SUSTAINABILITY & ENVIRONMENT	3	W 14h00-17h00
MAM1000W	MATHEMATICS 1000	3	By arrangement
MAM1005H	MATHEMATICS 1005	1/3	By arrangement
MAM2046W	APPLIED MATHEMATICS 2046	3	Th 14h00-16h00
MAM2047H	APPLIED MATHEMATICS 2047	3	Th 14h00-16h00
MAM2048H	APPLIED MATHEMATICS 2048	3	Th 14h00-16h00
MAM3040W	APPLIED MATHEMATICS 3040	3	Th 14h00-16h00
MAM3041H	APPLIED MATHEMATICS 3041	3	Th 14h00-16h00
MAM3048H	APPLIED MATHEMATICS 3048	3	Th 14h00-16h00
PHY1004W	MATTER & INTERACTIONS	3	Tu 14h00 to 17h00
PHY1023H	PRINCIPLES OF PHYSICS A	3	Tu 14h00-17h00
PHY1031F	GENERAL PHYSICS A	3	M, W or Th 14h00-17h00
PHY1032F	GENERAL PHYSICS B	3	W 14h00-17h00

Third period, second semester			
BIO2011S	LIFE ON LAND: ANIMALS	3	M 14h00-17h00
BIO3017S	MARINE RESOURCES	3	F 14h00-17h00
CEM2008S	ORGANIC & INORGANIC CHEMISTRY	3	M or Th, 14h00-17h00
CSC2003S	COMPUTER GAMES	3	M to F 14h00-18h00
PHY1032S	GENERAL PHYSICS B	3	M, W or Th 14h00-17h00
STA3036S	OPERATIONAL RESEARCH TECHNIQUES	3	M to F

Fourth period, first semester			
AGE3011F	THE ROOTS OF RECENT AFRICAN IDENTITIES	4	By arrangement
CEM1000W	CHEMISTRY 1000	2/4	Tu, Th or F, 14h00-17h00
CEM1009H	CHEMISTRY 1009	4	W 14h00-17h00
CEM1010H	CHEMISTRY 1010	4	Tu 14h00-17h00
CSC1011H	COMPUTER SCIENCE 1011	4	M 14h00-16h00
CSC1015F	COMPUTER SCIENCE 1015	4/5	M, Tu or W 14h00-17h30
MCB2020F	BIOLOGICAL INFORMATION TRANSFER	4	Th or F 14h00-17h00
MCB3026F	MOLECULAR GENETICS & GENOMICS	4	Th or F 14h00-17h00
PHY2004W	INTERMEDIATE PHYSICS	4	M 14h00-17h00 and Tu 14h00-16h00
PHY3004W	ADVANCED PHYSICS	4	M 14h00-17h00 and Tu 14h00-16h00
SEA2004F	PRINCIPLES OF OCEANOGRAPHY	4	Tu 14h00-17h00
SEA3004F	OCEAN & ATMOSPHERE DYNAMICS	4	M 14h00-17h00
STA3022F	RESEARCH & SURVEY STATISTICS	4	By arrangement

Fourth period, second semester			
AGE3012S	GLOBAL DIASPORAS & THE ARCHAEOLOGY OF THE HISTORICAL PAST	4	By arrangement
CSC1016S	COMPUTER SCIENCE 1016	4/5	M, Tu or W 14h00-17h30
EGS3022S	GEOGRAPHIC THOUGHT	4	W 14h00-17h00
MCB2023S	FUNCTIONAL GENETICS	4	Th or F 14h00-17h00
MCB3023S	MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT	4	By arrangement
PHY2004W	INTERMEDIATE PHYSICS	4	M 14h00-17h00 and Tu 14h00-16h00
PHY3004W	ADVANCED PHYSICS	4	M 14h00-17h00 and Tu 14h00-16h00
SEA2005S	MARINE SYSTEMS	4	Tu 14h00-17h00
STA1006S	MATHEMATICAL STATISTICS I	4	By arrangement

Fifth period, first semester			
AST1000F	INTRODUCTION TO ASTRONOMY	5	W 14h00-17h00
BIO1000F	CELL BIOLOGY	5	M, Tu, W or Th 14h00-17h00
BIO1000H	CELL BIOLOGY	5	Th 14h00-17h00
BIO1004F	BIOLOGICAL DIVERSITY	5	Th 14h00-17h00
BIO3015F	ECOLOGY	5	By arrangement
CSC1010H	COMPUTER SCIENCE 1010	5	Th 14h00-17h30
CSC1015F	COMPUTER SCIENCE 1015	4/5	M, Tu or W 14h00-17h30
EGS2013F	THE PHYSICAL ENVIRONMENT	5	F 14h00-17h00
EGS3023F	ANTHROPOCENE ENVIRONMENTS IN PERSPECTIVE	5	Th 14h00-17h00
MAM2000W	MATHEMATICS 2000	5	Th or F, 14h00-16h00
MAM2004H	MATHEMATICS 2004	5	Th or F, 14h00-16h00
MAM3000W	MATHEMATICS 3000	5	F 14h00-17h00
MAM3001W	MATHEMATICS 3001	5	F 14h00-17h00
MAM3002H	MATHEMATICS 3002	5	F 14h00-17h00
MCB2021F	MOLECULAR BIOSCIENCE	5	M or Tu 14h00-17h00
MCB3025F	STRUCTURAL & CHEMICAL BIOLOGY	5	M or Tu 14h00-17h00
STA2020F	BUSINESS STATISTICS	5	By arrangement

Fifth period, second semester			
AGE1002S	ARCHAEOLOGY & OUR COMMON HERITAGE	5	F 12h00-13h00
BIO1004S	BIOLOGICAL DIVERSITY	5	M, Tu, W, Th or F 14h00-17h00
BIO3016S	SYSTEMATICS AND MACROEVOLUTION	5	Tu 14h00-17h00
CSC1016S	COMPUTER SCIENCE 1016	4/5	M, Tu or W 14h00-17h30
EGS2014S	CONTEMPORARY URBAN CHALLENGES	5	F 14h00-17h00
GEO1006S	INTRODUCTION TO MINERALS, ROCKS & STRUCTURE	5	Th or F 14h00-17h00
MAM2002S	MATHEMATICS 2002	5	Th or F, 14h00-16h00
MAM3003S	MATHEMATICS 3003	5	F 14h00-17h00
MCB2022S	METABOLISM AND BIOENGINEERING	5	M or Tu 14h00-17h00
MCB3024S	DEFENCE & DISEASE	5	By arrangement

Various			
AGE1004S	INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES	To be advised	F 14h00-17h00
AGE3006H	DIRECTED READING & RESEARCH	By arrangement	None
MAM1019H	FUNDAMENTALS OF MATHEMATICS	Meridian	W 13h00-14h00
MAM1004S	MATHEMATICS 1004	Meridian	By arrangement
STA1000F/S	INTRODUCTORY STATISTICS	See departmental entry	By arrangement

ADDITIONAL INFORMATION

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 are Fellows in the Faculty of Science.

Professor I V Barashenkov
Professor S Bourne
Professor K Chibale
Professor A Chinsamy-Turan
Professor T J Egan
Professor J Farrant
Professor G Janelidze

Professor R Kraan-Korteweg
Professor H-P Künzi
Professor A P le Roex
Professor B D Reddy
Professor S H Richardson
Professor E Rybicki
Professor J C Sealy

Distinguished Teachers in the Faculty

The University makes a Distinguished Teacher Award in recognition of the importance of excellence in teaching at all levels in the University. Up to three awards are made annually. The following members (or past members) of the Faculty are recipients of this award:

1983: G M Branch (Zoology)
1984: J H Webb (Mathematics)
1986: B R Davies (Zoology)
1990: H S T Driver (Physics)
1992: J J Conradie (Mathematics)
1992: J E Parkington (Archaeology)
1994: J R Moss (Chemistry)
1996: M J Hall (Archaeology)
1996: M D Picker (Zoology)
1997: N Morrison (Mathematics)
1998: A N Rynhoud (Mathematics)
1998: J A Thomson (Microbiology)
1998: I V Barashenkov (Mathematics)
1998: J U M Jarvis (Zoology)
1999: T Egan (Chemistry)
2000: D L Reid (Geological Sciences)
2001: V Abratt (Molecular & Cell Biology)
2002: J W Lutjeharms (Ocean & Atmosphere Science)
2002: S Oldfield (Environmental & Geographical Science)
2002: A Buffler (CHED/Physics)
2003: D W Gammon (Chemistry)
2004: B Davidowitz (CHED/Chemistry)
2004: S Mundree (Molecular & Cell Biology)
2006: R R Ackermann (Archaeology)
2008: J O'Riain (Zoology)
2009: G Marsden (Computer Science)
2011: G Smith (Chemistry)
2012: Z Woodman (Molecular & Cell Biology)
2014: J Gain (Computer Science)
2014: S Wheaton (Physics)
2015: A West (Biological Sciences)

UCT Book Award

The University makes a Book Award in recognition of the publication of books, written by University staff, that brings credit to the University.

Professor G M Branch	*The Living Shores of South Africa 1985*
Professor G M Branch, Associate Professor C L Griffiths, Mrs M L Branch and Dr L E Beckley	*Two Oceans - A guide to the Marine life of Southern Africa 1995*
Professor B Warner	*Cataclysmic Variable Stars 1997*
Dr P Bruyns	*Stapeliads of Southern Africa & Madagascar 2008*

Prizes

(Further information regarding the value of prizes may be obtained from the Faculty Office.)

Chemistry Prize
Awarded to the best student in second-year Chemistry who will be proceeding to third-year Chemistry.

Computer Science BSG Prizes
Awarded to the best student in each of Computer Science second and third year courses, the best student in the Honours course and for the best Honours project.

Computer Science ENTELECT Prizes
Two prizes, one awarded for Social Responsiveness and another for Achievement

Dick & Dorothy Borcherds Prize
Awarded to the student achieving the highest standard at the end of the second year in Biological Sciences or Astronomy.

Frank Schweitzer Memorial Prize
Awarded to one or more outstanding senior students in Archaeology, at the discretion of the Head of Department.

Gordon Percy Memorial Award
Awarded to the best student in Chemistry Honours.

J Barry Hawthorne Centennial Prize
Awarded to the best student in third-year Geology who will be proceeding to Honours in the Department.

Joseph Arenow Prize plus Science Faculty PhD medal
Awarded at the discretion of the Dean for outstanding, original postgraduate research.

Merck Prize plus medal
Awarded to the best student in third-year Chemistry who will be proceeding to Honours in the Department.

Merck Prize
Best student in Molecular & Cell Biology Honours

Purcell Memorial Prize
Awarded for the best MSc or PhD dissertation dealing with a Zoological subject

Steve Driver Prize
Awarded to the student producing the best laboratory work in a second-year Physics course.

The Mathematics & Applied Mathematics Webb-Ellis trophy
Awarded to the best student in first year with double majors in Applied Mathematics and Mathematics.

Scholarships

(Further information regarding the value of scholarships may be obtained from the Faculty Office.)

Dr Jacob Burlak Memorial Scholarship Tenure 1 year
Awarded to the best student in second-year Mathematics, registered in the Faculty of Science, who will be proceeding to third-year Mathematics.

Myer Levinson (Emdin) Scholarship Tenure 2 years
Awarded every second year to a candidate who has obtained the BSc Hons degree in the first class and who proposes to pursue further study.

Twamley Undergraduate Scholarship Tenure 1 year
Awarded for the most outstanding academic performance at the end of the first year of study.

Class Medals

A class medal may be awarded to a student who has demonstrated special ability in a course, but an award shall not be made if there is no candidate of sufficient merit. Only one medal shall be awarded for each course. Students undertaking a course for a second time are not eligible.

Dean's Merit List

Students who obtain consistently good results may be included on the Dean's Merit List, issued annually, in recognition of their academic achievements. To qualify for the Dean's Merit List in a particular year, a student must normally:
(a)   have taken the equivalent of the following minimum number of courses:
        BSc degree:
        first year: four full courses
        second year: three full courses, two of which must be senior courses
        third year: two full courses, one of which must be a third-year course
        [GEPS – Refer to 2012 Handbook]
(b)   have passed all these courses in the year;
(c)   not be repeating courses;
(d)   have obtained a weighted average of 70% or above for the courses taken.

Minimum requirements for admission to an undergraduate degree

A candidate for the degree of bachelor must have obtained a National Senior Certificate endorsed by Umalusi to state that he or she has met the minimum admission requirements for degree study, or a matriculation certificate or have obtained a Senior Certificate endorsed to state that he or she has met the matriculation requirements or an exemption certificate issued by the Matriculation Board. Council and Senate may, in addition, prescribe, as a prerequisite for admission to any programme or course, the attaining of a specified standard in specified subjects at the matriculation or equivalent examination. (Where these have been prescribed, they are set out in the Admission Policy.) The Matriculation Board's website address is http://hesa-enrol.ac.za/mb
Further information on Faculty Course entry requirements can be found in Book 1, Information for Applicants for Undergraduate Degrees and Diplomas and in the Undergraduate Prospectus.

Non-Science electives in the Bachelor of Science (BSc) degree

Courses from other Faculties may be taken as electives, but subject to the following constraints and approval by a Student Advisor or Deputy Dean:

- Only courses with an NQF credit value of 18 or more will be counted (a first year half course in the Science Faculty has an NQF credit value of 18). Courses are not summed.
- If the equivalent of two or less full Science courses (maximum 72 level 6 NQF credits) are replaced by courses from another Faculty, then any courses not specifically excluded by Science Faculty rules (see below) can be chosen.
- If more than two full year Science courses are replaced with electives from another Faculty, then the further electives must form part of a hierarchical sequence linked to those already completed.

Specific exclusions

- AHS (Allied Health Services) courses do not count
- Architecture & Planning courses do not count (i.e. APG courses other than Geomatics)
- DOH1002F; DOH1004S; DOH1005F do not count
- DRM (Drama) courses do not count
- FIN (Fine Art) courses do not count
- HUB courses (other than those offered for Human Physiology major) do not count
- INF1002F/S/H; INF1003S do not count if credit is given for CSC1015F/1016S; nor do they give exemption from CSC1015/1016
- INF2004F, INF2008F and INF2010S do not count together with senior CSC courses
- STA1001F/S does not count
- CHE1004W/CHE1005W, CIV1004W, CON1004W, EEE1004W or MEC1004W counts as a half course for students transferring from the Faculty of EBE, but these courses may NOT be taken by students registered in the Science Faculty.
- Professional Communication courses do not count.

Courses taught by the Science Faculty for students in other Faculties

Courses taught by the Faculty of Science for other Faculties may not be taken by students registered in Science. However, students transferring into Science from other Faculties may be able to count such courses towards their Science curriculum as Science courses, with the credit weighting and equivalence established by the Departments concerned – see below.

Transferring students

GEO1008F counts as a Science half credit, but credit will not be given for both GEO1008F and GEO1006S

MAM1010F/S counts as a half course credit (CX MAM1005H)

MAM1012F/S counts as a half course credit (CX MAM1006H)

MAM1017F/S counts as a half course if result is 70% or more (CX MAM1005H)

MAM1018F/S counts as a half course if result is 70% or more (CX MAM1006H)

MAM1017F/S plus MAM1018F/S count as full course credit if both are passed with an average mark for the two courses of 70% or more (CX MAM1000W)

MAM1017F/S plus MAM1018F/S count as a half course if the result is less than 70% (CX MAM1005H)

MAM1017F/S plus MAM1018F/S plus MAM2083F/S count as a full course credit if the average result is less than 70% (CX MAM1000W)

MAM1020F/S counts as a half course credit (CX MAM1005H)

MAM1021F/S counts as a half course credit (CR MAM1006H)

MAM1020F/S plus MAM1021F/S with an average of 60% or more is required for entry into MAM2000W (CX MAM1000W)

MAM2083F/S plus MAM2084F/S counts as a senior half course. Neither MAM2083 nor MAM2084 counts on their own. (Entry to MAM3000W will be decided on an individual basis, and will require a pass in both MAM2083 and MAM2084 plus registration for one or two MAM2000W modules).

PHY1012F/S (16 credits) counts as a half course if result is 70% or more; PHY1012F/S (18 credits) counts as a half course (CX PHY1031F)

PHY1013F/S (16 credits) counts as a half course if result is 70% or more; PHY1013F/S (18 credits) counts as a half course (CX PHY1032S)

PHY1012F/S plus PHY1013F/S (16 or 18 credits) count as full course credit if both are passed with an average mark for the two courses of 75% or more (CX PHY1004W)

PHY1012F/S (16 credits) plus PHY1013F/S (16 credits) count as half course credit if both are passed with an average mark for the two courses of less than 75%

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