Mission Statement

UCT aspires to become a premier academic meeting point between South Africa, the rest of Africa and the world. Taking advantage of expanding global networks and our distinct vantage point in Africa, we are committed, through innovative research and scholarship, to grapple with the key issues of our natural and social worlds. We aim to produce graduates whose qualifications are internationally recognised and locally applicable, underpinned by values of engaged citizenship and social justice. UCT will promote diversity and transformation within our institution and beyond, including growing the next generation of academics.

Foundation statement underpinning the mission statement

Our research-led identity is shaped by a commitment to:

- academic freedom as the prerequisite to fostering intellectual debate and free inquiry;
- ensuring that research informs all our activities including teaching, learning and service to the community;
- advancing and disseminating knowledge that addresses the key challenges facing society - South African, continental and global;
- protecting "curiosity driven research";
- nurturing and valuing creativity in the sciences and arts including the performing and creative arts;
- stimulating international linkages of researchers and research groupings.

We strive to provide a superior quality educational experience for undergraduate and postgraduate students through:

- providing an intellectually and socially stimulating environment;
- inspired and dedicated teaching and learning;
- exposure to the excitement of creating new knowledge;
- stimulating the love of lifelong learning;
- the cultivation of competencies for global citizenship;
- supporting programmes that stimulate the social consciousness of students;
- offering access to courses outside the conventional curricula;
- attracting a culturally and internationally diverse community of scholars;
- guaranteeing internationally competitive qualifications;
- offering a rich array of social, cultural, sporting and leadership opportunities;
- providing an enabling physical and operational environment.

In advancing UCT as an Afropolitan university, we will:

- expand our expertise on Africa and offer it to the world;
- extend our networks on the continent, along with our global connections and partnerships;
- promote student and staff exchanges and collaborative research and postgraduate programmes;
- engage critically with Africa's intellectuals and world views in teaching and research;
- contribute to strengthening higher education on our continent.

We strive to provide an environment for our diverse student and staff community that:

- promotes a more equitable and non-racial society;
- supports redress in regard to past injustices;
- is affirming and inclusive of all staff and students and promotes diversity in demographics, skills and backgrounds;
- offers individual development opportunities to all staff;
- is welcoming as a meeting space for scholars from Africa and around the world.

UNIVERSITY OF CAPE TOWN

FACULTY OF SCIENCE

2013

Postal Address: University of Cape Town
Private Bag X3
7701 RONDEBOSCH

Dean's & Faculty Offices: Room 6.43, P D Hahn Building
28 Chemistry Road
Upper Campus

Office Hours: Mondays to Fridays: 08h30 - 16h30

Fax: (021) 650 2710
(021) 650 4511

Telephones:

Dean's Office	(021) 650 2711
Faculty Office	(021) 650 2712/3023
Accounts and Fees	(021) 650 4076/2134
Admissions	(021) 650 2128

Internet:

UCT's Home Page	http://www.uct.ac.za
Faculty Website	http://www.science.uct.ac.za
Faculty Office	sci-science@uct.ac.za
International Academic Programmes Office	int-iapo@uct.ac.za

Information for prospective international students can be obtained at http://www.uct.ac.za/about/iapo/overview/welcome/

The Admissions Office and Student Records Office are located in the Masinge Student Administration 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:	Information for applicants for undergraduate degrees and diplomas
Book 2:	Authorities and information of record
Book 3:	General rules and policies
Book 4:	Academic calendar and meetings
Book 5:	Student support and services
Books 6-11:	Handbooks of the Faculties of Commerce, Engineering and the Built Environment, Health Sciences, Humanities, Law, Science
Book 12:	Student fees
Book 13:	Financial assistance for undergraduate students
Book 14:	Financial assistance for postgraduate students

CONTENTS

The University has made every effort to ensure the accuracy of the information in its handbooks. However, we reserve the right at any time, if circumstances dictate, to

(i) make alterations or changes to any of the published details of the opportunities on offer; or

(ii) add to or withdraw any of the opportunities on offer.

Our students are given every assurance that changes to opportunities will only be made under compelling circumstances and students will be fully informed as soon as possible.

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 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 entrance 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: **Rm 6.46 P D Hahn Building**
Professor A P le Roex, BSc *Stell* BSc (Hons) PhD *Cape Town* sci-dean@uct.ac.za

Assistant Dean: **Rm 6.42 P D Hahn Building**
Associate Professor D W Gammon, PhD HDE *Cape Town* david.gammon@uct.ac.za

Deputy Dean, Undergraduate studies: **Rm 6.41 P D Hahn Building**
Professor S A Bourne, BSc (Hons) PhD *Cape Town* susan.bourne@uct.ac.za

Deputy Dean, Postgraduate studies: **Rm 3.20 J Day Zoology Building**
Associate Professor M J O'Riain, BSc (Hons) PhD *Cape Town* justin.oriain@uct.ac.za

Secretary to the Dean: **Rm 6.46 P D Hahn Building**
E Taladia elhaam.taladia@uct.ac.za

Faculty Manager (Academic): **Rm 6.56 P D Hahn Building**
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Deputy Faculty Manager (Academic): **Rm 6.54 P D Hahn Building**
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Senior Administrative Officer, Undergraduate: **Rm 6.54 P D Hahn Building**
T Mohamed, BSc BCom (Hons) *UWC* tasneem.mohamed@uct.ac.za

Administrative Officer, Postgraduate: **Rm 6.57 P D Hahn Building**
Y Hall, BSocSci *Cape Town* yolandah.hall@uct.ac.za

Administrative Officer: **Rm 6.54 P D Hahn Building**
S Moodley shoma.moodley@uct.ac.za

Senior Secretaries/Receptionists: **Rm 6.54 P D Hahn Building**
L Masella leverne.masella@uct.ac.za
L Morgan lucrishia.morgan@uct.ac.za
C Richfield, BSocSci (Hons) *Cape Town* clare.richfield@uct.ac.za

Student Development Officer: **Rm 6.53 P D Hahn Building**
To be advised

Manager: Faculty Communications, Development & Marketing: **Rm 6.51 P D Hahn Building**
K Thomson, BA (Hons) HDE *Cape Town* katherine.thomson@uct.ac.za

Schools Liaison & Recruitment Officer: **Rm 6.51 P D Hahn Building**
S Smith, BCom (Hons) *UWC* shanaaz.smith@uct.ac.za

2 GENERAL INFORMATION

Faculty Manager (Finance): S Custers, BSc *Cape Town* BCompt BCom (Hons) *UNISA*	**Rm 6.47 P D Hahn Building** sue.custers@uct.ac.za
Assistant Faculty Manager (Finance): T Shounyane	**Rm 6.45 P D Hahn Building** tebogo.shounyane@uct.ac.za
Senior Faculty Finance Officers: S Champion, Nat.Dipl Fin Inf Sys *CPUT* S Kriel, BCom *UCT*	**Rm 6.44 P D Hahn Building** shaahid.champion@uct.ac.za shuaib.kriel@uct.ac.za
Assistant Faculty Finance Officer: J Wyngaard, BCom *UWC*	**Rm 6.44 P D Hahn Building** jody.wyngaard@uct.ac.za
Senior Human Resource Adviser: A Tilney	 ann.tilney@uct.ac.za
Human Resource Adviser: N Maharaj, BCom *Natal* Dipl HR Management *Natal*	**Rm 6.48 P D Hahn Building** nalinee.maharaj@uct.ac.za

Senior Student Advisers in the Faculty

General
Associate Professor A Buffler — Rm 503 R W James Building, andy.buffler@uct.ac.za

Information Technology & Statistics
Associate Professor S Berman — Rm 317 Computer Science Building, sonia.berman@uct.ac.za

Biology, Earth & Environmental Sciences
Professor J J Bolton — Rm 2.14 H W Pearson Building, john.bolton@uct.ac.za

Chemical, Molecular & Cellular Sciences
Associate Professor N Ravenscroft — Rm 6.09 P D Hahn Building, neil.ravenscroft@uct.ac.za

Mathematics, Physics & Astronomy
Associate Professor C Gilmour — Rm 314 Mathematics Building, christopher.gilmour@uct.ac.za

General Entry Programme for Science (GEPS)
Associate Professor B Davidowitz — Rm 5.22 P D Hahn Building, bette.davidowitz@uct.ac.za

Extended Degree Programme (EDP)
Associate Professor D W Gammon — Rm 6.42 P D Hahn Building, david.gammon@uct.ac.za

Student Advisers in the Faculty

Information Technology & Statistics

Dr B Erni — Rm 6.64 P D Hahn Building, birgit.erni@uct.ac.za

Dr F Gumedze — Rm 6.63 P D Hahn Building, freedom.gumedze@uct.ac.za

Associate Professor M Kuttel — Rm 304.02 Computer Science Building, student-advisors@cs.uct.ac.za

Professor G Marsden — Rm 304 Computer Science Building, student-advisors@cs.uct.ac.za

Biology, Earth & Environmental Sciences

Dr B J Abiodun — Rm 4.10 Environmental & Geographical Sciences Building, babatunde.abiodun@uct.ac.za

Dr A M Muasya — Rm 3.18.2 H W Pearson Building, muthama.muasya@uct.ac.za

Dr C Reed — Rm 3.25 John Day Zoology Building, cecile.reed@uct.ac.za

Dr E Bordy — Room 501 Geological Science Building, emese.bordy@uct.ac.za

Chemical, Molecular & Cellular Sciences

Professor N Illing	Rm 426 Molecular Biology Building nicola.illing@uct.ac.za
Dr P Meyers	Rm 202 Molecular Biology Building paul.meyers@uct.ac.za
Dr G Smith	Rm 7.08 P D Hahn Building gregory.smith@uuct.ac.za

Mathematics, Physics & Astronomy

Dr D Solomons	Rm 323.1 Mathematics Building deon.solomons@uct.ac.za
Dr S Wheaton	Rm 4T4 R W James Building spencer.wheaton@uct.ac.za

Extended Degree Programme (EDP)

Mr G Stewart	Rm 304 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 (Botany)	H W Pearson Building	(021) 650 2447
Biological Sciences (Zoology)	J Day Building	(021) 650 3603
Chemistry	P D Hahn Building	(021) 650 2446
Computer Science	Computer Science Building	(021) 650 2663
Environmental & Geographical Science	Shell 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 2712/3023

Fee problems/accounts	Central Fees Office, Kramer Law Building	(021) 650 2142
Fee payments	Cashier's office, Kramer Law Buildin (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 4, Room 4.18 and may be contacted via email: uct_ssc@uct.ac.za.

Postgraduates:
The Science Postgraduate Students Association (SPGSA) is elected by the postgraduate students in the Faculty of Science. The SPGSA represents the postgraduate students on the executive committee of the University PGSA. The Chairperson of the SPGSA may be contacted via email: sciencepgsa@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 (PGSC) 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 Masters 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 2013

1st Semester

1st Quarter	11 February to 20 March
Mid-term break	21 March to 1 April
2nd Quarter	2 April to 07 June

2nd Semester

3rd Quarter	15 July to 30 August
Mid-term Break	31 August to 08 September
4th Quarter	09 September to 17 December

Explanatory Notes on Course Codes

The curriculum for the bachelor 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 degree may be completed in one semester (ie. a "half-course") or over two semesters (ie. a "full-course"). In this respect, the following codes are used:

F	1st semester half-course
S	2nd 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.

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 degree in the Faculty of Science.

Essential Terminology

Pre-requisite courses

Most courses at UCT (except some 1st 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 G25
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 22

Deferred examinations
Refer to General Rules G 26 & 27

DEGREES OFFERED IN THE FACULTY

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

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);

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 students

FB4.1 The Senate may permit a first-year student who has registered for a bachelor 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.

Students other than first-year students

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, may 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 and a half courses or the equivalent, including one course specific to a major, 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 entrance 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 six 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 Science course in Mathematics (18 HEQF credits, level 5) plus a half Science course in Statistics (18 HEQF credits, level 5), or a full Science course in Mathematics (36 HEQF 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, but subject to the following constraints and approval by a Student Adviser or Deputy Dean:

- Only courses with an HEQF credit value of 18 or more will be counted (a first year half course in the Science Faculty has an HEQF credit value of 18).
- If the equivalent of two or less full Science courses are replaced by courses from another Faculty, then any courses not specifically excluded by Science Faculty rules 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.

- 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 the section "Additional Information" at the back of this book for details on non-Science elective 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	Environmental & Geographical Science
Applied Mathematics	Genetics
Archaeology	Geology
Astrophysics	Human Physiology
Biochemistry	Marine Biology
Business Computing*	Mathematical Statistics
Chemistry	Mathematics
Computer Science	Microbiology
Computer Engineering*	Ocean & Atmosphere Science
Computer Games Development*	Physics
Ecology & Evolution	

* 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. A number of majors (currently Biochemistry, Genetics, Geology, Human Physiology and Microbiology) have limits on the number of students accepted into second year level courses. 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.

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

FB7.7 All courses have been assigned a credit value and level, according to the Higher Education Qualifications Framework (HEQF).

The standard BSc degree requires:

(a) two majors*
(b) a total of 432 HEQF credits (the equivalent of nine full-year courses). A minimum of 402 HEQF credits will be accepted for certain curricula, where the second major or suite of hierarchical courses is from another Faculty
(c) a minimum of 276 HEQF credits from Science courses (the equivalent of six full-year courses)
(d) a minimum of 120 HEQF credits at level 7

**NOTE: A curriculum leading to only one major but including at least 120 HEQF credits at level 7 will be acceptable.*

Read in conjunction with rule FB7.1-FB7.5.

Compulsory courses to be completed for each Science major:
NOTE: 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+CEM1010F is deemed equivalent to CEM1000W, etc).

Major in APPLIED BIOLOGY (BIO01)			
		HEQF course level	**HEQF credits**
Year 1	BIO1000F	5	18
	BIO1004S	5	18
	CEM1000W	5	36
	MAM1004F+STA1007S	5	18+18
	(or MAM1000W)	5	(or 36)
Year 2	BIO2010F	6	24
	Two of BIO2011S, BIO2012S, BIO2013F/S	6	24+24
Year 3	BIO3013F	7	36
	BIO3014S	7	36
			Total 252

Major in APPLIED MATHEMATICS (MAM01)			
		HEQF course level	**HEQF credits**
Year 1	MAM1000W	5	36
	MAM1043H	5	18
	MAM1044H	5	18
Year 2	MAM2000W	6	48
	MAM2046W	6	48
Year 3	MAM3040W	7	72
			Total 240

Major in ARCHAEOLOGY (AGE01)			
		HEQF course level	**HEQF credits**
Year 1	GEO1009F (or EGS1004S)	5	18
	AGE1002S	5	18
	MAM1004F+STA1000S	5	18+18
	(or MAM1000W)	5	(or 36)
Year 2	AGE2011S	6	24
	AGE2012F	6	24
Year 3	AGE3013H	7	36
	At least one of AGE3011F and AGE3012S	7	36(or 72)
			Total 192 (or 228)

Major in ASTROPHYSICS (AST02)			
		HEQF course level	**HEQF credits**
Year 1	MAM1000W	5	36
	PHY1004W	5	36
	AST1000F highly recommended	5	18
Year 2	AST2002H	6	24
	AST2003H	6	24
	MAM2000W (or		48

	MAM2004H+MAM2046W)	6	(or 24+48)
	PHY2014F	6	24
	PHY2015S	6	24
Year 3	AST3002F	7	36
	AST3003S	7	36

Total 288(or 312)

Major in BIOCHEMISTRY (MCB01)
(This major has limits on the number of students accepted into second year level courses; it is also under review and may not be offered in the current format from 2014).

		HEQF course level	**HEQF credits**
Year 1	BIO1000F	5	18
	CEM1000W	5	36
	MAM1004F (or	5	18
	MAM1000W)	5	(or 36)
	STA1007S (or STA1000F/S)	5	18
Year 2	MCB2014F	6	24
	MCB2015S	6	24
Year 3	MCB3020F	7	36
	MCB3024S	7	36
	MCB3012Z	7	0

Total 210 (or 228)

Major in BUSINESS COMPUTING (CSC02)
(Must be taken concurrently with a Computer Science major)

		HEQF course level	**HEQF credits**
Year 1	CSC1015F	5	18
	CSC1016S	5	18
	MAM1000W	5	36
Year 2	INF2009F	6	18
	INF2011S	6	18
Year 3	INF3011F	7	18
	INF3012S	7	18
	INF3014F	7	18

Total 162

Major in CHEMISTRY (CEM01)

		HEQF course level	**HEQF credits**
Year 1	CEM1000W	5	36
	MAM1000W	5	36
	PHY1031F	5	18
	PHY1032S	5	18
Year 2	CEM2007F	6	24
	CEM2008S	6	24
Year 3	CEM3005W	7	72

Total 192

Major in COMPUTER ENGINEERING (CSC03) (Must be taken concurrently with a Computer Science major)			
		HEQF course level	**HEQF credits**
Year 1	CSC1015F	5	18
	CSC1016S	5	18
	MAM1000W	5	36
Year 2	EEE2040F	6	24
	EEE2026S	6	20
Year 3	EEE3078W	7	44
			Total 160

Major in COMPUTER GAMES DEVELOPMENT (CSC07) (Must be taken concurrently with a Computer Science major)			
		HEQF course level	**HEQF credits**
Year 1	CSC1015F	5	18
	CSC1016S	5	18
	MAM1000W	5	36
Year 2	CSC2003S	6	24
	INF2009F	6	18
Year 3	CSC3020H	7	36
	CSC3022H	7	36
			Total 186

Major in COMPUTER SCIENCE (CSC05)			
		HEQF course level	**HEQF credits**
Year 1	CSC1015F or CSC1018F	5	18
	CSC1016S	5	18
	MAM1000W	5	36
Year 2	CSC2001F	6	24
	CSC2002S	6	24
	INF2009F	6	18
Year 3	CSC3002F	7	36
	CSC3003S	7	36
			Total 210

Major in ECOLOGY & EVOLUTION (BI004)			
		HEQF course level	**HEQF credits**
Year 1	BIO1000F	5	18
	BIO1004S	5	18
	CEM1000W	5	36
	MAM1004F+STA1007S (or	5	18+18
	MAM1000W)	5	(or 36)
Year 2	BIO2010F	6	24
	Two of BIO2011S,		
	BIO2012S, BIO2013F/S	6	24+24
Year 3	BIO3015F	7	36
	BIO3016S	7	36
			Total 252

Major in ENVIRONMENTAL & GEOGRAPHICAL SCIENCE (EGS02)			
		HEQF course level	**HEQF credits**
Year 1	EGS1003S	5	18
	GEO1009F (or EGS1004S)	5	18
	MAM1004F (or	5	18
	MAM1000W)	5	(or 36)
	STA1007S or STA1000S	5	18
Year 2	EGS2013F	6	24
	EGS2014S	6	24
Year 3	Two of EGS3012S, EGS3020F, EGS3021F, EGS3022S	7	36+36

Total 192 (or 210)

Major in GENETICS (MCB04)
(This major has limits on the number of students accepted into second year level courses; it is also under review and may not be offered in the current format from 2014).

		HEQF course level	**HEQF credits**
Year 1	BIO1000F	5	18
	BIO1004S	5	18
	CEM1000W	5	36
	MAM1004F (or	5	18
	MAM1000W)	5	(or 36)
	STA1007S (or STA1000F/S)	5	18
Year 2	MCB2018F	6	24
	MCB2019S	6	24
Year 3	MCB3019F	7	36
	MCB3023S	7	36
	MCB3012Z	7	0

Total 228 (or 246)

Major in GEOLOGY (GEO02)
(This major has limits on the number of students accepted into second year level courses)

		HEQF course level	**HEQF credits**
Year 1	GEO1009F (or EGS1004S)	5	18
	GEO1006S	5	18
	CEM1000W	5	36
	MAM1004F+STA1000S (or	5	18+18
	MAM1000W)	5	(or 36)
	PHY1031F	5	18
Year 2	GEO2001F	6	24
	GEO2004S	6	24
	GEO2005X*	6	
Year 3	GEO3005F	7	36
	GEO3001S	7	36
	GEO2005X*	6	24

*field work half-course to be taken over second and third years of study **Total 270**

Major in HUMAN PHYSIOLOGY (HUB17)
(This major has limits on the number of students accepted into second year level courses)

		HEQF course level	HEQF credits
Year 1	BIO1000F	5	18
	BIO1004S	5	18
	CEM1000W	5	36
	MAM1004F+STA1007S (or	5	18+18
	MAM1000W)	5	(or 36)
	1000-level Physics highly recommended	5	
Year 2	HUB2019F	6	24
	HUB2021S	6	24
	One full senior Science course	6	48
Year 3	HUB3006F	7	36
	HUB3007S	7	36

Total 276

Major in MATHEMATICAL STATISTICS (STA02)

		HEQF course level	HEQF credits
Year 1	MAM1000W	5	36
	STA1006S	5	18
Year 2	STA2004F	6	24
	STA2005S	6	24
Year 3	STA3041F	7	36
	STA3043S	7	36

Total 174

Major in MARINE BIOLOGY (BIO05)

		HEQF course level	HEQF credits
Year 1	BIO1000F	5	18
	BIO1004S	5	18
	CEM1000W	5	36
	MAM1004F	5	18
	STA1007S	5	18
Year 2	BIO2013F/S	6	24
	BIO2010F highly recommended	6	24
	SEA2004F	6	24
Year 3	BIO3002F/S	7	36
	BIO3017S	7	36

Total 228 (or 252)

Major in MATHEMATICS (MAM02)

		HEQF course level	HEQF credits
Year 1	MAM1000W	5	36
	MAM1019H	5	18
Year 2	MAM2000W	6	48
Year 3	MAM3000W	7	72

Total 174

Major in MICROBIOLOGY (MCB05)
(This major has limits on the number of students accepted into second year level courses; it is also under review and may not be offered in the current format from 2014).

		HEQF course level	HEQF credits
Year 1	BIO1000F	5	18
	CEM1000W	5	36
	MAM1004F (or	5	18
	MAM1000W)	5	(or 36)
	STA1007S (or STA1000F/S)	5	18
Year 2	MCB2016F	6	24
	MCB2017S	6	24
Year 3	MCB3021F	7	36
	MCB3022S or MCB3024S	7	36
	MCB3012Z	7	0

Total 210 (or 228)

Major in OCEAN & ATMOSPHERE SCIENCE (SEA03)

		HEQF course level	HEQF credits
Year 1	GEO1009F	5	18
	MAM1004F	5	
	+STA1007S/1000S (or	5	18+18
	MAM1000W)	5	(or 36)
	PHY1031F or equivalent	5	18
Year 2	SEA2004F	6	24
	SEA2005S	6	24
Year 3	SEA3004F	7	36
	EGS3012S	7	36

Total 192

Major in PHYSICS (PHY01)

		HEQF course level	HEQF credits
Year 1	MAM1000W	5	36
	MAM1043H+MAM1044H highly recommended	5	
	PHY1004W	5	36
Year 2	MAM2000W (or	6	48
	MAM2046W+MAM2004H)	6	(or 48+24)
	PHY2014F	6	24
	PHY2015S	6	24
Year 3	PHY3021F	7	36
	PHY3022S	7	36

Total 240 (or 264)

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.

FB8.1 **Rules for distinction in a major**

(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/S, plus BIO3013F, BIO3014S
Applied Mathematics:	MAM2046W (or two of MAM2047H, MAM2048H and MAM2043S) and MAM3040W
Archaeology:	Four senior half-courses in Archaeology
Astrophysics:	AST2002H, AST2003H, AST3002F, AST3003S
Biochemistry:	MCB2014F, MCB2015S, MCB3020F, MCB3024S
Business Computing:	INF3011F, INF3012S, INF3014F
Ecology & Evolution:	BIO2010F; any one of BIO2011S, BIO2012S, BIO2013F/S, plus BIO3015F, BIO3016S
Chemistry:	CEM2007F, CEM2008S, CEM3005W
Computer Engineering:	EEE2040F, EEE2026S, EEE3078W
Computer Games Development:	CSC2003S, CSC3020H and CSC3022H or INF2009F
Computer Science:	CSC2001F, CSC2002S, CSC3002F, CSC3003S
Environmental & Geographical Science:	EGS2013F and EGS2014S; any two of EGS3012S, EGS3020F, EGS3021F, EGS3022S
Genetics:	MCB2018F, MCB2019S, MCB3019F, MCB3023S
Geology:	GEO2001F, GEO2004S, GEO3005F, GEO3001S
Human Physiology:	HUB2019F, HUB2021S, HUB3006F, HUB3007S
Marine Biology:	SEA2004F, BIO2013F/S, BIO3002F, BIO3017S
Mathematics:	MAM2000W, MAM3000W
Mathematical Statistics:	STA2004F, STA2005S, STA3041F, STA3043S
Microbiology:	MCB2016F, MCB2017S, MCB3021F, MCB3022S or MCB3024S
Ocean & Atmosphere Science:	SEA2004F, SEA2005S, SEA3004F, EGS3012S
Physics:	PHY2014F, PHY2015S, PHY3021F, 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).

FB8.2 **Rules for distinction in the BSc degree as a whole**

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 bachelors 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 shall, with permission of the Head of Department, register as an occasional student to complete preparatory courses. On completion of such courses, he/she will 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.

Subjects

FH3 The 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)	SH001SEA02	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)	SH001MAM	Industrial Mathematics
BSc (Hons)	SH001CSC05	Information Technology
BSc (Hons)	SH001BIO05	Marine Biology

BSc (Hons)	SH001STA02	Mathematical Statistics
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)	SH001BUS01	Statistical Sciences for Actuaries

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 HEQF credits out of a total of 160 credits; and

(b) subject to the research project being passed at 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 or 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 of appropriate training that he or she has reached the current level in the subject or discipline equivalent to an honours degree; or

(c) has in any other manner attained a level of competence which in the opinion of 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 faculty or another university who holds a degree recognized by the Senate as being equivalent to an honours degree in the Faculty of Science; or

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

Guidelines for applicants
Prospective candidates should contact the Head of the Department most closely concerned with their research interests, or the member of the academic staff of the department with whom they would like to do a project. The Dean (through the Head) is responsible for the acceptance of the candidate, and appointment or approval of the supervisor(s). The candidate may be required, after consultation with the prospective supervisor(s) to draw up a project proposal. This may then be inspected by a departmental board or panel appointed by the Head, before the candidacy is submitted for the approval of the Head and the Dean.

Subjects

FM3 The degree may be conferred in any one of the following specialisations:

Qualification	Degree and Plan Code	Specialisations
MSc/MPhil	SM004/5 SEA01	Applied Marine Science
MSc/MPhil	SM001/2 MAM01	Applied Mathematics
MSc/MPhil	SM001/2 AGE02	Archaeology
MSc/MPhil	SM001/2 AST01	Astronomy
MSc/MPhil	SM004/5 AST03	Astrophysics & Space Science
MSc/MPhil	SM001/2 BIO08	Botany
MSc/MPhil	SM001/2 CEM01	Chemistry
MSc/MPhil	SM004/5 EGS06	Climate Change & Sustainable Development
MSc/MPhil	SM001/2/4/5 CSC05	Computer Science
MSc/MPhil	SM001/2/4/5 BIO09	Conservation Biology
MSc/MPhil	SM001/2/4/5 EGS02	Environmental & Geographical Science
MPhil	SM005 EGS05	Environment, Society & Sustainability
MSc/MPhil	SM001/2 GEO01	Geochemistry
MSc/MPhil	SM001/2 GEO02	Geology
MSc/MPhil	SM004/5 CSC06	Information Technology
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	SM004/5 SEA06	Ocean & Climate Dynamics
MSc/MPhil	SM001/2 STA03	Operational Research
MSc/MPhil	SM001/2 SEA05	Physical Oceanography
MSc/MPhil	SM004/5 STA04	Statistical Sciences
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	SM001/2 BIO06	Zoology

NOTE: SM001/SM002 refers to MSc/MPhil by full dissertation
SM004/SM005 refers to MSc/MPhil by coursework and minor dissertation

Award of the degree

FM4.1 The degree of MSc/MPhil may be conferred

(a) after acceptance by 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); 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).

FM4.2 Supplementary examinations are not awarded to candidates for the degree of Master.

FM4.3 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.

Registration and candidacy

FM5 Subject to the provisions of Rule FM7, 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.

Guidelines for candidates
After registration the candidate is expected to consult regularly with the supervisor(s). Prior to re-registration, both the candidate and the supervisor(s) are expected to present brief written progress reports to the Head of Department. These may be considered before the Head recommends re-registration for the degree. 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 during the second year of MSc registration.

The dissertation

FM6.1 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 to Faculty Postgraduate Information Handbook).

FM6.2 (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.

FM6.3 A candidate required to submit a dissertation shall

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

(b) submit three copies (by dissertation only) or two copies (Master's by coursework and dissertation) in temporary binding to the Dean by the third week in February for graduation in June or the third week in August for graduation in December. A further one unbound copy plus an electronic copy on a CD must be submitted once all necessary corrections and revisions to the dissertation have been made.

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 or supervisors. It is not essential for the Master's degree that the dissertation constitute 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 50 000 words (appendices excluded).

Part-time programme

FM7 On the recommendation of the Head of Department, the Senate may permit a candidate who is unable to complete the programme within the minimum period, to complete the programme 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

FM8 The Senate may accept, in lieu of, part or all of the required periods of attendance, 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 is assured.

Rules for the degree of Doctor of Philosophy (PhD)

(Rules for the PhD degree may be found in Book 3, General Rules for Students.)

Admission

The entrance requirement to the PhD is a Master's degree, but 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 not later than 5 January or 21 June respectively; the final dates for receipt of theses by the Doctoral Degrees Board Office are 8 February or 16 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 to the Dean for consideration and possible approval.

Rules for the degree of Doctor of Science (DSc)

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 during the period of examination, whichever is the 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 to constitute a substantial, original and important contribution to learning in some branch of science in the sense that*
4. (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.*

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.

Professor and Head of Department:

Professor and South African Research Chair in Stable Isotopes in Archaeology and Paleo-environments:
J C Sealy, MSc PhD *Cape Town*
Associate Professor:
R R Ackermann, MA *Arizona* PhD *Washington*
Senior Lecturers:
D R Braun, MA PhD *Rutgers*
S Chirikure, MA PhD *UCL*
S L Hall, MA *Wits* DPhil *Stell*
Lecturers:
R Sithaldeen, BSc (Hons) PhD *Cape Town* (CHED)
D D Stynder, MA PhD *Cape Town*
A Sumner, PhD *Toronto*
Senior Scholar:
J E Parkington, MA PhD *Cantab*
Emeritus Professor:
N J van der Merwe, MA PhD *Yale*
Emeritus Associate Professor:
A B Smith, PhD *Berkeley*
Principal Scientific Officer:
J L Lanham, BA (Hons) *Cape Town*
Senior Scientific Officer:
L Hutten, BSc (Hons) MSc *Pretoria*
Administrative Officer:
L J Cable
Laboratory Assistant:
D H Jacobs
Departmental Assistant:
E Britton

RESEARCH IN ARCHAEOLOGY

Research in Archaeology embraces a wide variety of topics, some of which are listed below. More detailed information can be obtained by writing to the Department of Archaeology. Some research programmes lie mainly in the areas of arts and humanities; others have closer affiliations with the natural sciences. Archaeological sites contain a rich record of the long-term history of peoples' interaction with the environment, and palaeoenvironmental research is one focus of activity within the department. Particular research interests include issues related to human evolution, the emergence of modern humans, and the history of hunter-gatherer, pastoralist and farming communities in southern Africa, as well as the archaeology of more recent colonial settlement.
The department houses and manages the University's light isotope mass spectrometers, and has a strong research programme in the area of light stable isotopes as environmental and dietary tracers. Short courses on the theory and practice of light isotope mass spectrometry are offered from time to time. The Archaeometry Laboratory is also equipped with a range of smaller items of equipment used in analytical studies of archaeological remains. Most, but not all, work in this area is focused on archaeological questions; other activities include surveys of selected modern environments to

provide comparative data for studies of the past, and wildlife forensics.
There is also a laboratory for the study of archaeomaterials, with facilities for the preparation and study of metallographic and other specimens. Identification and interpretation of biological residues from archaeological sites is routine, and the department houses comparative material for this purpose, including mammal, reptile and fish skeletons, marine mollusc shells, and botanical specimens. Larger reference collections are readily available in related University departments and allied institutions. Further information may be found in the Department's website at http://www.uct.ac.za/depts/age.

Undergraduate Courses

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

First-Year Courses

AGE1002S AFRICA & WORLD ARCHAEOLOGY

18 HEQF credits at level 5

Course co-ordinator(s): Dr D Stynder

Entrance requirements: None

Course outline:

An overview of the human past from the perspective of Africa. The course will provide an introduction to human origins and the origin of the archaeological record in Africa, the expansion of the human population from Africa, a comparative perspective on hunter-gatherers, the development of farming and the origins of complex societies, and the contact between Africa, Asia and Europe in the colonial period.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	

Tutorials: One tutorial/practical per week, Friday, 5th period or as arranged.

DP requirements: Attendance and participation in lectures and tutorials; submission of written work.

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

SAN1015F WORDS, DEEDS, BONES & THINGS

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor M Spiegel

Entrance requirements: None

Course outline:

How might one explain the beginnings of our species and diversity of human social, cultural and linguistic forms that have arisen as humans have developed into and now live as modern people? The course compares approaches taken by archaeologists, linguists and social-cultural anthropologists in their attempts to answer such questions. We delve into what lies behind the many ways people interact, communicate and use the material resources around them. Using examples from a wide variety of social, cultural, linguistic and ecological contexts, we address debates about the idea of human evolution, about the relation between nature and nurture and its links with concepts such as race, gender and kinship; and about the social-cultural underpinnings of language use and linguistic variations. A core theme is to understand and recognise the limitations of a cultural relativist approach. A core goal is to introduce students to critical academic skills that enable us to understand the bases on which new knowledge is developed and thereby to recognise how provisional knowledge is.

Lectures: Three lectures per week, times to be confirmed.

Tutorials: One tutorial per week, time to be arranged.

DP requirements: Attendance at tutorials and submission of all written work, plus class test.
Assessment: Assignments and class tests count 50%; one 2-hour examination in June counts 50%.

GEO1009F INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

See course details under the Department of Geological Sciences.

AGE1004H INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 HEQF credits at level 5

Course co-ordinator(s): Dr R Sithaldeen

Entrance requirements: None, but the permission of the Dean or Head of Department is required prior to registration for this course.

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 GEO1009F (see entry for GEO1009F). It 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.

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Friday, 14h00-17h00.

DP requirements: A class record of at least 45%; attendance at 80% each of practicals, tutorials and lectures.

Assessment: Class project, tests, practicals and field report count 50%; one 2-hour paper written in November counts 50%. A sub-minimum of 40% is required for the final exam.

Second-Year Courses

AGE2011S HUMAN EVOLUTION

24 HEQF credits at level 6

Course co-ordinator(s): Associate Professor R R Ackermann

Entrance 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 hominid evolution, showing how the traces of fossil skeletons and artefacts are interpreted in terms of human behaviour and evolutionary processes. We answer such questions as Why in Africa? Why a larger brain? Why bipedalism? Why make tools? and situate the study of human origins in its evolutionary context. The syllabus for AGE2011S includes practical sessions for the study of primate and human, fossil and recent skeletal material and the artefacts associated with early hominids.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	

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 SOUTHERN AFRICAN HUNTERS & HERDERS

24 HEQF credits at level 6

Course co-ordinator(s): Dr A Sumner

Entrance 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:

Humans have been hunter-gatherers for 99% of their evolutionary history, which means that our physical, psychological and social selves have been shaped by this way of life. Southern African Khoesan hunter-gatherers and herders have contributed significantly to our understanding of such societies. In this course, we focus on hunting and gathering as a way of life in Southern Africa from some 20 000 years ago to the twentieth century, concluding by considering the contemporary socio-political environment, in which many South Africans are (re-) connecting to a Khoesan identity. The course will include coverage of rock art and its significance, as well as other material culture, biology, linguistics and economic and environmental issues.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	

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 one-day field trip.

Assessment: Practical hand-ins, essays and tests count 50%; one 3-hour examination in June counts 50%. A sub-minimum of 40% is required for the examination.

Third-Year Courses

AGE3006H DIRECTED READING & RESEARCH

36 HEQF credits at level 7

Entrance 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.

Lectures: By arrangement

DP requirements: Completion of assignments.

Assessment: Essays and tests count 20%; a long paper count 40%; one 3-hour examination in November counts 40%.

AGE3011F ROOTS OF BLACK IDENTITY

36 HEQF credits at level 7

Course co-ordinator(s): Dr S Chirikure

Entrance requirements: AGE2011S or AGE2012F, or by permission of the Head of Department.

Course outline:

In AGE3011F we explore the history of southern Africa's people over the past 2000 years. Why are southern African populations so diverse? What lies behind the linguistic map of modern South Africa? What are the links between human biology, culture and language? We use the archaeological record of artefacts, settlement systems, food waste, environmental contexts and human skeletons to look at population movement, assimilation, conflict, co-operation and domination. We explain the origins of current demographic patterns, problematise the notion of 'settler' and explore the rich and diverse heritage of the making of South Africa.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	

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 June counts 50%. A sub-minimum of 40% is required for the examination.

AGE3012S GLOBAL INTERACTION & THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY

36 HEQF credits at level 7

Course co-ordinator(s): Dr S Hall

Entrance requirements: AGE2011S or AGE2012F, or by permission of the Head of Department.

Course outline:

Over the last thousand years, trade, population movements and exploratory settlement led to massive impacts on indigenous economies in southern Africa. In AGE3012S we look at these transformations from both foreign and local viewpoints. The archaeological record of Indian and Atlantic Ocean expansions record events of great significance and drama, including the process of colonization, slavery, genocide and eventually apartheid. Material culture, historic written records and excavated artefacts all inform our understanding of these events, many of them the major determinants of current conflicts and differences. We trace the history of interactions, the roots of inequalities and the course of differentiation through the archaeological record.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	

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 November counts 50%. A sub-minimum of 40% is required for the examination.

AGE3013H ARCHAEOLOGY IN PRACTICE

36 HEQF credits at level 7

NOTE: This course is a three and a half week residential field-school during the January/February vacation.

Course co-ordinator(s): Dr S Hall

Entrance requirements: AGE2011S and AGE2012F, or by permission of the Head of Department.

Course outline:

The curriculum covers field 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, spreadsheet use, preliminary conservation and accessioning of materials. The daily programme consists of lectures, followed by fieldwork and a short period of laboratory processing.

DP requirements: Attendance at field-school and completion of assignments.

Assessment: Essays and tests count 30%; projects count 20%; examinations count 50%.

Postgraduate Courses

AGE4000W BSc (HONS) IN ARCHAEOLOGY

160 HEQF credits at level 8

(includes research project of 48 credits)

Course co-ordinator(s): Dr D Stynder

Entrance 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 field work 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 attend a one-week field trip held during the year.

Assessment: On average examinations count 50% of the final mark, coursework counts 20% and the research project counts 30%. A sub-minimum of 50% is required for the research project.

AGE4001W BSc (HONS) IN ARCHAEOLOGY & ENVIRONMENTAL SCIENCE

160 HEQF credits at level 8

(includes research project of 48 credits)

Course co-ordinator(s): Dr D Stynder

Entrance 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 paleoenvironmental 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 and a dissertation (48 credits).

Assessment: On average examinations count 50% of the final mark, coursework counts 20% and the research project counts 30%. A sub-minimum of 50% is required for the research project.

AGE5000W MASTERS IN ARCHAEOLOGY

180 HEQF credits at level 9

Candidates will be required to present a dissertation on an approved topic.

See also AGE5006W, Faculty of Humanities Handbook.

AGE6000W PhD IN ARCHAEOLOGY

360 HEQF credits at level 10

Candidates will be required to present a thesis on an approved topic. Candidates are referred to the rules for this degree as set out in Book 3, General Rules.

DEPARTMENT OF ASTRONOMY

The Department is housed in the 5th Floor 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:
R C Kraan-Korteweg, Diplom (MSc) *Basle* PhD Phil II *Basle*
South African Research Chair in Astrophysics and Space Science:
T H Jarrett, Phd *Amherst*
SKA South African Research Chair in Multi-wavelength Extragalactic Astronomy:
C Carignan, MSc *Montréal* PhD *Canberra*
Associate Professor:
P A Woudt, MSc *Groningen* PhD *Cape Town*
Senior Lecturer:
K J van der Heyden, BSc (Hons) MSc *Cape Town* PhD *Utrecht*
Lecturer:
S-L Blyth, MSc PhD *Cape Town*
V A McBride, BSc (Hons) MSc *Cape Town* PhD *Southampton*
Honorary Academic Member:
P K S Dunsby, BSc PhD *London*
Senior Scholar:
B Warner, BSc (Hons) PhD DSc *London* MA DSc *Oxon* DSc (h.c) *Cape Town* Hon FRSSAf Hon Fell *UCL*
Honorary Professors:
M W Feast, BSc (Hons) PhD *London* DSc (h.c) *Cape Town* ARCS DIC Assoc.RAS FRSSAf MASSAf FSAIP
P A Charles, BSc (Hons) PhD *London* FRAS
W J G de Blok, MSc PhD *Groningen*
SKA Visiting Professor:
R Fender, PhD *OU Milton Keynes*
Visiting Professor:
P A Whitelock, DIC PhD *London* Assoc RAS FRSSAf MASSAf
Honorary Research Associate:
I Stewart, PhD *Armidale*
Computer System Manager:
B Kuck
Administrative Officer:
C Marsh
Senior Secretary:
R Daniels

RESEARCH CENTRE IN ASTROPHYSICS, COSMOLOGY AND GRAVITATION
The core of the Centre consists of the members of the Astronomy Department (AST) and the members of the Cosmology and Gravity Group (CGG) of the Department of Mathematics and Applied Mathematics (MAM):
Directors:
R C Kraan-Korteweg (AST), Diplom (MSc) *Basle* PhD Phil II *Basle*
P K S Dunsby (MAM), BSc PhD *London*
Deputy Directors:
J Murugan (MAM), MSc PhD *Cape Town*
T H Jarrett, PhD *Amherst*

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 *Glascow*
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 Assoc.RAS 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*
D Solomons (MAM), MSc PhD *Cape Town*
I Stewart (AST), PhD *Armidale*
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* Assoc RAS FRSSAf MASSf
P A Woudt (AST), MSc *Groningen* PhD *Cape Town*

It also incorporates numerous postdoctoral fellows: Drs Angus, Armstrong, Bilicki, Coriat, Deane, Hess, Lucero, Maddox, Puglielli, Ribeiro, Schurch (AST) and Drs de la Cruz,Goswami, Patel, Poltis, Prinsloo, Roy, Seikel, Sundin, Sung (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.

RESEARCH IN ASTRONOMY

The department makes use of the Southern African Large Telescope and other instruments at the South African Astronomical Observatory at Sutherland. Studies are carried out on galaxies (optical, NIR and radio), their dark matter content, large-scale structures, including those partially obscured by the foreground Milky Way (Professors Kraan-Korteweg, Carignan, Jarrett, Associate Professor Woudt and Drs Blyth and van der Heyden) and the extra-galactic distance scale (Professor Feast). Research also includes the theory and observation of variable stars, in particular, cataclysmic variable stars and degenerate variable stars (Professor Warner and Associate Professor Woudt), Long Period Red Variables (eg. Miras), Cepheids and RR Lyrae Stars (Professor Feast) and X-ray binaries (Professor Fender and Dr McBride). The history of astronomy in South Africa is also studied (Professor Warner).
The Research Centre in Astrophysics, Cosmology and Gravitation (http://www.acgc.uct.ac.za) was established in 2009. Its primary goal is to form a major research hub in astrophysics, cosmology and gravitation in Southern Africa, with particular emphasis on projects involving the new facilities SALT and MeerKAT that will require the expertise from both observers and theorists. The Centre provides a natural home for the students and staff of NASSP, the National Astrophysics and Space Science Programme (http://www.star.ac.za).

Undergraduate Courses

First-Year Courses

AST1000F INTRODUCTION TO ASTRONOMY
18 HEQF credits at level 5
Course co-ordinator(s): Dr S-L Blyth
Entrance requirements: None

Course outline:
Our place in the Universe. Early beliefs and historical development of astronomical knowledge. Electromagnetic radiation. Telescopes and Instrumentation. The Earth-Sun-Moon system. The Solar System. Stars. Our galaxy and others. Relativity and cosmology, and the early Universe.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One compulsory tutorial/practical session per week, Wednesday, 14h00-17h00 (two sessions are held in the Planetarium of Iziko Museums of Cape Town plus five tutorial sessions and five practical sessions, including a tour of the SAAO in Observatory).
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%; one 2-hour final examination 50%; subminimum requirement of 40% for final examination.

Second-Year Courses

AST2002H ASTROPHYSICS

24 HEQF credits at level 6
Course co-ordinator(s): Dr V A McBride
Entrance requirements: PHY1004W, MAM1000W.
Course outline:
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 planet; Stellar motions; The Milky Way and other galaxies; The extragalatic distance scale; Large scale structure; Newtonian cosmology

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2		2		2 (no Friday lecture in second semester)

Tutorials: 10 Compulsory tutorial/practical sessions over the year, Wednesday, 14h00-17h00
Practicals: One virtual observatory project, by arrangement; one essay and one presentation. One field trip to the South African Astronomical Observatory, Sutherland.
DP requirements: Satisfactory attendance at lectures and tutorials/practicals; class record 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

24 HEQF credits at level 6
Course co-ordinator(s): Associate Professor P A Woudt
Entrance 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, coordinate 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

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:		2		2	(no Thursday lectures in second semester)

Tutorials: Five tutorials over the year, Wednesday, 14h00-16h30, by arrangement

Fieldwork: One observational radio astronomy project and one observational optical astronomy project, by arrangement. One field trip to South African Astronomical Observatory, Sutherland

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 two-hour theoretical examination counts 25%; two projects count 40% and presentation counts 10%

Third-Year Courses

AST3002F STELLAR ASTROPHYSICS

36 HEQF credits at level 7

This course will not be offered if there are insufficient students unless required for a major in Astronomy.

Course co-ordinator(s): Associate Professor P A Woudt

Entrance requirements: AST2002S, PHY2014F, PHY2015S.

Course outline:

Stellar atmospheres; radiative transfer and atomic processes; Boltzmann formula; Saha equation; scattering; theory of line formation; Doppler profile; Voigt profile; curve of growth; spectral analysis; physics of stellar interiors; stellar structure and evolution; hydrostatic equilibrium; thermal equilibrium; convective instability; theory of energy transport; energy generation; nuclear fusion; homologous stars; stellar birth, evolution and death; white dwarfs, neutron stars and black holes; supernovae; stellar pulsation.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical or tutorial per week, Wednesday, 14h00-16h30. One week observing trip to Sutherland.

DP requirements: Satisfactory attendance at lectures and tutorials; class record of at least 35%.

Assessment: Class record 50%; one 2-hour final examination 50%; subminimum requirement of 40% for final examination.

AST3003S GALACTIC & EXTRAGALACTIC ASTROPHYSICS

36 HEQF credits at level 7

This course will not be offered if there are insufficient students unless required for a major in Astronomy.

Course co-ordinator(s): Professor R C Kraan-Korteweg

Entrance requirements: AST2002S, PHY2014F, PHY2015S.

Course outline:

Interstellar gas and dust; size shape and properties of dust grains; interstellar extinction and reddening; 21-cm radiation; molecular clouds; masers; radiative and collision processes in gaseous nebulae; galactic structure; differential galactic rotation; Oort equations;galaxy morphology; rotation curves; dark matter; spiral structure; large-scale distribution of galaxies; galaxy collisions; starbursts; active galaxies; radio galaxies, Seyfert galaxies, quasars; cosmology; scale of the

universe; expansion of the universe; the Big Bang; primordial nucleosynthesis; cosmic background radiation.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical or tutorial per week, Wednesday, 14h00-16h30. One observing trip to Sutherland.

DP requirements: Satisfactory attendance at lectures and tutorials; class record of at least 35%.

Assessment: Class record 50%; one 2-hour final examination 50%; subminimum requirement of 40% for final examination.

Postgraduate Courses

AST4007W BSc (HONS) IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme (NASSP))

160 HEQF credits at level 8

(includes research project of 32 credits)

Course co-ordinator(s): Professor P K S Dunsby

Entrance requirements: AST3002F and AST3003S 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. Admission is subject to the approval of the Steering Committee and an application must be made before 30th October of the preceding year. Late applications will also be considered.

Course outline:

The Honours course in Astrophysics and 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 field trips to the national facilities.

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%.

AST5003F TAUGHT COMPONENT OF THE MASTERS IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme (NASSP))

90 HEQF credits at level 9

Course co-ordinator(s): Professor P K S Dunsby

Entrance requirements: This programme 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:

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%.

AST5001W DISSERTATION COMPONENT OF THE MASTERS IN ASTROPHYSICS & SPACE SCIENCE

90 HEQF credits at level 9

Entrance requirements: AST5003F

Minor dissertation: Students will work on an approved research topic on which a dissertation must be presented.

AST5000W MASTERS IN ASTRONOMY

180 HEQF credits at level 9

The normal route to an MSc in Astronomy is via AST5003F and AST5001W as above. However, in certain circumstances, the Head of Department may recommend an MSc by research work and the writing of a dissertation only. General Rules for this degree may be found at the front of the handbook.

AST6000W PhD IN ASTRONOMY

360 HEQF credits at level 10

Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies. Supervision of research work towards this degree is provided by the Department.

DEPARTMENT OF BIOLOGICAL SCIENCES

The Department is housed in the John Day Zoology Building, 20 University Avenue
Telephone (021) 650-3603/4 Fax (021) 650-3301
and the H W Pearson Botany Building, 8 University Avenue,
Telephone (021) 650-2447 Fax (021) 650-4041
The Animal Demography Unit may be reached on telephone (021) 650-2324
The Percy Fitzpatrick Institute for African Ornithology may be reached on telephone (021) 650-3291
The Departmental abbreviation for Biological Sciences is BIO.

Professor and Head of Department:
A Chinsamy-Turan, BSc (Hons) PhD *Wits*
Harry Bolus Professor of Botany:
W J Bond, BSc (Hons) *Exeter* MSc *Cape Town* PhD *UCLA*
Leslie Hill Professor of Plant Conservation:
M T Hoffman, BSc (Hons) PhD *Cape Town*
Pola Pazvolsky Chair of Conservation Biology:
G Cumming, BSc (Hons*) Rhodes* DPhil *Oxon*
H W Pearson Honorary Professor of Botany:
J S Donaldson MSc *Rhodes* PhD *Cape Town*
Professors:
J J Bolton, BSc (Hons) PhD *Liverpool*
T M Crowe, MSc *Chicago* PhD *Cape Town*
C L Griffiths, BSc (Hons) *Soton* PhD *Cape Town*
T A Hedderson, MSc *Memorial* PhD *Reading*
P A R Hockey, BSc (Hons) *Edinburgh* PhD *Cape Town*
J J Midgley, BSc (Hons) PhD *Cape Town*
Associate Professors:
C Attwood, BSc (Hons) PhD *Cape Town*
E C February, BA (Hons) PhD *Cape Town*
M D Cramer, MSc *Wits* PhD *Cape Town*
L Gillson, BA *Oxon* MSc *Imperial* DPhil *Oxon*
J H Hoffmann, MSc PhD *Rhodes*
M I Lucas, BSc (Hons) PhD *Wales*
C L Moloney, BSc (Hons) PhD *Cape Town*
M J O'Riain, BSc (Hons) PhD *Cape Town*
M D Picker, BSc (Hons) PhD *Wits*
P G Ryan, MSc PhD *Cape Town*
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*
Senior Lecturers:
A D Amar, BSc (Hons) *Newcastle* PhD *Aberdeen*
G N Bronner, MSc PhD *Natal*
H Marco, BSc (Hons) PhD *Cape Town*
A M Muasya, MPhil *Moi* PhD *Reading*
Lecturers:
S B M Chimphango, MSc *Malawi* PhD *Cape Town*
J Bishop, BSc (Hons) *King's College London* PhD *Cape Town*
L Khomo, BSc (Hons) PhD *Wits*

D Pillay, BSc (Hons) PhD *UKZN*
C C Reed, MSc PhD *UFS*
A G West, MSc *Cape Town* PhD *Utah*
Senior Scholars:
G M Branch, BSc (Hons) PhD *Cape Town* FRSSAf
G Gäde, MS PhD *Munster*
L G Underhill, MSc PhD *Cape Town*
Emeritus Associate Professors:
B R Davies, BSc (Hons) *Newcastle* PhD *CNAA* MSAIE & ES
J A Day, BSc (Hons) PhD *Cape Town*MSAIE & ES
J U M Jarvis, MSc Cape Town PhD *East Africa* FRSSAf
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*
Honorary Associate Professor:
R J Anderson, BSc (Hons) *Wits* PhD *Cape Town*
Principal Technical Officers:
G A Aguilar, MSc *Chile*
A Plos, BSc *Cape Town*
Chief Technical Officers:
G du Plessis
P Müller
Chief Scientific Officer:
L V Phigeland, BSc *Cape Town*
Senior Scientific Officer:
D Hattas, B Tech (*Cape Tech*) MSc *UWC*
Technical Officer:
D I Barnes
Administrative Manager:
S Pillay
Administrative Officer:
S Smuts
Senior Secretaries:
S Abrahams
T Nozewu
Administrative Assistants:
N Jodamus
A Stain
Laboratory Assistants:
N Davids
G Faulmann
Z Jikumlambo
F Majola

BOLUS HERBARIUM
Director:
J J Midgley, BSc (Hons) PhD *Cape Town*
Keeper:
T A Hedderson, MSc *Memorial* PhD *Reading*
Curator/Principal Technical Officer:
T H Trinder-Smith, BSc (Hons) MSc *Cape Town*
Chief Scientific Officer (part-time):
C Klak, BSc (Hons) PhD *Cape Town*

Librarian:
C P Kotze, BA *Unisa* PTD III *Dept Ed* PG Dip LIS *Cape Town*
Departmental Assistant:
C J Christians

THE PERCY FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY
Director:
P A R Hockey, BSc (Hons) *Edinburgh* PhD *Cape Town*
Pola Pazvolsky Chair of Conservation Biology:
G Cumming, BSc (Hons) *Rhodes* DPhil *Oxon*
Professor:
T M Crowe, MSc *Chicago* PhD *Cape Town*
Associate Professor:
P G Ryan, MSc PhD *Cape Town*
Emeritus Professor:
W R Siegfried, PhD *Cape Town*
Honorary Professors:
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Senior Lecturer:
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Manager, Centre of Excellence:
R M Little, PhD *Cape Town*
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D Grémillet PhD *Kiel*
A R Ridley, BSc (Hons) *Lincoln* PhD *Cantab*
R Simmons, MSc *Acadia* PhD *Wits*
R M Wanless, MSc PhD *Cape Town*
Research Affiliates:
P Bloomer, PhD *Virginia*
R C K Bowie, MSc PhD *Cape Town*
R Covas, MSc *Lisbon* PhD *Cape Town*
W R J Dean, MSc *Natal* PhD *Cape Town*
A Jenkins, PhD *Cape Town*
T Mandiwana-Neudani, BSc (Hons) *Venda* PhD *Cape Town*
A McKechnie, PhD *Natal*
A Milewski, MSc *Cape Town* PhD *Murdoch*
M Pineiro de Melo, MSc *Cape Town* PhD *Edinburgh*
C O'Ryan, BSc (Hons) PhD *Cape Town*
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C Spottiswoode, BSc (Hons) *Cape Town* PhD *Cantab*
Postdoctoral Fellows:
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T R Cook, PhD *Strasbourg*
S Cunningham, PhD *Massey*
A de Vos, PhD *Cape Town*
T Flower, PhD *Cantab*
R Martin, BSc (Hons) *East Anglia* PhD *Sheffield*
R Mullers, PhD *Groningen*
M Nelson-Flower, PhD *Cape Town*
G Oatley, PhD *Cape Town*
L Pichegru, PhD *Strasbourg*
T Reid, PhD *Tasmania*

Principal Technical Officer:
C J Tobler
Librarian:
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Administrative Assistant:
H Buchanan, BA H Dip Lib *Cape Town*
Senior Secretary:
T Jansen
Departmental/Accounts Assistant:
A Links

PLANT CONSERVATION UNIT
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Deputy Director:
L Gillson, BA *Oxon* MSc *Imperial* DPhil *Oxon*
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A Stain

ANIMAL DEMOGRAPHY UNIT
Director:
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R J M Crawford, MSc PhD *Cape Town*
Honorary Research Associates:
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P Barham, MSc PhD *Bristol*
D L Borchers, MSc PhD *Cape Town*
R J M Crawford, MSc PhD *Cape Town*
M de Villiers, MSc PhD *Pretoria*
A Jenkins, PhD *Cape Town*
S P Kirkman, MSc *Pretoria* PhD *Cape Town*
Q Martins PhD *Bristol*
J P Roux, MSc PhD *Montpellier*
I Wiesel, MSc PhD *Hamburg*
A J Williams, MSc PhD *Cape Town*
Senior Scientific Officer:
R A Navarro, MSc *Austral de Chile* PhD *Cape Town*
Research Assistants:
M Brooks, Nat Dipl in Conservation
D M Harebottle, MSc *Natal* PhD *Cape town*
S Kuyper, BA *Natal* HDLS *Unisa*
H D Oschadleus, MSc PhD *Cape Town*
M T E Wren-Sargent, BA HDE *Natal* PG Dip LIS *Cape Town*
D J Young, MSc *Cape Town*
Postdoctoral Fellows:
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F Gebreselassie, PhD *Bern*
T Hoffman, PhD *Cape Town*
S Kohler, PhD *Reunion*
K Ludynia, PhD *Kiel*
R B Sherley, PhD *Bristol*
A Steinfurth, PhD *Kiel*

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Chief Research Officers:
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Scientific Officers:
J Ewaert-Smith, BSc (Hons) MSc *Cape Town*
Research Affiliates:
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E G Day, BSc (Hons) PhD *Cape Town*
N Job, BA *UKZN* HDE *Cape Town*
J M King, BSc (Hons) PhD *Cape Town* MSAIE & ES
D Ollis, BSc (Hons) MPhil *Cape Town* MSc *Stell*
P Pashnee, BSc *Wits* BSc (Hons) MSc *Cape Town*
G Ractliffe, BSc (Hons) PhD *Cape Town*

MARINE BIOLOGY RESEARCH CENTRE
Director:
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Associates:
C Attwood, BSc (Hons) PhD *Cape Town*
J J Bolton, BSc (Hons) PhD *Liverpool*
G M Branch, BSc (Hons) PhD *Cape Town* FRSSAf
J G Field, BSc (Hons) PhD *Cape Town* FRSSAf
A Jarre, MSc Kiel PhD Bremen
M I Lucas, BSc (Hons) PhD *Wales*
C L Moloney, BSc (Hons) PhD *Cape Town*
D Pillay, BSc (Hons) PhD *UKZN*
L Shannon, BSc (Hons) PhD *Cape Town*
Honorary Research Associates:
L Atkinson, MSc PhD *Cape Town*
R Barlow, MSc *Natal* PhD *Cape Town*
A Cockroft,MSc PhD *UPE*
D Durholtz, BSc (Hons) PhD *Cape Town*
J A Huggett, MSc PhD *Cape Town*
K Hutchings, BSc (Hons) PhD Cape Town
S Kerwath, MSc *Erlangen* PhD *Rhodes*
R W Leslie, BSc *Stellenbosch* PhD *Wits*
B Paterson, MA *Aachen* PhD *Cape Town*
G Pitcher, BSc (Hons) *Natal* PhD *Cape Town*
T Samaai, BSc (Hons) *IC London* PhD *UWC*
C van der Lingen, BSc (Hons) *Rhodes* PhD *Cape Town*
H Verheye, MSc *Ghent* PhD *Cape Town*
D Yemane, BSc *Asmara* PhD *Cape Town*
Scientific Officers:
G E Smith BSc *Cape Town*

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

WEED BIOLOGICAL CONTROL UNIT
Chief Research Officer:
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 Biological Sciences Department 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 J 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), Dr AM Muasya (wetlands and Cyperaceae), Associate Professor GA Verboom (speciation, Cape flora).
Ecology and Behaviour: Professor W Bond (Harry Bolus Chair of Botany, global change, impacts of fire, herbivory and CO_2), Adjunct 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), Dr L Khomo (soils and landscapes), Professor JJ Midgley (ecosystem dynamics, plant-animal interactions), Assoc 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 Assoc 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), Associate Professor CL Griffiths (coastal ecology, taxonomy), 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 A Amar (conservation and raptor biology), Professor TM Crowe (systematics, gamebird management), Professor G Cumming (Pola Pasvolsky Chair of Conservation Biology),

Professor PAR Hockey (avian evolutionary biology and ecology), Associate Professor PG Ryan (Seabirds, marine mammals).
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 L Underhill)
The Bolus Herbarium: Taxonomy of the Cape Flora (Curator: Mr T Trinder-Smith)
The Percy FitzPatrick Institute of African Ornithology*:* Avian Conservation Biology and Evolutionary Ecology (Director: Professor PAR Hockey)
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 (Director: Associate Professor RJ Anderson)

Undergraduate Courses

DP Requirements: In all undergraduate courses the class record comprises marks from essays, tests and practical write-ups (as well as seminars and projects in some senior courses).

First-Year Courses

BIO1000F CELL BIOLOGY

18 HEQF credits at level 5

Course co-ordinator(s): Dr S B M Chimphango

Entrance requirements: Admission will be restricted to students who have passed either NSC Physical Science or Life Science with at least 60%.

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. Chemistry concepts necessary for understanding biological processes are introduced, as well as the structure and function of cell components. Cellular respiration and the energetic relationships of photosynthesis, and cellular processes associated with nitrogen assimilation, animal physiology and animal behaviour follow. Sections dealing with genetics and cell division provide an introduction to biological diversity.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week, by arrangement.

Practicals: One afternoon per week, Monday or Tuesday or Wednesday or Thursday, 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 HEQF credits at level 5

Course co-ordinator(s): To be advised

Entrance 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.

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 for BIO1000F). It 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. Note that BIO1000H is equivalent to BIO1000F in level, credit value and as prerequisite for certain other courses.

Course outline:

The content includes basic biological principles and processes at a cellular level that provide an essential grounding for future study in life sciences. Chemistry concepts necessary for understanding biological processes are introduced, as well as the structure and function of cell components. Cellular respiration and the energetic relationships of photosynthesis, and cellular processes associated with nitrogen assimilation, animal physiology and animal behaviour follow. Sections dealing with genetics and cell division provide an introduction to biological diversity.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week, by arrangement.

Practicals: One afternoon per week, Monday or Tuesday or Wednesday or Thursday, 14h00-17h00.

DP requirements: Attendance at 90% of the practicals, completing the project 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.

BIO1004S BIOLOGICAL DIVERSITY

18 HEQF credits at level 5

Course co-ordinator(s): Dr L Khomo

Entrance requirements: BIO1000F or a pass at 60% in Life Sciences or by permission of the Head of Department.

Course outline:

An investigation of a range of plants and animals to illustrate the diversity and complexity of living things. 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. Interdependence of organisms in South African biomes. Plant/animal symbiosis, mutualism and parasitism.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical per week, Monday, Tuesday, Wednesday, Thursday or Friday, 14h00-17h00. Practicals will examine animal and plant diversity.

Fieldwork: A compulsory one-day excursion will be held over a weekend.

DP requirements: Attendance at practicals and an average of 50% for the practical record.

Assessment: Class record counts 40%; one 2-hour theory paper written in November counts 40% (subminimum of 40% applies); one 1.5-hour practical examination written in November counts 20%.

Second-Year Courses

BIO2010F PRINCIPLES OF ECOLOGY & EVOLUTION

24 HEQF credits at level 6

Course co-ordinator(s): Professor C L Griffiths

Entrance requirements: BIO1000F, BIO1004S.

Course outline:

This course explains how species have evolved and are 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; animal and plant life histories and interactions. The formal lectures and practicals will be supported by a 5-day compulsory field camp.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	

Tutorials: One per week, Friday 1st period (if required)

Practicals: One practical per week, Monday, 14h00-17h00.

Fieldwork: One 5 day field trip during April vacation.

DP requirements: 50% for class record; submission of assignments on schedule and attendance at field camp held during the Easter vacation.

Assessment: A 2-hour theory examination will count for 50% of the course with a sub-minimum of 40%. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 15%; project based on field camp data collection counts 20%; one class test counts 15%.

BIO2011S LIFE ON LAND: ANIMALS

24 HEQF credits at level 6

NOTE: This course replaces BIO3012F & BIO2002S

Course co-ordinator(s): Associate Professor M Picker

Entrance requirements: BIO1000F, BIO1004S.

Course outline:

This course will familiarise 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), paying special attention to the major adaptations required for life on land.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	

Tutorials: One per week, Friday, 4th period.

Practicals: One practical per week, Monday, 14h00-17h00.

Fieldwork: One 5 day field trip during September vacation.

DP requirements: 50% for class record; submission of assignments on schedule and attendance at a 5 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 with a sub-minimum of 40% for the combined mark (theory & practical). Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 10%; project based on field camp data collection counts 20%; two class tests count 20%

.

BIO2012S LIFE ON LAND: PLANTS

24 HEQF credits at level 6

Course co-ordinator(s): Associate Professor M D Cramer

Entrance requirements: BIO1000F, BIO1004S

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Thursday, 14h00-17h00, and a compulsory field excursion.

DP requirements: Minimum of 40% for class record and attendance at practicals and five day field camp.

Assessment: Class record counts 50% (tests count 15%; practicals (assessed weekly) count 10%; project counts 25%); two 2-hour written examinations in November each count 25%. A subminimum of 40% is required for examinations.

BIO2013F LIFE IN THE SEA

24 HEQF credits at level 6

NOTE: This course replaces BIO2009S.

Course co-ordinator(s): Dr D Pillay

Entrance requirements: BIO1000F, BIO1004S.

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	

Tutorials: One per week, Friday, 3rd period.

Practicals: One practical per week, Wednesday, 14h00-17h00.

Fieldwork: One 4-day field trip during April vacation

DP requirements: 50% for class record; submission of assignments on schedule; attendance at field camp.

Assessment: A 2-hour theory examination will count for 50% of the course with a sub-minimum of 40%. Coursework marks will be allocated as follows: Practical classes (assessed weekly) count 10%; project counts 25%; class tests count 15%.

Third-Year Courses

BIO3002F MARINE ECOSYSTEMS

36 HEQF credits at level 7

NOTE: This course replaces BIO3002S.

Course co-ordinator(s): Associate Professor M I Lucas

Entrance requirements: SEA2004F, BIO2013F/S

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 (eg. 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: By arrangement

Practicals: One practical per week, Wednesday, 14h00-17h00.

Fieldwork: A compulsory 5 day field camp during February.

DP requirements: 50% for class record; submission of assignments on schedule and attendance at field camp.

Assessment: A 3-hour theory exam written in June will count for 50% of the course with a sub-minimum of 40%. Course work marks will be allocated as follows: project based on field camp data collection counts 25%; two class tests count 10% each; essay counts 5%.

BIO3013F GLOBAL CHANGE ECOLOGY

36 HEQF credits at level 7

Course co-ordinator(s): Dr A West

Entrance requirements: BIO1000F, BIO1004S

Course outline:

How are organisms and ecosystems affected by the drivers of global environmental change? This course begins with a brief overview of key drivers of global environmental change, including both natural (e.g. Milankovich cycles) and anthropogenic "forcings" (e.g. greenhouse gas emissions, nitrogen deposition and pollution, land-use change). It then examines how these drivers influence (and are influenced by) primary productivity, nutrient cycling, water relations and vegetation-climate feedbacks. Biological responses to global change are examined in the context of marine, freshwater and terrestrial ecosystems. The course provides an integrated knowledge of contemporary environmental issues related to global change (e.g. carbon sequestration, climate change mitigation, and dynamic global vegetation models).

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Monday, 14h00-17h00.

DP requirements: Minimum of 40% for class record.

Assessment: Class record counts 50% (practicals 20%, tests 15% and projects 15%); two 2-hour written examinations in June count 25% each. A subminimum of 40% is required in examinations.

BIO3014S CONSERVATION: GENES, POPULATIONS & BIODIVERSITY

36 HEQF credits at level 7

Course co-ordinator(s): Dr J Bishop

Entrance 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 at the level of genes, species, populations and ecosystems, starting with the understanding of conservation at the genetic level as well as the management of genetic diversity are explored. At the species and population levels, the life history, behaviour and 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, and threats by alien plants and animals. This course concludes by considering conservation and society. Issues to be considered here include: incentives, access, who benefits from conservation, legal aspects and management policies.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Tutorials: By arrangment

Practicals: One practical per week, Monday, 14h00-17h00.

Fieldwork: A compulsory 2-day field trip during the September vacation.

DP requirements: Submission of assignments by due date and 50% subminimum.

Assessment: A single 3-hour theory examination will count 50% of the course marks, with a sub-minimum of 40%. Coursework counts 50% with marks allocated to tests (20%), practicals (5%), project (15%) and term paper (10%).

BIO3015F ECOSYSTEM ECOLOGY

36 HEQF credits at level 7

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.

Course co-ordinator(s): Professor J J Midgley

Entrance requirements: BIO2010F

Course outline:

This course focuses on terrestrial and freshwater ecosystems, especially of Africa. Lectures take place mainly on a field camp where there is ample opportunity for practicals and individual projects. Typical practicals concern the distribution and impact of small mammals and large herbivores, succession between fynbos and forest, the role of soil water on ecosystem attributes and freshwater vlei and river dynamics. The course begins with an introduction to ecosystem ecology and the role of abiotic factors (such as nutrients, fire and water) and biotic factors (such as predation). The issue of scale, both spatial (from metres to kilometres) and temporal (for days to millennia) is considered as is the issue of scaling and scaling-up in ecosystem ecology. Trophic ecology, the causes and consequences of the elimination of predators is discussed, with examples from Africa. Besides developing field work skills in ecosystem ecology, students will also develop modelling skills including simple demographic and succession models. Finally, the dynamics, management and conservation of Africa's terrestrial and freshwater resources are studied.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: By arrangement.

Practicals: By arrangement.

DP requirements: A minimum of 40% for class record, attendance of two week field camp.

Assessment: Class record counts 50% (practicals 25%, project based on field camp data collection 10%, class test 10%, seminars 10%); one 2-hour theory examination and one 2-hour practical examination written in March/April each count 25%. A subminimum of 40% is required in examinations.

BIO3016S SYSTEMATICS & MACROEVOLUTION

36 HEQF credits at level 7

Course co-ordinator(s): Dr A M Muasya

Entrance 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, naming and description of previously-undescribed species. Thereafter, the focus shifts to the inference of phylogenetic (evolutionary) relationships amongst species, with an emphasis on the data (morphological, molecular) and analytical methods (parsimony, likelihood, Bayesian) employed in phylogeny reconstruction. Following on from this, the utility of phylogenetic data in the study of macroevolution is explored, specifically in relation to the study of adaptation, key innovation, evolutionary radiation and molecular dating. Students will also be introduced to

several key biodiversity initiatives including the Tree of Life Project and The Consortium for the Barcode of Life.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical per week, Tuesday, 14h00-17h00.

DP requirements: Minimum of 40% for class record and attendance at weekend field camp.

Assessment: Class record counts 50% (practicals and tutorials 20%, class tests 30%; two 2-hour written examinations in November each count 25%. A subminimum of 40% is required in examinations.

BIO3017S MARINE RESOURCES

36 HEQF credits at level 7

Course co-ordinator(s): Associate Professor C Attwood

Entrance requirements: BIO1000F, BIO1004S, BIO2013F/S

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical per week, Friday, 14h00-17h00.

Fieldwork: A compulsory 2-day field trip.

DP requirements: 50% for class record; submission of assignments on schedule.

Assessment: A 3-hour theory examination will count for 50% of the course marks, with a sub-minimum of 40%. Coursework marks will be allocated as follows: Practical classes count 30%; two class tests count 20%.

Postgraduate Courses

BIO4000W BSc (HONS) IN BIOLOGICAL SCIENCES

160 HEQF credits at level 8

(includes research project of 72 credits)

Course co-ordinator(s): Associate Professor G A Verboom

Entrance 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 field work. In addition to a compulsory coursework module, students are required to choose 8 elective modules. Students are also expected to conduct research project/s.

Assessment: Two written examinations count 16%; two projects count 45%; theory and research seminars (one of each) count 5% each; compulsory coursework counts 9%; and elective module coursework counts 20%. The non-project component of the course carries a sub-minimum of 45%. The project component must be passed at 50%.

BIO4001W BSc (HONS) IN MARINE BIOLOGY

160 HEQF credits at level 8

(includes research project of 72 credits)

Course co-ordinator(s): Associate Professor C Atwood

Entrance 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 a compulsory coursework module, students are required to choose 8 elective modules. Students are also expected to conduct research project/s. The projects, theory seminar and project seminar have to be on marine topics, and at least four marine electives must be selected.

Assessment: Two written examinations count 16%; Project/s count 45%; theory and research seminars (one of each) count 5% each; compulsory coursework counts 9%; and elective module coursework counts 20%. The non-project component of the course carries a sub-minimum of 45%. The project component must be passed at 50%.

BIO5000W MASTERS IN BOTANY

180 HEQF credits at level 9

Training in research techniques leading to a dissertation. General rules for this degree may be found at the front of the handbook.

BIO5004W MASTERS IN ZOOLOGY

180 HEQF credits at level 9

Training in research techniques leading to a dissertation. General rules for this degree may be found at the front of the handbook.

BIO5005H and BIO5006W MASTERS IN APPLIED MARINE SCIENCE

(by coursework and minor dissertation)

Coursework (BIO5005H): 90 HEQF credits at level 9

Minor Dissertation (BIO5006W): 90 HEQF credits at level 9

Course co-ordinator(s): Associate Professor C L Moloney

Course outline:

The objective of this Masters by coursework and dissertation is to provide skills and specialised knowledge appropriate for a broad range of disciplines in marine science. The course is intended for professional scientists interested in applied aspects of marine science, where broadly-based, practical skills are required, often in a management context. The course has two components. Component 1 (BIO5005H) 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, biostatistics, marine environmental law, fisheries and population modelling, aquaculture, remote sensing, ocean modelling techniques, multivariate analysis, marine conservation, project management, building a habitable planet, ecosystem approach to fisheries management, decision analysis, marine meteorology and integrated coastal management. The modules are conducted in a classroom setting involving lectures and tutorials, and field and laboratory practicals.

Each student is 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. The research undertaken in component 2 (BIO5006W) must be submitted as a dissertation. The expected duration of the research component is 5-6 months.

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: Both coursework and dissertation components must be passed separately for the degree to be awarded. Of the coursework component, class assessments will count 60% and two formal examinations will count 40%.

BIO5007H and BIO5008W MASTERS IN CONSERVATION BIOLOGY

(by coursework and minor dissertation)

Coursework (BIO5007H): 90 HEQF credits at level 9

Minor Dissertation (BIO5008W): 90 HEQF credits at level 9

Course co-ordinator(s): Professor G S Cumming and Associate Professor P G Ryan

Course outline:

A one-year intensive programme deals with the conservation and biologically sustainable and economically viable use of biodiversity. It provides the education and training necessary to identify threatened species, ecosystems and ecological processes, and to develop appropriate measures to mitigate against, or reduce the effects of, particular threats to biodiversity. From a utilisation perspective, it focuses on biological and socio-economic criteria necessary to select species and areas of utilisation and the development of appropriate management and monitoring strategies. This programme is intended for students concerned with both the theory and practise of conservation and consists of two components. Component 1 (BIO5007H) is a series of modules covering a range of fields of conservation biology: philosophy of science and conservation ethics; community ecology, population ecology, biodiversity basics, ecosystem/aquatic ecology, disturbance and restoration ecology, invasive species, complex systems concepts, landscape ecology, GIS and conservation planning, climate change and conservation, resource economics, conservation genetics, societies and natural resources. Each student receives a mark for each of the modules, and the modules are examined in groups during 'open-book' examinations. Component 2 is a research project (BIO5008W) which must be submitted as a dissertation. A pass in both components is required for the degree. It should be completed by mid-February following first registration. 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 (see below). A handbook for the programme is available from the Percy Fitpatrick Institute's website: www.fitzpatrick.uct.ac.za.

Assessment: Coursework and dissertation components each constitute 50% to the final grade; both must be passed separately for the degree to be awarded.

BIO5009W MASTERS IN CONSERVATION BIOLOGY

180 HEQF credits at level 9

A training in research leading to a dissertation in the field of conservation biology. General rules for this degree may be found at the front of this handbook.

BIO6000W PhD IN BOTANY

360 HEQF credits at level 10

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

BIO6001W PhD IN ZOOLOGY

360 HEQF credits at level 10

This research degree is offered in a number of specialised zoological fields, eg. marine ecology, animal behaviour, freshwater biology, ornithology, entomology, mammalogy and environmental physiology. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

BIO6002W PhD IN CONSERVATION BIOLOGY

360 HEQF credits at level 10

This is a research degree in all aspects of conservation biology. 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.

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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:
M R Caira, MSc PhD *Cape Town* Dr Hon Causa Univ Med Pharm 'Iuliu Hatieganu' *Romania*
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:
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Associate Professors:
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D W Gammon, BSc (Hons) PhD HDE *Cape Town* MSACI
A T Hutton, MSc PhD *Cape Town* CChem MRSC MSACI
N Ravenscroft, BSc (Hons) PhD *Cape Town* MSACI
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G S Smith, BSc *Natal* BSc (Hons) MSc PhD *UWC* MSACI
S Wilson, BSc (Hons) PhD *Cape Town*
Lecturers:
C L Oliver, BSc (Hons) PhD *Cape Town*
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Principal Technical Officers:
P D de Kock, BEng MEng *Stell*
A de Jager
Chief Technical Officers:
A D Joseph
G Hesselink
Senior Technical Officers:
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P Roberts
Technical Officer:
K Willis
Assistant Technical Officer:
M McLean, N Dipl Anal Chem *CPUT*
Departmental Admin istrative Manager:
S Manie
Administrative Officer:
K Badenhorst
Administrative Assistants:
L M Bezuidenhout
D C Brooks
L Kleinsmidt (part-time) BA HDE *UWC*
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Senior Secretaries:
L Lalbahadur
S D Naicker
P Smit
Departmental Assistants:
S Y Dyule-Nozewu
F Esau
E Jooste
A M Khoapa
G M Mlungu
N Ngamani
J Paulse
K M Sigam
C M Stanley
Workshop Assistant:
Y Ely

RESEARCH IN CHEMISTRY

The Department of Chemistry is equipped for many and varied research activities. In addition to a microanalytical service, gas-liquid chromatography, high-speed liquid chromatography and other routine facilities, major items of modern physical equipment include NMR (Varian VXR 200, Mercury 300 multi-nuclear and solid-state spectrometers) and atomic absorption spectrometers (flame and graphite furnace), an inductively-coupled plasma spectrometer, mid-IR spectrophotometers, UV-visible spectrophotometers, X-ray generators and single-crystal diffractometers (four-circle and CCD detector) for crystallographic studies, a spectropolarimeter, and workstations for both thermal and electrochemical analysis. The Department is also fortunate in

having the opportunity of utilising facilities in other departments within the University. In terms of computing the Department has several research and teaching microlabs, several workstations for molecular modelling, workstations for the processing of NMR data, and full access to the local area network.
In its Strategic Plan the Department has affirmed the central importance of the sub-disciplines of Inorganic, Organic and Physical Chemistry, and their applications in synthesis and analysis. These three themes constitute the essential pillars of the discipline of Chemistry. The Department wishes to consolidate and strengthen four main focus areas for its research activities:
Synthetic and medicinal chemistry - the discovery, design, synthesis and activity of bio-active molecules (M R Caira, K Chibale, T J Egan, D W Gammon, R Hunter, G E Jackson, M A Jardine, N Ravenscroft).
Supramolecular chemistry - the application of X-ray diffraction and other physical methods to the understanding of inclusion phenomena and other molecular associations (S A Bourne, M R Caira, L R Nassimbeni, C L Oliver).
Transition metal chemistry - the discovery, design, synthesis and properties of new coordination and organometallic compounds of the transition metals with potential applications as materials or catalysts (A T Hutton, G S Smith).
Biophysical and structural chemistry - the application of spectroscopic, diffraction and computational methods to the understanding of molecular and macromolecular phenomena (T J Egan, G E Jackson, K J Naidoo, N Ravenscroft, A L Rodgers, G A Venter).
Research is also carried out on aspects of *chemistry education* - curriculum design, writing and communication within the discipline (B Davidowitz).
Further information may be found on the Department's website at http://www.uct.ac.za/depts/cem

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.

Textbooks:
The lecturers in charge of each course will advise students at the commencement of the course on the textbooks required and recommended.

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 and the Built Environment. CEM1009H and CEM1010F 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.
The practical courses are designed to test and apply the principles discussed in the lectures, and include titrimetric analysis, introductory instrumental techniques and the preparation and reactions of organic compounds.

CEM1000W CHEMISTRY 1000

36 HEQF credits at level 5

Course co-ordinator(s): Dr G S Smith

Entrance 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%.

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.

Course outline:

Microscopic and macroscopic concepts, atomic structure, chemical bonding and molecular structure, chemistry of the elements and inorganic chemistry, chemical equilibrium, acids and bases, solubility products, chemical analysis, phases of matter, thermodynamics and thermochemistry, colligative properties, oxidation and reduction, electrochemistry, chemical kinetics and radiochemistry. Introduction to structure and reactivity in organic chemistry and the language of organic chemistry; describing and predicting organic reactivity; introduction to the structure, properties and reactivity of biologically important molecules.

Lectures: Four lectures per week, Monday to Wednesday and Friday, 2nd or 4th period.

Tutorials: One tutorial per week, Thursday, 2nd or 4th period.

Practicals: One practical per week, Tuesday, Thursday or Friday, 14h00-17h00.

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

Assessment: Class record (comprising tests and practicals) counts 50%; one 3-hour paper written in November counts 50%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

CEM1009H CHEMISTRY 1009

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor B Davidowitz

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

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). It 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. Note that the combination of CEM1009H and CEM1010F is equivalent to CEM1000W in level, credit value and as prerequisite for certain other courses.

Course outline:

Microscopic and macroscopic worlds, gases, atomic structure, chemical bonding and molecular structure, introduction to acids and bases, solutions, thermochemistry, kinetics, chemical equilibrium, acid-base equilibria, introduction to the language of organic chemistry, functional groups and isomers in organic chemistry.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:			4	4	4

Tutorials: Two tutorials per week, Monday and Tuesday, 4th period.

Practicals: One practical per week, Wednesday, 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 and practicals) counts 50%; one 2-hour paper written in November counts 50%. It is necessary to pass the theory examination and the whole course in order

to secure an overall pass.

CEM1010F CHEMISTRY 1010

18 HEQF credits at level 5

This half course is taken by students who have completed CEM1009H during the previous academic year. The half courses CEM1009H and CEM1010F together are equivalent to the first-year full course CEM1000W.

Course co-ordinator(s): Associate Professor A T Hutton

Entrance requirements: CEM1009H

Course outline:

Volumetric analysis, chemical bonding, the solid state, liquids, colligative properties of solutions, acid-base equilibria, solubility products, chemical kinetics, oxidation and reduction, electrochemistry, introductory thermodynamics, describing and predicting organic reactivity, introduction to the structure, properties and reactivity of biologically important molecules.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Tutorials: One tutorial per week, by arrangement.

Practicals: One practical per week, Thursday, 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 paper written in June counts 50%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

Second-Year Courses

CEM2007F and CEM2008S are required courses for students proceeding to a major in Chemistry.

CEM2007F PHYSICAL CHEMISTRY & SPECTROSCOPY

24 HEQF credits at level 6

Course co-ordinator(s): Dr G A Venter

Entrance requirements: CEM1000W (or equivalent), 1000-level full course in Physics, 1000-level full or semester course in Mathematics; concurrent registration for STA1000F/S is highly recommended.

Course outline:

Introduction to spectroscopy, molecular spectroscopy, thermodynamics, phase equilibria, electrochemistry, kinetics, solid-state chemistry. The practical course covers the lectured material.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: Six tutorials per semester, by arrangement

Practicals: One practical per week, Thursday, 13h30-17h00.

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

Assessment: Class record (comprising tests and practicals) counts 50%; one 2-hour paper written in June counts 50%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

CEM2008S ORGANIC & INORGANIC CHEMISTRY

24 HEQF credits at level 6

Course co-ordinator(s): Dr A Jardine

Entrance requirements: CEM1000W (or equivalent), 1000-level full course in Physics, 1000-level full or semester course in Mathematics, DP certificate for CEM2007F.

Course outline:

Main-group chemistry and trends in the Periodic Table, chemistry of the transition metals and co-ordination chemistry, structure elucidation of organic molecules, organic reactivity, reaction mechanisms and stereochemistry, elimination reactions and carbonyl group reactivity, substitution and addition reactions, chemical biology. The practical course covers the lectured material.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week, by arrangement.

Practicals: One practical per week, Thursday, 13h30-17h00.

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

Assessment: Class record (comprising tests and practicals) counts 50%; one 2-hour paper written in November counts 50%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

Third-Year Courses

CEM3005W is the required course for students proceeding to a major in Chemistry.

CEM3005W CHEMISTRY 3005

72 HEQF credits at level 7

Course co-ordinator(s): Professor M R Caira

Entrance requirements: CEM2007F and CEM2008S, 1000-level full course in Mathematics; completion of or concurrent registration for STA1000F/S is highly recommended.

Course outline:

Wave mechanics and spectroscopy, adsorption and heterogeneous catalysis, X-ray crystallography, dynamics, inorganic reaction mechanisms, organometallic chemistry, organic structure and reactivity, organic synthesis, organic dynamic stereochemistry. The practical course covers the lectured material.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: Two practicals per week, Wednesday and Friday, 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 papers written in November count 50% towards the final mark. It is necessary to pass the theory examination and the whole course to secure an overall pass.

Postgraduate Courses

CEM4000W BSc (HONS) IN CHEMISTRY

160 HEQF credits at level 8

(includes a research project of 66 credits)

Course co-ordinator(s): Professor T J Egan

Entrance 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.

NOTE: Entrance is limited to 16 students.

Course outline:

The programme starts at the end of January with a four-week course on *modern instrumental methods and group theory*, providing a strong grounding in key instrumental techniques that are extensively used in modern chemistry. It includes theory lectures and hands-on practical work in NMR spectroscopy, X-ray methods of analysis, separation methods, modern electrochemical methods, and group theory.

This is followed by the *core lecture course*, providing the basic conceptual tools in inorganic, organic and physical chemistry. It is tested by written examination in June and comprises 40 lectures in each of inorganic chemistry (aqueous coordination chemistry, organometallic chemistry, bioinorganic chemistry and catalysis), organic chemistry (organic synthesis in action, the third dimension in organic reactions, asymmetric synthesis and advanced reagents in organic synthesis) and physical chemistry (statistical thermodynamics, quantum chemistry, solid state chemistry and liquids).

This leads to the *research project*, lasting from August to November, in which each student chooses a research project of personal interest. There is a two-week period to prepare and present a full research proposal, and then ten weeks of full-time research work in the laboratory of an academic member of staff, culminating in the presentation of a short dissertation and an oral presentation to the Department. Training in oral communication is also carried out in the second semester.

Lectures: 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, complete the Modern Instrumental Methods and Group Theory module, all practical work, tutorial assignments, generic skills course and any other compulsory activities.

CEM5000W MASTERS IN CHEMISTRY

180 HEQF credits at level 9

Candidates must submit a dissertation on an approved research topic. General rules for this degree may be found at the front of the handbook.

CEM5004W MASTERS IN TERTIARY CHEMISTRY EDUCATION

180 HEQF credits at level 9

Candidates must submit a dissertation on an approved research topic. General rules for this degree may be found at the front of the handbook.

CEM6000W PhD IN CHEMISTRY

360 HEQF credits at level 10

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 PhD IN TERTIARY CHEMISTRY EDUCATION

360 HEQF credits at level 10

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) 689-9465
The Departmental abbreviation for Computer Science is CSC.

Associate Professor and Head of Department:
S Berman, BSc *Rhodes* MSc PhD *Cape Town*
Professors:
E H Blake, BSc (Hons) *Wits* PhD *London*
G Marsden, BSc (Hons) PhD *Stirling*
Associate Professor:
J E Gain, MSc *Rhodes* PhD *Cantab*
M Kuttel, MSc PhD *Cape Town*
H Suleman, MSc *UDW* PhD *Virginia Tech*
Senior Lecturers:
A Bagula, MEng *UCL* MSc *Stell* PhD *KTH*
A Kayem, MSc *Yaoundé* PhD *Queens*
H Le, BA BSc *Hanoi* PhD *UTS*
P C Marais, MSc *Cape Town* DPhil *Oxon*
A Mbogho, MS PhD *City Univ of New York*
G Nitschke, BSc (Hons) *Curtin* PhD *VU Amsterdam*
Lecturer:
G Stewart BSc (Hons) *Cape Town*
Honorary Professor:
J Bishop, BSc (Hons) *Rhodes* MSc *Natal* PhD *Southampton*
Adjunct Professor:
A C M Hutchison, MSc HDE (PG) Sec *Cape Town* PhD *Zurich*
Computer System Manager:
C Balfour, BSocSci *Cape Town* BA (SS) Hons *UNISA*
Administrative Officer:
S Valley
Administrative Assistant:
E M Gill
Senior Secretary:
T Jeneker
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 hosts investigations into all aspects of high performance and high throughput computing, including: parallel architectures and algorithms; scientific computing; high performance visualisation; large-scale information retrieval; high-performance digital archives; grid and volunteer computing; software optimization; and multi-core and GPU programming.
ICT FOR DEVELOPMENT CENTRE (Director: Professor G Marsden). 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.
INTELLIGENT SYSTEMS AND ADVANCED TELECOMMUNICATIONS (Co-ordinator: Dr A Bagula). The aim of this research group is to advance the science and engineering of intelligent systems and their applications. Main research activities are in the design, modelling, simulation and prototype implementation of intelligent systems with a specific focus on (1) novel speech and vision based human computer interaction and (2) exact and heuristic optimisation methods using Evolutionary techniques, Neural networks, Immune systems and Statistical models to solve telecommunication problems.
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

First-Year Courses

CSC1010H COMPUTER SCIENCE 1010

18 HEQF credits at level 5

Course co-ordinator(s): Mr G Stewart

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

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). It 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. Note that CSC1010H is equivalent to CSC1015F in level, credit value and as prerequisite for certain other courses.

Course outline:

As for CSC1015F

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	This includes one tutorial per week.

Practicals: One practical per week, Thursdays, 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 paper written in November counts 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

NOTE: Credit will not be given for CSC1015F and CSC1016S together with any of the following: CSC1010H, CSC1011H.

CSC1011H COMPUTER SCIENCE 1011

18 HEQF credits at level 5

This course is part of the General Entry Programme for Science, and, from 2014, the Science Extended Degree Programme.

Course co-ordinator(s): Mr G Stewart

Entrance requirements: CSC1010H, MAM1005H

Course outline:

Problem solving and programming in Python. Object-oriented design. Advanced programming constructs and techniques using Java. Linear abstract data structures. Binary trees and their applications. Event-driven programming, graphics and graphical user interfaces. Ethics and professional issues in computing.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	This includes one tutorial per week

Practicals: One practical per week, Mondays, 14h00-17h30.

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

Assessment: Theory tests count 25%; practical tests and practical assignments count 25%; one 3-hour paper written in November counts 50%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1015F COMPUTER SCIENCE 1015

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor J Gain

Entrance 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 CEM1010H from week 7.

Course outline:

Introduction to computing and applications. Problem solving and algorithm development in Python. Fundamental programming constructs and abstractions. Number representation, boolean algebra and logic gates.

Lectures: 4th or 5th period daily. This includes one tutorial per week.

Practicals: One practical per week, Monday, Tuesday or Wednesday, 14h00-17h30.

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

Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 2-hour paper written in June counts 60%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC1016S COMPUTER SCIENCE 1016

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor J Gain

Entrance requirements: CSC1015F (or supp for CSC1015F)

Course outline:

Object-oriented design. Advanced programming constructs and techniques using Java. Linear abstract data structures. Binary trees and their applications. Event-driven programming, graphics and graphical user interfaces. Ethics and professional issues in computing.

Lectures: 4th or 5th period daily. This includes one tutorial per week.

Practicals: One practical per week, Monday, Tuesday or Wednesday, 14h00-17h30.

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

Assessment: Theory tests count 15%; practical tests and practical assignments count 25%; one 2-hour paper written in November counts 60%. Subminima: 45% for practicals and 45% on weighted average of theory tests and examination.

Second-Year Courses

CSC2001F COMPUTER SCIENCE 2001

24 HEQF credits at level 6

Course co-ordinator(s): Dr A Bagula

Entrance requirements: CSC1016S or CSC1011H, MAM1000W or equivalent. It is STRONGLY recommended that students register concurrently for second-year courses in Mathematics, Applied Mathematics or Statistics.

Course outline:

Object-oriented design. Data structures: Abstract data types and assertions; Linear structures - lists, strings, stacks, queues; Recursive algorithms, tree structures - binary trees, AVL trees, B-Trees; Graphs - Graph traversals, minimum spanning trees, sets, hashing, priority queues.

Database systems: Conceptual modelling, design, query and manipulation of relational databases.

	Period					
	Mon	**Tue**	**Wed**	**Thu**	**Fri**	
Lectures:	2	2	2	2	2	Four or five lectures per week.

Practicals: One 4-hour practical per week, Monday to Friday, 14h00-18h00.

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

Assessment: Tests count for 16.7%; practicals and projects 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 HEQF credits at level 6

Course co-ordinator(s): Dr A Bagula

Entrance requirements: CSC2001F (or supp for CSC2001F), MAM1000W or equivalent. It is strongly recommended that students register concurrently for second-year courses in Mathematics, Applied Mathematics or Statistics.

Course outline:

Mobile application development and interface design. Computer architecture and introduction to assembler programming. Multicore computers. Concurrent programming.

	Period					
	Mon	**Tue**	**Wed**	**Thu**	**Fri**	
Lectures:	2	2	2	2	2	Four lectures per week.

Practicals: One 4-hour practical per week, Monday to Friday, 14h00-18h00.

DP requirements: Minimum of 45% aggregate in practical work and minimum of 50% in practical test.

Assessment: Tests count for 16.7%; practicals, 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.

CSC2003S COMPUTER GAMES

24 HEQF credits at level 6

Course co-ordinator(s): Dr P Marais

Entrance requirements: CSC2001F, MAM1000W or equivalent.

Course outline:

Introduction - History of Games, Genres of Games Playability and Design - Play, Design Process,

Design Documents. 2D Game Programming - Game APIs, Game Technology, Interaction. Text-based Games. Al/Simulation - Simulation and Search Strategies.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Four lectures and 1 tutorial per week.

Practicals: One 4-hour practical per week, Monday to Friday, 14h00-18h00.

DP requirements: Minimum of 45% aggregate in practical work, minimum of 50% in practical test and minimum of 40% in theory tests.

Assessment: Tests count for 16.7%; practicals, practical test and projects count 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% on weighted average of theory tests and examination.

Third-Year Courses

CSC3002F COMPUTER SCIENCE 3002

36 HEQF credits at level 7

Course co-ordinator(s): Professor E Blake

Entrance requirements: CSC2001F and CSC2002S. It is strongly recommended that students should have completed a second-year course in Mathematics, Applied Mathematics or Statistics.

Course outline:

Networks, Operating Systems, Functional Programming

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: Two 4-hour practicals per week, Monday to Friday, 14h00-18h00.

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

Assessment: Tests count 15%; practical work counts 35%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals; 45% on weighted average of theory tests and examination.

CSC3003S COMPUTER SCIENCE 3003

36 HEQF credits at level 7

Course co-ordinator(s): Professor E Blake

Entrance requirements: As for CSC3002F.

Course outline:

Compiler construction: language and compiler design; regular expressions and automata; context-free grammars; parsing and parser generators; abstract syntax trees; scope and symbol tables; intermediate representation language translation; canonicalisation and optimisation; liveness analysis; register allocation. Design and analysis of algorithms; analysis of lower bounds; P versus NP problems, handling algorithmic complexity. Advanced software engineering: design, verification and validation; software evolution; software project management.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: Two 4-hour practicals per week, Monday to Friday, 14h00-18h00.

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

Assessment: Tests count 15%; practical work counts 35%; one 3-hour paper written in November counts 50%. Subminima: 45% for practicals, 45% on weighted average of theory tests and examination.

CSC3020H THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN

36 HEQF credits at level 7

Course co-ordinator(s): Dr P Marais

Entrance requirements: CSC2001F, CSC2002S and CSC2003S.

Course outline:

Computer Graphics for Gaming, Agents in Gaming, Multi-User and Distributed Games, Game Design.

Lectures: CSC3020H and CSC3022H together occupy 3rd period daily

Practicals: 4 hours per week, by arrangement

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

Assessment: Tests count 16.7%; practical work counts 33.3%; examinations count 50%. Subminima: 45% for practicals, 45% weighted average of theory tests and examination.

CSC3022H C++ WITH APPLICATIONS

36 HEQF credits at level 7

Course co-ordinator(s): Dr P Marais

Entrance requirements: CSC2001F, CSC2002S

Course outline:

C++ programming : Introduction to C++; pointers and memory management; streams and I/O; object orientation in C++; operator overloading; function objects; templates; the STL; C++ threading model; exceptions; design patterns/advanced topics. Introduction to machine learning: types of learning – supervised, unsupervised, evolutionary, reinforcement; overview of learning techniques; neural networks; decision tree learning; genetic algorithms.

Lectures: CSC3020H and CSC3022H together occupy 3rd period daily

Practicals: 4 hours per week, by arrangement

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

Assessment: Tests count 16.7%; practical work counts 33.3%; examinations count 50%. Subminima: 45% for practicals, 45% weighted average of theory tests and examination.

EEE3067W DIGITAL ELECTRONICS & MICROPROCESSORS

24 HEQF credits at level 7

Course co-ordinator(s): Mr S Ginsberg

Entrance requirements: CSC2001F, CSC2002S, EEE2040F or equivalent.

Course outline:

This course comprises EEE3064W: Digital Electronics & Microprocessors and EEE4096S: Neural Fuzzy & Evolving Systems, taken together as a single course. Please see Engineering and the Built Environment Faculty handbook for further details.

Lectures: EEE3064W has 48 lectures and 8 practicals; EEE4096S has 24 lectures and project(s). Refer to department.

DP requirements: Satisfactory completion of coursework in EEE3064W, *as well as* 80% submission of all assignments and satisfactory completion of a hands-on proficiency test in EEE4096S.

Assessment: Final mark for EEE3064W counts 66.7% and final mark for EEE4096S counts 33.3%.

EEE3077W DIGITAL & EMBEDDED SYSTEMS

36 HEQF credits at level 7

Course co-ordinator(s): Mr S Ginsberg

Entrance requirements: CSC2001F, CSC2002S, EEE2040F or equivalent.

Course outline:

This course comprises EEE3064W: Digital Electronics & Microprocessors and EEE3074W:

Embedded Systems, taken together as a single course. Please see Engineering and the Built Environment Faculty handbook for further details.

Lectures: EEE3064W has 48 lectures and 8 practicals; EEE3074W has 48 lectures, 6 practicals and projects. Refer to department.

DP requirements: Satisfactory completion of coursework in EEE3064W, *as well as* completion of all practical reports and project report in EEE3074W.

Assessment: Final mark for EEE3064W counts 44% and final mark for EEE3074W counts 56%.

EEE3078W DIGITAL, EMBEDDED & ADAPTIVE SYSTEMS

44 HEQF credits at level 7

Course co-ordinator(s): Mr S Ginsberg

Entrance requirements: CSC2001F, CSC2002S, EEE2040F or equivalent.

Course outline:

This course comprises EEE3064W: Digital Electronics & Microprocessors, EEE3074W: Embedded Systems and EEE4096S: Neural Fuzzy & Evolving Systems, taken together as a single course. Please see Engineering and the Built Environment Faculty handbook for further details.

Lectures: EEE3064W has 48 lectures and 8 practicals; EEE3074W has 48 lectures, 6 practicals and projects. EEE4096S has 24 lectures and project(s). Refer to department.

DP requirements: Satisfactory completion of coursework in EEE3064W, *as well as* completion of all practical reports and project report in EEE3074W; 80% submission of all assignments and satisfactory completion of a hands-on proficiency test in EEE4096S.

Assessment: Final mark for EEE3064W counts 36%, final mark for EEE4096S counts 18% and final mark for EEE3074W counts 46%.

EEE3079W EMBEDDED & ADAPTIVE SYSTEMS

28 HEQF credits at level 7

Course co-ordinator(s): Mr S Ginsberg

Entrance requirements: CSC2001F, CSC2002S, EEE2040F or equivalent.

Course outline:

This course comprises EEE3074W: Embedded Systems and EEE4096S: Neural Fuzzy & Evolving Systems, taken together as a single course. Please see Engineering and the Built Environment Faculty handbook for further details.

Lectures: EEE3074W has 48 lectures and 6 practicals and projects; EEE4096S has 24 lectures and project(s). Refer to department.

DP requirements: Completion of all practical reports and project report in EEE3074W, *as well as* 80% submission of all assignments and satisfactory completion of a hands-on proficiency test in EEE4096S.

Assessment: Final mark for EEE4096S counts 29% and final mark for EEE3074W counts 71%.

Postgraduate Courses

CSC4000W BSc (HONS) IN COMPUTER SCIENCE

160 HEQF credits at level 8

(includes research project of 60 credits)

Course co-ordinator(s): Dr A Kayem

Entrance requirements: Students must have a BSc degree in Information Technology from UCT, with an average of at least 60% in CSC3002F and CSC3003S. Registrations are limited to 45.

Course outline:

A pamphlet outling the year's programme is available from the Department (and at http://www.cs.uct.ac.za/teaching). A major research project makes up 60 credits and the remaining 100 credits is calculated from the coursework modules. The modules given vary from year to year

but will typically be a selection from: Research Methods (compulsory), New Venture Planning (compulsory), Distributed Systems, Database 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, Intelligent Systems Design, Parallel and Multicore Computing, Wireless Sensor Networks. Some courses may also be taken from other departments, with approval of the Honours Course Co-ordinator.

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 3/8 of the total (60 credits out of 160). The remaining 5/8 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%.

CSC4016W BSc (HONS) IN INFORMATION TECHNOLOGY

160 HEQF credits at level 8

(includes research project of 60 credits)

Course co-ordinator(s): Dr A Kayem

Entrance requirements: Entrance requirement is a Bachelors degree with a major in Computer Science or related field. Students must have an average of at least 60% in the major. Combined entry to CSC4000W and CSC4016W is limited by available resources and is restricted to 45 students; 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.

Course outline:

A pamphlet outlining the year's programme is available from the Department (and at http://www.cs.uct.ac.za/teaching). A major research project makes up 60 credits and the remaining 100 credits is calculated from the coursework modules. The modules given vary from year to year but will typically be a selection from: Research Methods (compulsory), New Venture Planning (compulsory), Distributed Systems, Database 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, Intelligent Systems Design, Parallel and Multicore Computing, Wireless Sensor Networks. Some courses may also be taken from other departments, with approval of the Honours Course Co-ordinator.

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 3/8 of the total (60 credits out of 160). The remaining 5/8 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%.

MAM4007W BSc (HONS) IN MATHEMATICS OF COMPUTER SCIENCE

See details under the Department of Mathematics and Applied Mathematics.

CSC5000W MASTERS IN COMPUTER SCIENCE

180 HEQF credits at level 9

Course co-ordinator(s): Dr G Nitschke

Entrance requirements: A relevant Honours degree or four year equivalent.

Course outline:

Certain applicants who are graduates of universities other than the University of Cape Town may be required to complete specified courses. Continued registration is dependent upon successful completion of these courses.

This degree may be conferred after satisfactory completion of a dissertation embodying research under the guidance of an approved supervisor. The normal duration of the course is two years although it may be completed in one year.The Department has a research programme in association with industry and, depending on the research topic, additional funding may be available. General rules for this degree may be found in the front of the handbook.

CSC5001W and CSC5002W MASTERS IN COMPUTER SCIENCE

(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor dissertation: 90 HEQF credits at level 9

Course co-ordinator(s): Dr G Nitschke

Entrance requirements: A relevant Honours degree or four year equivalent.

Course outline:

Candidates are required to complete coursework (CSC5001W) involving studies in database theory, computer networks and protocols, artificial intelligence, computer graphics, distributed computing and software engineering, at the end of which they will sit formal examinations. They are required also to submit a dissertation (CSC5002W) which counts half of the requirements for the degree. The course lasts at least one year.

Assessment: Coursework modules are assessed by a combination of practical work and examination. All modules contribute equally to the final coursework mark, which counts for half of the final degree requirement, with the other half provided by the dissertation. Both the coursework component and the dissertation must be passed for the degree to be awarded.

CSC5005H, CSC5006H, CSC5004W MASTERS IN INFORMATION TECHNOLOGY

(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor Dissertation: 90 HEQF credits at level 9

Course co-ordinator(s): Dr A Mbogho

Entrance 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. CSC5004W consists of a one year research project submitted as a dissertation.

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 cannot continue in Masters in Information Technology. To pass each course an overall average of at least 50% is required. Both coursework components and minor dissertation

must be passed for the degree to be awarded.

CSC6000W PhD IN COMPUTER SCIENCE

360 HEQF credits at level 10

Supervision is provided in the areas of research represented in the Department. The Department has a research programme in association with industry and, depending on the research topic, additional funding may be available. 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 Shell 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:
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Professor:
S M Parnell, MA PhD *Wits*
Associate Professors:
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M F Ramutsindela, MA *UNIN* PhD *London*
M R Sowman MSc PhD *Cape Town*
Associate Professor and South African Research Chair in Environmental and Social Dimension of the Bio-economy
R P Wynberg, BSc (Hons) MSc MPhil *Cape Town* PhD *Strathclyde*
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R C Hill, BSc (Eng) *Cape Town* Pr Eng PhD *Cape Town*
Z Patel, MSc *Natal* PhD *Cantab*
G Ziervogel, BSc (Hons) *Rhodes* DPhil *Oxon*
Lecturers:
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J Battersby-Lennard, MA *Newcastle* DPhil *Oxon*
S Daya, MA PhD *Durham*
K J Winter, BA (Hons) *Cape Town* MA *London* PhD *Cape Town*
Emeritus Professor:
R F Fuggle, BSc (Hons) UED *Natal* MSc *Louisiana* PhD *McGill*
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J Crush, MA *Cantab* MA *Laurier* PhD *Queens*
D S G Thomas, MA PhD *Cantab*
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S Samsodien
Librarian:
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Laboratory Departmental Assistant:
S Hess
Library Assistant:
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Deputy Director:
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D Fig, BA *Cape Town* BSc (Hons) PhD *LSE*
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V Mafanya

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

Field work

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

First-Year Courses

AGE1004H INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 HEQF credits at level 5

See course details under the Department of Archaeology.

GEO1009F INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

See course details under the Department of Geological Sciences.

EGS1003S GEOGRAPHY, DEVELOPMENT & ENVIRONMENT

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor M F Ramutsindela

Entrance requirements: Geography at NSC level 4 or GEO1009F (or ERT1000F)

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical or tutorial per week, Monday, Tuesday or Thursday, 14h00-17h00.

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

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 paper written in November counts 50% (subminimum of 40% required).

EGS1004S INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 HEQF credits at level 5

NOTE: EGS1004S is a tutorial-based reinforcement of GEO1009F, offered to students who fail but gain a DP in or are awarded a supplementary for GEO1009F. Credit will not be given for both GEO1009F and EGS1004S. No supplementary examination will be offered.

Course co-ordinator(s): Ms K Vickery

Entrance requirements: DP in GEO1009F.

Course outline:

As for GEO1009F.

Tutorials: One tutorial per week, Friday, 14h00-17h00.

Assessment: Marked classwork counts 40%; one 3-hour theory examination written in November counts 45%; one 1-hour practical examination written in November counts 15%. Subminima of 40% are required in practical and theory examination papers.

Second-Year Courses

EGS2013F THE PHYSICAL ENVIRONMENT

24 HEQF credits at level 6

Course co-ordinator(s): Dr F Eckardt

Entrance 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, 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical per week, Friday, 14h00-17h00.

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

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

24 HEQF credits at level 6

Course co-ordinator(s): Professor S Parnell

Entrance requirements: For BSc: EGS1003S (or EGS1002S); For BA or BSocSci: EGS1003S (or EGS1002S) or Social Science Foundation course and two full first year Humanities courses, or equivalent).

Course outline:

This course draws together historical and contemporary analysis of social, political, economic and environmental dimensions of the South African city. This conceptual material is grounded in field-based experiential learning in Cape Town.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical or tutorial per week, Friday, 14h00-17h00.

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

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 3-hour theory paper written in November counts 50% (subminimum of 40% required).

Third-Year Courses

EGS3012S ATMOSPHERIC SCIENCE

36 HEQF credits at level 7

Course co-ordinator(s): Dr B J Abiodun

Entrance 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:

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Practicals: One practical per week, Tuesday or Wednesday, 14h00-17h00.

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).

EGS3020F ENVIRONMENTAL CHANGE & CHALLENGE

36 HEQF credits at level 7

Course co-ordinator(s): Professor M E Meadows

Entrance requirements: EGS2013F

Course outline:

The course explores the nature of physical environmental change as manifested through processes associated with biological, phyiscal and human components of ecosystems with a focus on southern Africa. The recent geological past (the late Quaternary) provides a longer term perspective that enables recent and contemporary environmental changes to be placed in context. The nature and extent of human impact on landscapes is examined along with a consideration of how conservation efforts are applied in order to mitigate these changes. Environmental change is conceptualised as geohazard; and disaster risk and disaster risk profiling is introduced at the regional and local scale. The course further considers key land surface processes in a range of environments and how these respond to environmental dynamics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical per week, Thursday, 14h00-17h00.

Fieldwork: There is a compulsory four day residential field excursion during the University vacation.

DP requirements: Attendance at residential fieldwork during a University vacation is compulsory; 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 45%; one 3-hour examination written in June count 55% (sub-minimum of 40% required).

EGS3021F SUSTAINABILITY & ENVIRONMENT

36 HEQF credits at level 7

Course co-ordinator(s): Associate Professor M Sowman

Entrance 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical per week, Wednesday, 14h00-17h00.

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

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 HEQF credits at level 7

Course co-ordinator(s): Dr S Daya

Entrance 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One practical or tutorial per week, Wednesday, 14h00-17h00.

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).

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 BSc (HONS) IN ATMOSPHERIC SCIENCE

160 HEQF credits at level 8

(includes research project of 40 credits)

Course co-ordinator(s): Dr B J Abiodun

Entrance 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 research project counts 25% of the degree as a whole. Students must pass the project component in order to qualify.

EGS4004W BSc (HONS) IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE

160 HEQF credits at level 8

(includes research project of 40 credits)

Course co-ordinator(s): Dr P Anderson

Entrance requirements: A BSc degree with a major in Environmental & Geographical Science or related field. Enrollments are limited to 30, 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 referee reports. Preference may be given to UCT graduates who meet the entrance 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 convenor in consultation with the Head of Department. In addition, each student completes a research project. At the discretion of the course 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, field work and seminar presentation marks. Examinations on average count 50% and coursework 50% for each module. The research project counts 25% of the degree as a whole. Students must pass the project component in order to qualify.

EGS5003W MASTERS IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE

180 HEQF credits at level 9

Following completion of an Honours degree (or equivalent) acceptable to the Head of Department, candidates must undertake an independent research project and submit the results in the form of a

dissertation. General rules for this degree may be found in the front of the handbook. In addition to submitting an application to the University, prospective candidates must complete an application form available from the department.

EGS5008H and EGS5009W MPhil IN ENVIRONMENT, SOCIETY & SUSTAINABILITY (by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor Dissertation: 90 HEQF credits at level 9

This MPhil programme is designed for students with diverse backgrounds who have an interest in environment, society and sustainability. Problems pertaining to the environment, society and sustainability are interdisciplinary in nature and students with backgrounds in geography, natural and social science, planning, engineering, education, economics and law are encouraged to apply.

Course co-ordinator(s): Dr P Anderson

Entrance requirements: Students must hold 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 admitted.

Applications for admission: Prospective students are advised that, because there is a limit of 12 places in the Environment, Society and Sustainability programme, only selected students are admitted. Selection will be at the discretion of the Head of the Department, based on quality of qualification, experiential learning and/or referee reports. It is therefore imperative that intending applicants, in addition to submitting an application to the University, complete the application form available from the Department and submit this before the annual deadline - the date is displayed on the departmental website - see www.egs.uct.ac.za.

Course outline:

Prescribed coursework (EGS5008H): In the first year of the programme, students select four departmental coursework modules in, for example, Theory and Practice of Environmental Management, Capital Politics and Nature, Geography of Development and Environment, Living with Environmental Change, Urban Food Security, Cultural Geographies, Managing Complex Human-Ecological Systems, or Geomorphology. Assessment for these modules includes both written examinations and coursework assignments. Examinations on average count 50% and coursework 50% for each module.

Minor Dissertation (EGS5009W): In the second year students 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 dissertation that counts 50% of the final course outcome.

EGS5010H and EGS5020W MASTERS IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE

(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor Dissertation: 90 HEQF credits at level 9

Course co-ordinator(s): Dr P Anderson

Entrance requirements: Candidates must have completed a BSc (Hons) degree in Environmental & Geographical Science. Individual specialist modules may carry additional prerequisites. In addition to submitting an application to the University, prospective candidates must complete an application form available from the department.

Course outline:

Students select four 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. In addition, each student conducts a major research project examined by dissertation (EGS5020W). At the discretion of the course convener, in consultation with the Head of

Department, students may count one or two modules from outside the department towards the Masters degree in Environmental & Geographical Science by coursework and minor dissertation.

Assessment: Modules are conventionally examined by 3-hour written papers 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 dissertation component counts 50% of the degree as a whole.

EGS5012W MASTERS IN CLIMATE CHANGE & SUSTAINABLE DEVELOPMENT

(by coursework and minor dissertation)

Coursework: 120 HEQF credits at level 9

Minor dissertation: 60 HEQF credits at level 9

This one-year taught Master's course provides interdisciplinary training in climate change and sustainable development, with a focus on the issues of relevance to African development. It is convened by UCT's African Climate and Development Initiative (ACDI), a UCT Signature Theme comprising academics and research units from across the University with a shared interest in interdisciplinary research and solutions to the climate change problem. The overriding message of the course is that one cannot deal with climate change and development without considering both the scientific uncertainties, and the social, technological and ethical issues at stake. South Africa is uniquely positioned geographically, as a peninsula jutting out into the world ocean, with warm and cold oceans on either side and the southern ocean to the south. Thus land-ocean-atmosphere interactions have a strong influence on our climate, and our status as a developing country with good technology and infrastructure alongside under-developed communities provide a microcosm of the world's social and economic development issues. The course is designed for both recent graduates and those with several years' experience 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 course will equip its graduates for employment in government, local authorities, and businesses with a sustainability agenda, consultancies, NGOs and international development organisations. Environmental problems are interdisciplinary in nature and students with backgrounds in scientific, planning, engineering, economic, educational, social and legal disciplines are encouraged to apply.

Course co-ordinator(s): Dr Bradley Rink

Entrance requirements: Students must hold an Honours degree (or equivalent).

Course outline:

This full time coursework Masters in Climate Change and Sustainable Development is designed to have four compulsory core modules to cover an overview of Earth system science and the social, economic, adaptation and mitigation issues. Core modules for 2013 include: Earth System Science and Global Change (SEA5006F); Energy and climate change (MEC5090Z); Development Economics (ECO4051S); and Adapting to global change (EGS5043S). In addition, students are required to enroll in three elective modules that may be related to a student's individual background in Science, Engineering, Humanities or Law. A selection of elective modules for 2013 include: Biodiversity & climate change (BIO5003Z); Climate modeling (EGS5030S); Climate change & predictability (EGS5038F); Understanding climate change in the recent past (GEO5004Z); Sustainable urban systems (END5042Z); Energy, Poverty & Development (MEC5088Z); Climate Law and Governance (PBL5046S); Society and Natural Resources (SOC5011S); and Numerical skills, modelling, econometrics, graphics (ZOO5011F).

Students will register for a separate minor dissertation component based on a three-month research project that must be passed for the degree to be awarded. The course begins in late January 2013, with a minor dissertation hand-in deadline at the end January 2014.

Assessment: Both coursework and dissertation components must be passed separately for the degree to be awarded. Of the coursework component, class assessments will count 50% and examinations will count 50%. *Subminima:* Six of the seven modules must be passed, with an average mark of 50%

or greater for all seven (a subminimum of 33% is required for all seven modules)**.**

EGS6003W PhD IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE

360 HEQF credits at level 10

Prospective candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies. In addition to submitting an application to the University, prospective candidates must complete an application form available from the department.

PBL5045S ENVIRONMENTAL LAW FOR NON-LAWYERS

15 HEQF credits at level 9

NOTE: The following course is offered by the Faculty of Law and forms part of the taught modules offered in EGS5008H.

Course co-ordinator(s): Associate Professor A Paterson

Entrance requirements: Successful completion of any undergraduate degree. Not available to students undertaking an LLB or LLM degree.

Course outline:

The inclusion of an environmental right in South Africa's Constitution has led to the emergence of many environmental laws and court decisions in the past 15 years. These developments are of key relevance to those working in the environmental sector including developers, consultants, biologists, zoologists, planners, sociologists and anthropologists. This course provides students undertaking postgraduate studies relevant to the environment with an insight into relevant principles of international and domestic environmental law. Key content covered in the course includes: an introduction to basic legal principles and resources; constitutional aspects (environmental rights, access to information, administrative justice and access to courts); framework environmental laws; land-use planning laws (planning law, environmental impact assessment and protected areas); natural resource laws (biodiversity, water and marine living resources); and pollution laws (fresh water, land and air pollution).

Lectures: 2 double lectures per week

DP requirements: Satisfactory attendance of lectures and completion of essay.

Assessment: Essay counts 50%, written examination in June.

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.

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Chamber of Mines Professor of Geochemistry:
A P le Roex, BSc *Stell* BSc (Hons) PhD *Cape Town*
Philipson-Stow Professor of Mineralogy and Geology:

Professor:
C Harris, MA DPhil *Oxon*
Associate Professors:
J S Compton, BA *San Diego* PhD *Harvard*
D L Reid, MSc *Wellington* PhD *Cape Town*
Senior Lecturers:
M E Bordy, MSc *Budapest* PhD *Rhodes*
P E Janney, BSc *New Hampshire*, PhD *San Diego*
G C Smith, MA *Cantab*
Lecturers:
J F A Diener, MSc *Stell* PhD *Melbourne*
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D Wilson

Departmental Assistants:
E W Stout
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, a solid source mass spectrometer and access to gas-source mass spectrometers for oxygen, hydrogen and carbon stable isotope measurements. The Department is also well 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 the field excursions arranged for them during the year. These excursions take place during the Easter and September mid-semester vacations, and 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

GEO1009F INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES
18 HEQF credits at level 5

This course is presented jointly by the Departments of Archaeology, Environmental & Geographical Science and Geological Sciences, but administered by Geological Sciences.

Course co-ordinator(s): Associate Professor J S Compton

Entrance requirements: NSC Physical Science, Life Sciences or Geography with at least 60% (or AGE1003/4H). 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 AGE1004H from week 7.

Course outline:
Structure and dynamics of the Earth; stratigraphy and geological history; climatology; surface processes and evolution of landscapes; biogeography; humans and the environment.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Monday or Tuesday or Thursday or Friday, 14h00-17h00.
Fieldwork: Students are required to attend three half day excursions in the Cape Peninsula.

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

Assessment: Marked class work counts 24%; marked class tests count 16%; one 3-hour theory examination written in June counts 60%. A subminimum of 40% is required in the theory examination paper.

NOTE: Supplementary examinations will be written in November.

AGE1004H INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES

18 HEQF credits at level 5

See course details under the Department of Archaeology.

GEO1006S INTRODUCTION TO MINERALS, ROCKS & STRUCTURE

18 HEQF credits at level 5

Course co-ordinator(s): Associate Professor D L Reid

Entrance requirements: A minimum of 45% in GEO1009F or a pass in EGS1004S or AGE1004H (from 2014).

Course outline:

Crystals and minerals; Igneous and metamorphic rocks; Structural geology; Mineral deposits and economic geology; Palaeontology.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Practicals: One practical per week, Thursday or Friday, 14h00-17h00.

Fieldwork: Students are required to attend a one-day excursion in the Cape Peninsula, and a four-day excursion through the southwestern Cape during the September vacation.

DP requirements: An average of 30% in all marked classwork and tests. Compulsory attendance at one tutorial session per week for all students who fail any class test, until such time as a subsequent test is passed.

Assessment: Class tests count 35%; field reports count 15%; one 2-hour theory examination written in November counts 50%. A subminimum of 40% is required in the theory examination paper.

Second-Year Courses

GEO2001F MINERALOGY & CRYSTALLOGRAPHY

24 HEQF credits at level 6

NOTE: Entrance is limited to 35 students.

Course co-ordinator(s): Professor S H Richardson

Entrance requirements: GEO1009F (or EGS1004S or AGE1004H from 2015) and GEO1006S, CEM1000W or equivalent.

Course outline:

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Wednesday, 14h00-17h00.

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

written in June counts 30%; one 2-hour theory paper written in June counts 50%. Subminima of 40% are required in practical and theory examination papers.

GEO2004S PHYSICAL GEOLOGY

24 HEQF credits at level 6

Course co-ordinator(s): Dr A Fagereng

Entrance requirements: GEO2001F, PHY1031F or equivalent

Course outline:

Stratigraphy of South Africa. Transport and deposition of siliciclastic sediment. Sedimentary textures and structures. Siliciclastic, carbonate, evaporitic and other sedimentary rocks. Earthquakes, stress, displacement, and strain. Brittle and ductile deformation. Classification and petrography of igneous rocks; Physical processes in magma chambers. Relationship between chemical and mineralogical composition. Types of metamorphism, metamorphic textures and mineral assemblages.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: One practical per week, Wednesday, 14h00-17h00.

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 written in November counts 30%; one 2-hour theory paper written in November counts 45%. Subminima of 40% are required in practical and theory examination papers.

GEO2005X FIELD GEOLOGY & GEOLOGICAL MAPPING (second-year half course)

24 HEQF credits at level 6

Course co-ordinator(s): Professor C Harris

Entrance 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.

Lectures: None

Practicals: Five afternoons by arrangement.

Fieldwork: Nine days in Laingsburg area, nine days in northern Cape, three days in Southwestern Cape, nine days in southern Cape.

DP requirements: Attendance at all field camps.

Assessment: Maps and reports count for 70%; three 2-hour practical examinations in June and November count for 30%.

Third-Year Courses

GEO3005F PETROLOGY & STRUCTURAL GEOLOGY

36 HEQF credits at level 7

Course co-ordinator(s): Professor C Harris

Entrance requirements: GEO2001F, GEO2004S

Course outline:
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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: Two practicals per week, Tuesday and Thursday, 14h00-17h00.
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 paper written in June counts 50%. Subminima of 40% required in practical and theory examination papers.

GEO3001S STRATIGRAPHY & ECONOMIC GEOLOGY
36 HEQF credits at level 7
Course co-ordinator(s): Associate Professor D L Reid
Entrance requirements: GEO2004S, DP in GEO3005F
Course outline:
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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Practicals: Two practicals per week, Tuesday and Thursday, 14h00-17h00.
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.

Postgraduate Courses

GEO4000W BSc (HONS) IN GEOLOGY
160 HEQF credits at level 8
(includes research project of 40 credits)
Course co-ordinator(s): Professor S H Richardson
Entrance 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 entrance requirements.
Course outline:
Students are required to elect one of two streams of study - General Geology, or Petroleum Geology. Selections of compulsory and elective modules are available for each stream, and would normally include the following: Analytical Geochemistry, Applied Geophysics, Petroleum Sedimentology, Economic Geology, Igneous Petrology, Isotope Geochemistry, Mantle Petrology, Marine

Geochemistry, Metamorphic Petrology, Petroleum Geology, Sedimentory Basins, Structural Geology. Evolution of the African Plate 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 field trip 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 55%, practical and assignment work done during the year counts 20%, and the research project 25% towards the final grade. Subminima are required for the overall examination mark (40%) and for the research project (50%).

GEO4001W BSc (HONS) IN GEOCHEMISTRY

As for GEO4000W above, but with a restricted choice of modules.

GEO5000W MASTERS IN GEOLOGY

180 HEQF credits at level 9

General rules for this degree may be found at the front of the handbook.

GEO5003W MASTERS IN GEOCHEMISTRY

180 HEQF credits at level 9

General rules for this degree may be found at the front of the handbook.

GEO6000W PhD IN GEOLOGY

360 HEQF credits at level 10

Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.

GEO6001W PhD IN GEOCHEMISTRY

360 HEQF credits at level 10

Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.

DEPARTMENT OF HUMAN BIOLOGY

The Department of Human Biology is part of the Faculty of Health Sciences and incorporates the disciplines of Anatomy, Cell Biology, Biomedical Engineering, Physiology, Exercise Science and Sports Medicine.They offer the Human Biology (HUB) courses detailed in this section towards the Human Physiology major for the BSc degree.

The Department is housed in the Anatomy Building, Room 5.14, level 5, Health Sciences Campus and Sports Science Institute building, Newlands
Telephone (021) 406-6235
The Departmental abbreviation for Human Biology is HUB.

Associate Professor and Head of Department
L A Kellaway, MSc PhD *Cape Town*
Hyman Goldberg Professor of Biomedical Engineering:

Discovery Health Chair of Exercise and Sports Science:
T D Noakes, MBChB MD DSc *Cape Town* FACSM
Professors:
E W Derman, MBChB *Pret* BSc Med (Hons) PhD *Cape Town* FACSM
S H Kidson, MSc PhD *Wits* HDE (JCE)
E V Lambert, BA (Phys Ed)(Hons) *Rhodes* MSc *South Carolina* PhD *Cape Town*
M I Lambert, BA (Phys Ed)(Hons) *Rhodes* MSc *South Carolina* PhD *Cape Town*
G J Louw, DVSc *Pret*
A G Morris, BSc (WLU) PhD *Wits*
V A Russell, BSc (Hons) MSc *Cape Town* PhD *Stell*
M P Schwellnus, MBChB *Wits* MSc MD *Cape Town* FACSM
Associate Professors:
A N Bosch, BA (PhysEd)(Hons) MA *Rhodes* PhD *Cape Town*
M R Collins, BSc (Hons) *Stell* PhD *Cape Town*
T S Douglas, BSc (Eng) *Cape Town* MS *Vanderbilt* PhD *Strathclyde*
D M Lang, Dr rer Nat *Konstanz*
E M Meintjies, BSc (Hons) MSc *Pietermaritzburg* PhD *Oregan State*
E Ojuka, BSc MEd (Makerere) PhD *Bingham Young*
S Prince, BSc (Hons) HDE PhD *Cape Town*
Senior Lecturers:
K Bugarith, BSc (Hons) *Natal* PhD *Washington State*
L Davids, MSc PhD *Cape Town*
A Gwanyanya, MBChB MMEd (Anae) *Zimbabwe* DA(SA)MSc PHd *Leuven*
T Kolbe-Alexander, BSc *UWC* BSc (Hons) PhD *Cape Town*
M A J Poluta, BSc (Eng) *Witwatersrand*
D Shamley, BSc (Hons) PhD *Witwatersrand*
C P Slater, MBChB *Cape Town* FFRad(T) SA
L van der Merwe, Nat Dip Med *Tech Cape Town* BSc (Med) Hons MSc PhD *Cape Town*
C Warton, MBChB *Rhodes* LRCP MRCS *London*
Senior Lecturer and Principal Biomedical Engineer:
M A J Poluta, BSc (Eng) *Wits*
Honorary Senior Lecturers:
J de Beer, MBChB MMed (Orthop) *Pretoria*
J Goedecke, PhD *Cape Town*
L Micklesfield, PhD *Cape Town*
M Patrick, PhD *Cape Town*
R Tucker, PhD *Cape Town*

Lecturers:
E Badenhorst, BA(Hons) *Stell*
J Friedling, MSc PhD *Cape Town*
G Gunston, MBChB *Cape Town*
L R John, BSc (Eng) *Natal* PhD *Cape Town*
R Kelly, PhD *Ireland*
Honorary Professors:
J L Jacobson, JD *Harvard* PhD *Harvard*
S W Jacobson, PhD *Harvard*
L van der Merwe, MSc PhD *UPE*
Honorary Research Associates:
N Bergman, MBChB DCH MPH MD *Cape Town*
Principal Technical Officer:
B Dando Dip Med Tech
Chief Technical and Scientific Officers:
S Rayise, MSc *UWC*
T Wiggins, Dip Med Tech BSc(Med)(Hons) *Cape Town*
C Harris, NTC (Tool, Jig and Die making) *Athlone Tech College*
G de Bie, BSc *Rhodes* BSc(Hons) *UOFS*
Senior Technical and Scientific Officer:
M P Phillips, BSc *Cape Town*
Technical Officers:
I Fakier, ND Electrical Eng *CPUT*
V Fourie
N Kariem, BSc (Hons) *Cape Town*
M Peterson, Dip Med Tech BTech *CPUT*

DIVISION OF HUMAN NUTRITION
Associate Professor and Head of Division:
M Senekal, PhD (Diet) *Stell* RD (SA)
Lecturers/Clinical Educators (Full-time):
S Booley, MSc (Nutrition Management) *UWC* RD (SA)
J Harbron, PhD (Physiology Sciences) *Stell* RD (SA)
L Hill, PhD (Physiology) *Cape Town* RD (SA)
B Najaar, M (Nutrition) *Stell* RD (SA)
Lecturers/Clinical Educators (Part-time):
D Curling, HDE (Home Economics) *Cape Town*
Z Ebrahim, MSc (Nutrition and Dietetics) *Cape Town* RD (SA)
L Fuller, BSc Dipl(Therapeutic Dietetics) *Cape Town* BSc Med(Hons) Epidem &Biostats *Stell* RD(SA)
F Herrmann, MSc Med (Dietetics) *Cape Town* RD (SA)
F Hoosen, BSc (Dietetics) *UWC* RD (SA)
K Sexton, *BSc* Med Hons (Nutrition and Dietetics) *Cape Town* RD (SA)

Undergraduate Courses

Second-Year Courses

HUB2019F INTRODUCTION TO HUMAN BIOLOGY
24 HEQF credits at level 6
NOTE: Entrance is limited to 60 students.
Course co-ordinator(s): Associate Professor E Ojuka, Dr E van der Merwe
Entrance requirements: CEM1000W (or equivalent), BIO1000F

Course outline:
This course is an introduction to human anatomy and the basics of physiology. The first five weeks examine the basics of cells and tissues and cell proliferation, along with gross and histological studies and physiology of the integumentar, musculo-skeletal system, cardio-vascular system, GIT, reproductive, urinary and nervous systems. The course includes the study of homeostasis, the chemistry of life, membranes, electrophysiology, nutrition and metabolism.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Fridays may be used for tutorials, guest lectures and tests. Students are encouraged to attend all lectures and must sign a register of attendance.

Practicals: One per week, Mondays or Tuesdays

DP requirements: Attendance at all practicals, 40% average in class tests and an average of 50% for all assignments

Assessment: Class tests count 30%; assignments count 5%; practicals count 15%; examinations (theory and practical) count 50%. An oral examination may be required in the case of selected students.

HUB2021S HUMAN BIOLOGY: MAINTENANCE & INTEGRATION

24 HEQF credits at level 6

NOTE: Entrance is limited to 60 students.

Course co-ordinator(s): Dr E van der Merwe and Dr D Shamley

Entrance requirements: HUB2019F, CEM1000W (or equivalent)

Course outline:
The course contains lectures, tutorials and practicals on the physiology, anatomy and histology of organ systems in the human body including musculoskeletal, excretory & thermoregulation, respiratory, cardiovascular, lymphatic and immune, and reproductive systems. In addition, students are introduced to bone forensics and to concepts of aging and disease. In the practical sessions, students work in small groups using computers and other equipment to study
a) the electrical and mechanical events in the contraction of skeletal and cardiac muscle, b) the mechanics of the respiratory system, c) the immune system, d) excretion and temperature regulation, e) reproduction and f) study anatomical parts of the human body from cadavers and histological sections under a microscope.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Fridays may be used for tutorials, guest lectures and tests. Students are encouraged to attend all lectures and must sign a register of attendance.

Practicals: One per week, Mondays or Tuesdays, 14h00-17h00.

DP requirements: Attendance at all practicals, 40% average in class tests and an average of 50% for all assignments

Assessment: Class tests count 30%; assignments count 5%; practicals count 15%; examinations (theory and practical) count 50%. An oral examination may be required in the case of selected students.

Third-Year Courses

HUB3006F GENERAL & APPLIED PHYSIOLOGY

36 HEQF credits at level 7

Course co-ordinator(s): Associate Professor A Bosch

Entrance requirements: HUB2021S, CEM1000W (or equivalent)

Course outline:

The semester theme is "Living, working and playing". Topics dealt with in detail include: metabolism and homeostasis, cellular homeostasis, nutrition and metabolism, obesity and diabetes, muscle physiology, cardio-respiratory physiology, exercise physiology, thermoregulation, physiology in extreme environments.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Practicals: One practical per week, Wednesdays or Thursdays, 14h00-17h00. The nature of the practicals will sometimes require work outside of these formal times.

DP requirements: Attendance at all practicals, 40% average in class tests and an average of 50% for all assignments

Assessment: Class tests count 30%; assignments count 5%; practicals count 15%; examinations (written and practical) count 50%. An oral examination may be required in the case of selected students.

HUB3007S BIOPHYSICS & NEUROPHYSIOLOGY

36 HEQF credits at level 7

Course co-ordinator(s): Dr A Gwanyanya

Entrance requirements: HUB2021S, CEM1000W (or equivalent)

Course outline:

The course offers theoretical and practical instructions on advanced concepts in neuroscience, such as: embroyological 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, vascular systems, vision and pain perception, eating disorders and mechanisms of learning and development of memory.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Practicals: One practical per week, Wednesdays or Thursdays, 14h00-17h00. The nature of the practicals will sometimes require work outside of these formal times.

DP requirements: Attendance at all practicals, 40% average in class tests and an average of 50% for all assignments.

Assessment: Class tests count 30%; assignments count 5%; practicals count 15%; examinations (theory and practical) count 50%. An oral examination may be required in the 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 Acting 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
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*
Associate Professors:
C A Clarkson, BSc (Hons) *Edinburgh* PhD *Glasgow*
C R A Gilmour, MSc PhD *Cape Town*
C W Hellaby, BSc (Hons) *St Andrews* MSc PhD *Queen's (Ontario)*
A B Ianovsky, MSc *Sofia* PhD *Dubna*
Emeritus Professors:
D S Butterworth, MSc *Cape Town* PhD *London*
K A Driver, BSc (Hons) *Wits* MSc *Stanford* PhD *Wits*
Honorary Research Associates:
V Brattka, MSc PhD *Hagen Germany*
K R Hughes, BSc (Hons) PhD *Cape Town* PhD *Warwick*
E E Plagányi-Lloyd, BSc *Natal* MSc PhD *Cape Town*
F D Richardson, BSc (Agric) *Nottingham* PhD *London* PhD *Cape Town*
Senior Lecturers:
P V Bruyns, MA Dphil *Oxon* LRSM MSc *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*
J Murugan, MSc PhD *Cape Town*
K T P Rafel, BSc (Hons) *Wits* MSc *Cape Town*
A Schauerte, BSc (Hons) *Natal* MSc *Cape Town* PhD *McMaster*
A Weltman, BSc (Hons) *Cape Town* PhD *Columbia*
Lecturers:
NV Alexeeva, MSc *Sofia* PhD *Cape Town*
M L Archibald, MSc PhD *Wits*
T Chinyoka, MSc *Zimbabwe* PhD *Virginia Tech*
E Fredericks, MSc PhD *Wits*
R Martin, BSc *Guelph* MSc PhD *Waterloo*
A Pototsky, BSc MSc *Dnepropetrovsk* MSc PhD *Cottbus*
J Ratzkin, BA *Berkeley* PhD *Washington*
N R C Robertson, MSc PhD *Cape Town*
D Solomons, MSc PhD *Cape Tow*n
H Spakowski, PhD *Heinrich-Heine Germany*
C S Swart, MSc *Natal* MSc PhD *London*
V Vougalter, BSc (Hons) *Nizhny Novgorod* PhD *Georgia Tech*

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*
K A Hardie, MSc *Natal* PhD *Cantab*
J H Webb, BSc (Hons) *Cape Town* PhD *Cantab*
Emeritus Associate Professor:
R W Cross, MA *St Andrews* PhD *London* DSc *London*
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*
Principal Technical Officer:
J Gordon, BSc *Tel Aviv*
Administrative Manager:
H S Leslie, BA (Hons) *UPE*
Administrative Assistants:
T Hannival
M King
C D Sher
N Trikam
N Walker
A Willis-Thomas
Administrative & Research Assistant:
N Gihwala
Senior Secretaries:
P Tukwayo
N Davids
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, Logic and Foundational Aspects of 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)
Cryptography (C S Swart, H Spakowski)
Dynamical Systems (A B Ianovsky)
General Relativity and Cosmology (B A Bassett, C A Clarkson, P K S Dunsby, G F R Ellis, C W Hellaby, J Murugan, D Solomons, A Weltman)
Group Theory, Universal Algebra, Set Theory and Model Theory (P V Bruyns, H P A Künzi)
Industrial Mathematics (H de G Laurie)
Logic, Foundational Aspects of Computer Science and Theory of Algorithms (H Spakowski)
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, 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 (B D Reddy)
Approximation theory, special functions (K Driver)
Combinatorics, Analysis of Algorithms (M L Archibald)
Geometric Analysis (J Ratzkin)
Nonlinear dynamics, complex systems (A Pototsky)
Partial differential equations, quantum field theory (V Vougalter)
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 and 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, D Solomons, A Weltman)
Topology and Category Theory (J L Frith, C R A Gilmour, K A Hardie, G Janelidze, H P A Künzi, A Schauerte, G C L Brümmer)
String Theory and Quantum Gravity (J Murugan, A Weltman)
Category Theory (G Janelidze)
Discrete Mathematics, Graph Theory (D J Erwin)
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. Most course administrative information, eg. booklists, lecture/tutorial timetables, test details etc, can be found on the Departmental website under "Undergraduate courses" and "Postgraduate courses".

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 syllabuses indicate the contents of the various courses as recently given. All courses are subject to revision without advance notice.
3. Courses for Engineering and Commerce Faculty students are offered by the Department. See relevant Handbooks.
4. In exceptional cases, the usual entrance requirements may be waived with the 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, MAM3040W with courses in Physics, Astronomy and Mathematics.
Biomathematics and Life Sciences:
MAM1043H, MAM1044H, STA1006S, MAM2046W, MAM2043S, MAM3041H (modules 3ND and 3AN) with courses in the Life Sciences or Environmental & Geographical Science.

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.

MAM1043H MODELLING & APPLIED COMPUTING

18 HEQF credits at level 5

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

Course co-ordinator(s): Dr A Weltman

Entrance requirements: MAM1000W (corequisite), or already have an equivalent knowledge of Mathematics.

Course outline:

An introduction to 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.

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

Tutorials: One 1-hour tutorial per week.

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

Assessment: Class record counts 40%; one no longer than 3-hour paper written in October/November makes up the balance.

MAM1044H DYNAMICS

18 HEQF credits at level 5

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

Course co-ordinator(s): Dr J Murugan

Entrance requirements: MAM1000W (corequisite), or already have an equivalent knowledge of Mathematics.

Course outline:

A systematic introduction to the elements of mechanics; 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.

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

Practicals: One practical every second week, Friday, 6th and 7th periods.

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

Assessment: Class record counts up to 33%; one no longer than 3-hour paper written in October/November makes up the balance.

Second-Year Courses in Applied Mathematics

MAM2043S INTRODUCTION TO BIOLOGICAL MODELLING

24 HEQF credits at level 6

Course co-ordinator(s): To be advised

Entrance requirements: MAM1004F or MAM1004H or MAM1005H

Course outline:

Developing simple mathematical models useful to biologists. Models of growth, competition,

predation and sustainable harvesting. Implementing models using the computer. Elementary statistics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week, Friday, 6th and 7th periods, plus an alternative day as chosen by class.

DP requirements: Minimum of 30% in class tests.

Assessment: Class record counts 35%; 2-hour paper written in October/November counts 65%.

MAM2046W APPLIED MATHEMATICS 2046

48 HEQF credits at level 6

Course co-ordinator(s): Dr H de G Laurie (1st semester) and Dr N Alexeeva (2nd semester)

Entrance requirements: MAM1043H, MAM1044H and MAM1000W

Co-requisites: Modules 2LA and 2AC of MAM2000W/2004H

Course outline:

The course consists of four 30-lecture modules. Modules 2OD and 2ND are offered in the first semester and modules 2BP and 2NA in the second semester.

Syllabuses:

2NA NUMERICAL ANALYSIS (coded as MAM2053S for Engineering students)

Solutions to non-linear equations and rates of convergence. Direct and iterative methods for solving linear systems, pivoting strategies, matrix factorization, norms, conditioning. Solutions to initial value problems including higher order ordinary differential equations. Interpolation and approximation theory, splines, discrete and continuous least squares. Numerical differentiation and integration. Error analysis and control.

2OD ORDINARY DIFFERENTIAL EQUATIONS

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.

2BP BOUNDARY-VALUE PROBLEMS (coded as MAM2050S for Engineering students)

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 to oscillating chemical reactions and Josephson junctions. Chaos on a strange attractor, Lorentz map, logistic map, Hénon map, Lyapunov exponents. Fractals.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week, Thursday, 14h00-16h00.

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 HEQF credits at level 6

Course co-ordinator(s): Dr H de G Laurie (1st semester) and Dr N Alexeeva (2nd semester)

Entrance requirements: MAM1043H, MAM1044H and MAM1000W

Co-requisites: Modules 2LA and 2AC of MAM2000W/2004H

Course outline:

This half-course consists of two modules from MAM2046W, one of which should be the module 2OD.

Lectures: Depending on modules chosen, as for MAM2046W.

Tutorials: One tutorial per week, Thursday, 14h00-16h00.

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 HEQF credits at level 6

Course co-ordinator(s): Dr H de G Laurie (1st semester) and Dr N Alexeeva (2nd semester)

Entrance requirements: MAM2047H

Course outline:

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.

Lectures: Depending on modules chosen, as for MAM2046W.

Tutorials: One tutorial per week, Thursday, 14h00-16h00.

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.

MAM2052S QUANTITATIVE SKILLS FOR SCIENTISTS

24 HEQF credits at level 6

NOTE: This course will not be offered in 2013.

Entrance requirements: MAM1004F or MAM1004H or MAM1005H or MAM1000W

Course outline:

This course may be taken for credit by students registered in one of the programmes SB012 or SB013. A student from any other programme who wishes to take MAM2052F for credit will need the approval of the programme convener. The course will: 1. develop an ability to quantitatively analyse problems arising in the chemical, Earth and environmental sciences; 2. illustrate the great utility of mathematical models to provide answers to key chemical, geological and environmental problems; 3. develop an appreciation of the diversity of mathematical approaches potentially useful in the chemical, geological and environmental sciences. An important component of the course will be the use of computers and information technology.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Tutorials: Friday 3rd or Thursday 5th period.

DP requirements: A class record of 35% or more.

Assessment: Class record counts up to 40%; one no longer than 2-hour paper written in November makes up the balance.

Third-Year Courses in Applied Mathematics

MAM3040W APPLIED MATHEMATICS 3040

72 HEQF credits at level 7

Course co-ordinator(s): Dr J Murugan

Entrance requirements: MAM2046W or MAM2047H and MAM2048H; and MAM2000W

Course outline:

A total of five 30-lecture modules is offered, four of which make up MAM3040W. The module 3MP constitutes core (compulsory) material while the other three modules can be chosen from 3CV, 3FD, 3AN and 3GR. Modules 3AN and 3CV will be offered in the first semester, and modules 3FD, 3GR and 3MP in the second semester. A written project will be a compulsory component of the course.

Syllabuses:

3MP METHODS OF MATHEMATICAL PHYSICS (coded as MAM3043S for Engineering students)

The Fourier-transform and Laplace-transform solution of linear PDEs on the line; the influence function; the Parseval identity. The long-term asymptotic behaviour of solutions: the methods of Laplace, stationary phase and steepest descents. Nonlinear waves: the method of characteristics; Riemann invariants. The effect of dissipation; the Cole-Hopf transform for the Burgers equation; travelling fronts for the KPP equation. The effect of dispersion: KdV, nonlinear Schroedinger and sine-Gordon equation. Elliptic integrals and elliptic functions; cnoidal waves and solitons; kinks and breathers for the sine-Gordon equation. Multisoliton solutions: the Hirota method and Baecklund transformations.

3CV METHODS OF FUNCTIONS OF COMPLEX VARIABLES

Complex calculus, calculus of residues, special functions, applications to physics.

3AN ADVANCED NUMERICAL METHODS (coded as MAM3050F for Engineering Students).

Advanced methods for ODEs boundary value problems, differential eigenvalue problems. Numerical solution of PDEs by the methods of finite differences, finite elements and spectral methods.

3GR INTRODUCTION TO GENERAL RELATIVITY (coded as MAM3049S for Engineering students) *NOTE: This module is also available to interested parties on the Internet. Further details may be obtained from the website http://www.mth.uct.ac.za/omei/gr.*

Christoffel relations, geodesics, curvature, the Riemann tensor. The energy-momentum tensor in electrodynamics and fluid dynamics. Principle of equivalence, Einstein's field equations. Black holes, gravitational waves.

3FD FLUID DYNAMICS (coded as MAM3054S for Engineering students)

Description of fluids, equations of fluid flow for simple fluids, analytical techniques. Applications.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week, Thursday, 6th and 7th periods.

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 papers for module 3AN and 3CV are written in June and modules 3FD, 3GR and 3MP are written in October/November. All papers are no longer than 2 hours, except 3GR which is no longer than 3 hours.

MAM3041H APPLIED MATHEMATICS 3041

36 HEQF credits at level 7

Course co-ordinator(s): Dr J Murugan

Entrance requirements: MAM2000W and either MAM2046W or both MAM2047H and MAM2048H.

Course outline:

This half course consists of two modules of MAM3040W, at least one of which should be 3MP.

Lectures: Depending on modules chosen, as for MAM3040W.

Tutorials: One tutorial per week, Thursday, 6th and 7th periods.

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 HEQF credits at level 7

Course co-ordinator(s): Dr J Murugan

Entrance 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.

Lectures: Depending on modules chosen, as for MAM3040W.

Tutorials: One tutorial per week, Thursday, 6th and 7th period.

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

First-Year Courses in Mathematics

One full course in Mathematics at first-year level is offered in the Science Faculty, MAM1000W. (The courses MAM1010 and MAM1012 are intended for Commerce students and the courses MAM1017 and MAM1018 for Engineering students. Details of these can be found in the Handbooks for the Faculty of Commerce and the Faculty of Engineering and the Built Environment respectively). Credit equivalent to MAM1000W can be obtained by passing MAM1005H and MAM1006H. In special cases MAM1004F or MAM1004H 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.

No student may register for more than one of MAM1000W, MAM1004F, MAM1004H, MAM1005H and MAM1006H simultaneously. Credit will not be given for more than one of MAM1004F, MAM1004H 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.

MAM1000W MATHEMATICS 1000

36 HEQF credits at level 5

Course co-ordinator(s): Dr D J Erwin

Entrance 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:

Differential and integral calculus of functions of one variable, differential equations, partial derivatives, vector geometry, matrix algebra, complex numbers, Taylor series.

Lectures: Five lectures per week, Monday to Friday, 1st or 3rd period.

Tutorials: One 2-hour tutorial per week

DP requirements: Minimum of 30% for class 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 HEQF credits at level 5

Course co-ordinator(s): Dr R Martin

Entrance requirements: The normal minimum requirement is a pass in Mathematics with at least 70% for students with a NSC, or at least an E symbol at A-level. Students who fail MAM1004F are usually expected to register for MAM1004H in the 2nd semester

Course outline:

The course provides mathematics for applications, particularly in the Life and Earth sciences. Syllabus: 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. Newton's Method. Taylor Polynomials. Antiderivatives and integrals. Mathematical modelling. Separable and linear differential equations.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: One per week, Monday or Wednesday, 14h00-16h00.

DP requirements: Minimum of 30% in class tests, and at least 80% attendance at tutorials.

Assessment: Year mark counts up to 40%; one no longer than 3-hour paper written in June makes up the balance.

MAM1004H MATHEMATICS 1004

18 HEQF credits at level 5

Course co-ordinator(s): Ms M Kirova

Entrance requirements: For students with a National Senior Certificate, a pass in Mathematics with at least 70%, or at least an E symbol at A-level. Students who fail MAM1004F (see above) will be allowed to register for MAM1004H at the beginning of the second semester.

Course outline:

This course starts in the 2nd semester and is intended for students who have failed MAM1004F. The syllabus is the same as for MAM1004F.

Lectures: Five lectures per week, in meridian.

Tutorials: By arrangement.

DP requirements: As for MAM1004F.

Assessment: Year mark counts up to 40%; one no longer than 3-hour paper written in October/November makes up the balance.

MAM1005H MATHEMATICS 1005

18 HEQF credits at level 5

Course co-ordinator(s): Mr K Rafel

Entrance requirements: A pass in NSC Mathematics with at least 70%, 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.

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). It 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. Note that MAM1005H + MAM1006H is equivalent to MAM1000W in level, credit value and as prerequisite for certain other courses.

Course outline:

This course starts in the 2nd quarter. Differential and integral calculus of functions of one variable.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	

Tutorials: Friday, 1st 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 paper written in October/November makes up the balance.

MAM1006H MATHEMATICS 1006

18 HEQF credits at level 5

Course co-ordinator(s): Mr K Rafel

Entrance requirements: MAM1005H or a pass with at least 65% in MAM1004F or MAM1004H. Students who have passed MAM1004F or MAM1004H 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.

Course outline:

The course consists of those topics in the MAM1000W syllabus that was not covered in MAM1005H in the previous year.

Lectures: First period, three days per week.

Tutorials: First period, two 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 paper written in October/November makes up the balance.

MAM1019H FUNDAMENTALS OF MATHEMATICS

18 HEQF credits at level 5

Course co-ordinator(s): Dr P Bruyns (1st semester) and Professor H-P A Künzi (2nd semester)

Entrance requirements: At least 70% NSC Mathematics or a D symbol at A-level.

Course outline:

The idea 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.

Lectures: Five lectures per week in meridian.

Tutorials: One hour per week, Wednesdays 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 in Mathematics

MAM2000W MATHEMATICS 2000

48 HEQF credits at level 6

Course co-ordinator(s): Dr F Ebobisse Bille

Entrance requirements: MAM1000W or equivalent.

Course outline:

1. The course consists of four modules chosen from the list below.
2. The module 2LA is compulsory.
3. All students must take at least one of the modules 2IA or 2RA. Students who intend to proceed to MAM3000W should do both these modules.
4. The modules offered in any one year may differ from those listed below. Students should consult the departmental handout for a list of modules offered and approved combinations.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

with options in 4th period.

Tutorials: One tutorial per week, Thursday or Friday, 14h00-16h00.

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, MAM2004H and MAM2002S MATHEMATICS 2001, 2004 & 2002

Each 24 HEQF credits at level 6

MAM2001H: This course will not be offered in 2012.

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. 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.

Course co-ordinator(s): Dr F Ebobisse Bille

Entrance requirements: MAM1000W (or equivalent).

Course outline:

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.

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

Tutorials: One tutorial per week, Thursday or Friday, 14h00-16h00.

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.

Modules for Second-Year Courses

		Semester	Prerequisites
2AC	Advanced Calculus	1	-
2DE	Differential Equations	2	Modules 2AC and 2LA
2FM*	Fourier Methods	2	-
2IA	Introductory Algebra	2	Module 2LA
2LA	Linear Algebra	1	-
2RA	Real Analysis	2	-

* This module will not be offered in 2012.

Syllabuses

2AC ADVANCED CALCULUS Differentiable functions, independence of order of repeated derivatives, chain rule, Taylor's theorem, maxima and minima, Lagrange multipliers. Curves and surfaces in three dimensions, change of coordinates, spherical and cylindrical coordinates. Line integrals, surface integrals. Stokes' theorem. Green's theorem, divergence theorem.

2DE DIFFERENTIAL EQUATIONS: This module is aimed at Actuarial and Business Science students. A selection from the following topics will be covered: First order difference equations. Second order difference equations with constant coefficients. Systems of first order difference equations. Linear differential equations and systems with constant coefficients. Laplace transforms and applications. Nonlinear equations and phase plane analysis. Parabolic partial differential equations, separation of variables, two point boundary value problems. Option pricing by the Black-Scholes equation. Stochastic Differential Equations. All topics will have applications to economics and finance.

2FM FOURIER METHODS (this module will not be offered in 2012): Signals and systems. Fourier series. Analysis of periodic Fourier series. Discrete frequency spectra. Fourier transforms, convolution, continuous spectra. Applications. Discrete and Fast Fourier Transforms.

2IA INTRODUCTORY ALGEBRA: Group theory: basic properties, subgroups, cosets, equivalence relations, Lagrange's theorem, order of an element, cyclic groups, generation of groups, permutation groups, parity, conjugation, cycle structure, normal subgroups, quotients, homomorphisms, group actions. Number theory: basic properties of the integers, unique factorization, congruences. Ring theory: subrings, ideals, integral domains, Euclidean domains, polynomial rings, application to linear algebra. Field theory: field of fractions, finite fields.

2LA LINEAR ALGEBRA Matrices, Gauss reduction, invertibility. Vector spaces, linear independence, spans, bases, row space, column space, null space. Linear maps. Eigenvectors and eigenvalues with applications. Inner product spaces, orthogonality.

2RA REAL ANALYSIS Sequences, subsequences, Cauchy sequences, completeness of the real numbers. Series: convergence, absolute convergence and tests for convergence. Continuity and differentiability of functions. Taylor series and indeterminate forms. Sequences and series of functions, uniform convergence, power series.

Third-Year Courses in Mathematics

MAM3000W MATHEMATICS 3000

72 HEQF credits at level 7

Course co-ordinator(s): Associate Professor C R A Gilmour (1st semester) and Associate Professor A B Ianovsky (2nd semester)

Entrance requirements: MAM2000W. MAM1019H required as a pre- or co-requisite from 2012.

Course outline:

1. MAM3000W is the full-year major course for the BSc degree. Credit for MAM3000W is obtained by selecting an approved combination of four modules from those listed below. Such a selection must include at least one of the modules 3AL or 3MS. A student will not be given credit for MAM3000W without having completed the modules 2RA Real Analysis and 2IA Introductory Algebra. Students who did not take both these modules for MAM2000W will be allowed to take one of them as one of the modules for MAM3000W.
2. The modules offered in any one year may differ from those listed below. Each module consists

of thirty lectures and twelve tutorials.

3. Written projects with oral presentations will be a component of this course.
4. Students who are given permission to do a second-year module as part of MAM3000W might be required to do additional reading and be examined on it.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

with options in 4th period.

Tutorials: Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.

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

Assessment: Year mark counts up to 40%; the examination mark, project and test on additional reading, where applicable, account 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.

MAM3001W MATHEMATICS 3001

72 HEQF credits at level 7

Course co-ordinator(s): Associate Professor C R A Gilmour (1st semester) and Associate Professor A B Ianovsky (2nd semester)

Entrance requirements: MAM2000W.

Course outline:

The modules offered are 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

with options in 4th period.

Tutorials: Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.

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

Assessment: Year mark counts up to 40%; the examination mark account 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 and MAM3003S MATHEMATICS 3002 & MATHEMATICS 3003

MAM3002H: 36 HEQF credits at level 7

MAM3003S: 36 HEQF credits at level 7

MAM3002H is a half course for students who register at the beginning of the year. MAM3003S is a half course for those who register in the second semester, or those who have already obtained credit for MAM3002H.

Course co-ordinator(s): Associate Professor C R A Gilmour (1st semester) and Associate Professor A B Ianovsky (2nd semester)

Entrance 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.

	Period				
	Mon	Tue	Wed	Thu	Fri
Lectures:	5	5	5	5	with options in 4th period.

Tutorials: Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.

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.

Modules for Third-Year Mathematics Courses

		Semester	Prerequisites
3AL	Algebra	1	Module 2IA
3CA	Complex Analysis	2	Module 2RA
3LC	Logic and Computation	1	-
3MS	Metric Spaces	1	Module 2RA
3TA	Topics in Algebra	2	-
3TN	Topics in Analysis	2	Module 3MS

Allowed combinations

All combinations of modules are subject to the restrictions imposed by the timetable and the approval of the course co-ordinator.

Recommended modules for Mathematics Honours courses

Five types of Honours programmes are available to students who have completed senior courses in Mathematics:

(a) BROAD COVERAGE OF MATHEMATICS: Intended for prospective researchers and mathematicians.

(b) TEACHING: Intended for prospective high school mathematics teachers.

(c) MATHEMATICS OF COMPUTER SCIENCE: A co-operative venture with the Department of Computer Science. Each Department offers one half of the degree.

(d) INDUSTRIAL MATHEMATICS: Designed to prepare a mathematician to enter industry, this programme is run jointly through the Department of Mathematics & Applied Mathematics and the Department of Statistical Sciences.

(e) FINANCIAL MATHEMATICS: A course run jointly with the University of Stellenbosch and the African Institute for Mathematical Sciences, for those interested in employment in the financial sector.

Students registering for MAM3000W and intending to take (a) are advised to take modules 3MS, 3CA and 3AL as part of their course, and those intending to do (c) are advised to take Modules 3LC and 3AL. Students intending to do (b) are also advised to do 3MS, 3CA and 3AL, but may also do one of these as part of their Honours course. For (c) and (d) please refer also to the entries for MAM4007W and MAM4008W in this Handbook.

Syllabuses

3AL ALGEBRA An introductory course of modern abstract algebra involving the following concepts: algebraic operations; magmas and unitary magmas; semigroups; monoids; closure operators; equivalence relations; categories; isomorphism; initial and terminal objects; algebras, homomorphisms, isomorphisms; subalgebras; products; quotient algebras; canonical factorizations of homomorphisms; free algebras. Various classical-algebraic constructions for groups, rings, fields, and vector spaces, seen as examples of these concepts, will be described in tutorials.

3CA COMPLEX ANALYSIS An introduction to the theory of complex functions with applications.

3LC LOGIC AND COMPUTATION The propositional and predicate calculi: their syntax, semantics and metatheory. Resolution theorem proving.

3MS METRIC SPACES An introduction to metric spaces and their topology, with applications.

3TA TOPICS IN ALGEBRA A selection from lattices and order, congruences, Boolean algebra, representation theory, naive set theory, universal algebra. (Please note that this module is not a prerequisite for entry to the Honours course in Algebra.)

3TN TOPICS IN ANALYSIS A selection from the implicit function theorem and inverse mapping theorem, Lebesgue integral, Fourier analysis, Hilbert spaces, Lebesgue and Sobolev spaces, Fractals and approximation theory. (Please note that this module is not a prerequisite for entry to the Honours course in Functional Analysis.)

Courses Offered in Other Faculties

The Department of Mathematics & Applied Mathematics also offers courses to students registered in other faculties, as follows (see the appropriate Faculty Handbooks for course details):

FACULTY OF COMMERCE	
MAM1010F/S	Mathematics 1010
MAM1012F/S	Mathematics 1012
FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT	
MAM1017F/S	Engineering Mathematics A
MAM1018F/S	Engineering Mathematics B
MAM1042S	Engineering Statics
MAM1045S	Modelling and Programming with MATLAB for Electrical Engineers
MAM2003Z	Mathematics 2003
MAM2050S	Boundary-value Problems
MAM2053S	Numerical Analysis and Scientific Computing
MAM2082F	Computer Programming in MATLAB
MAM2083F/S	Vector Calculus for Engineers
MAM2084F/S	Linear Algebra and DE's for Engineers
MAM3004Z	Mathematics 3004
MAM3043S	Methods of Mathematical Physics
MAM3049S	Introduction to General Relativity
MAM3050F	Numerical Modelling
MAM3054S	Fluid Dynamics
MAM3080F	Numerical Methods
FACULTY OF HUMANITIES	
MAM1014F	Quantitative Literacy for Humanities
MAM1015S	Introductory Mathematics for Quantitative Social Sciences
MAM1016S	Quantitative Literacy for Social Science
FACULTY OF LAW	
MAM1013F	Law that counts : Quantative Literacy for Law
MAM1013S	Law that counts : Quantative Literacy for Law

Postgraduate Courses

There are several Honours programmes available to students who have completed senior courses in Applied Mathematics and Mathematics. A booklet will be available from the Department giving details. Those interested should enquire at the Department's offices, or write to The Head, Department of Mathematics & Applied Mathematics, University of Cape Town, Rondebosch 7701. Course co-ordinator for all Honours programmes in the Department: Dr C S Swart (1st semester) and Dr A Pototsky (2nd semester).

MAM4000W BSc (HONS) IN MATHEMATICS

160 HEQF credits at level 8

(includes research project of 30 credits)

Course co-ordinator(s): Professor G Janelidze

Entrance requirements: Normally a BSc degree with MAM3000W, or equivalent. In all cases subject to individual approval by the Head of Department. See the MAM3000W entry for recommended undergraduate modules.

Course outline:

A minimum of 160 credits is required for the Honours degree and each module offered at Honours level carries a specific credit rating. Each student will be required to do a project and a research seminar. Three streams are available:

Mathematical orientation: This course provides an introduction to some topics which are basic to a professional mathematician. The following modules are among those that have been offered in recent years: Algebra, Algebraic Geometry, Algebraic Topology, Category Theory, Computability and Complexity, Differential Geometry, Differential Topology, Functional Analysis, Lie Algebras, Measure Theory, Number Theory, Quantum Computing, Topology.

Teaching orientation: This course is for students who intend to enter the teaching profession. It aims at a very broad coverage of mathematics, without necessarily providing great depth. Students may be required to take some of the undergraduate courses that they did not take in their first degree. Students taking this orientation may need to undertake a programme of further work if they wish to proceed to a Master's degree.

Financial Mathematics: (See the Departmental Honours Handbook for a full description). This Honours stream is a jointly run course together with the University of Stellenbosch and the African Institute for Mathematical Sciences (AIMS). Students graduating from this stream will obtain a BSc (Hons) in Mathematics. The transcript of the modules taken will reflect that the course is a thorough grounding in Mathematical Finance. The stream gives a broad introduction to the field (which relies heavily on Mathematics) and graduates would normally either seek employment in an investment house, bank or hedge fund, or would proceed to do a Masters degree in Mathematics in the area, which at UCT is by thesis only. Graduates would **not** normally be admitted to the MPhil in Mathematical Finance in the Commerce Faculty at UCT.

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 mark for the course.

MAM4001W BSc (HONS) IN APPLIED MATHEMATICS

160 HEQF credits at level 8

(includes research project of 40 credits)

Course co-ordinator(s): Dr A Weltman (1st semester) and Associate Professor C Clarkson (2nd semester)

Entrance requirements: Normally a BSc degree with MAM3040W, or an equivalent. In all cases subject to individual approval by the Head of Department.

Course outline:

A minimum of 160 credits is required for the Honours degree and each module offered at Honours level carries a specific credit rating. Each student will be required to do a research project and an associated seminar. Among the modules which have been offered in recent years are: Advanced Mathematical Methods, Nonlinear Optimisation, Finite Element Analysis, General Relativity and Cosmology, Continuum Mechanics, and String Theory. It is a requirement that all Honours curricula include the module, Project and Seminar, but otherwise there is considerable flexibility in the structure of individual curricula. Furthermore, it is recommended that students include one or more modules from cognate departments in order to make up a well-rounded degree. However, the curriculum must include a minimum of 110 credits from Applied Mathematics modules.

Assessment: The project counts 25% 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 mark for the course.

MAM4007W BSc (HONS) IN MATHEMATICS OF COMPUTER SCIENCE

160 HEQF credits at level 8

(includes research project of 30 credits)

Course co-ordinator(s): Dr D J Erwin

Entrance 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:

A minimum of 160 credits is required for the Honours degree and each module offered at Honours level carries a specific credit rating. Each student will be required to do a research project. 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. 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 mark for the course.

MAM4008W BSc (HONS) IN INDUSTRIAL MATHEMATICS

160 HEQF credits at level 8

(includes research project of 30 credits)

NOTE: This course will not be offered in 2013

Entrance requirements: Normally a BSc degree in Applied Mathematics, Computer Science, Mathematics or Statistics, though graduates in other subjects (such as Physics or Engineering) are also eligible to apply. Admission is in all cases at the discretion of the Heads of the Department of Mathematics & Applied Mathematics and the Department of Statistical Sciences.

Course outline:

This programme is offered jointly by the Departments of Mathematics & Applied Mathematics and Statistical Sciences. The curriculum comprises a set of core courses, including case studies in the Mathematics of Management, a set of elective courses, and a research project. A minimum of 160 credits is required for the Honours degree and each module offered at Honours level carries a credit rating. Each student's curriculum has to be approved by the course co-ordinator. Further details about the curriculum may be obtained from the course co-ordinator.

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 mark for the course.

PHY4002W BSc (HONS) IN MATHEMATICAL & THEORETICAL PHYSICS

The Honours degree is offered jointly by the Department of Mathematics and Applied Mathematics and the Department of Physics.

See entry under courses offered by the Department of Physics.

AST4007W BSc (HONS) IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme (NASSP))

For course details see entry under Department of Astronomy.

AST5003F TAUGHT COMPONENT OF THE MASTERS IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme (NASSP))

For course details see entry under Department of Astronomy.

MAM5005W DISSERTATION COMPONENT OF THE MASTERS IN ASTROPHYSICS & SPACE SCIENCE

Minor dissertation: 90 HEQF credits at level 9

Entrance requirements: AST5003F

Dissertation: Students will work on an approved research topic on which a dissertation must be presented.

MAM5000W MASTERS IN MATHEMATICS

180 HEQF credits at level 9

Supervision of research towards the Masters degree will be provided in the areas of research represented in the Department (see 'Research in Mathematics & Applied Mathematics') and further details may be obtained from the Head of Department (see address at the beginning of the section "Postgraduate courses"). General rules for this degree may be found in the front of the handbook.

MAM5001W MASTERS IN APPLIED MATHEMATICS

180 HEQF credits at level 9

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.

MAM6000W PhD IN MATHEMATICS

360 HEQF credits at level 10

Candidates are referred to the general rules for the PhD as set out in Book 3, General Rules and Policies. Supervision of research towards the PhD degree will be provided in the areas of research represented in the Department (see 'Research in Mathematics & Applied Mathematics' and http://www.mth.uct.ac.za) and further details may be obtained from the Head of Department (see address at the beginning of the section 'Postgraduate Courses').

MAM6001W PhD IN APPLIED MATHEMATICS

360 HEQF credits at level 10

As for MAM6000W.

DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

The Department is housed in the Molecular Biology Building, 22 University Avenue
Telephone (021) 650-3270 Fax (021) 689-7573
The Departmental abbreviation for Molecular and Cell Biology is MCB.

Associate Professor and Head of Department:
V E Coyne, BSc (Hons) PhD *Cape Town*
Professors:
J M Farrant, BSc (Hons) PhD *Natal*
J P Hapgood, BSc (Hons) PhD *Cape Town*
N Illing, MSc *Cape Town* DPhil *Oxon*
E P Rybicki, MSc PhD *Cape Town*
Associate Professors:
V R Abratt, BSc (Hons) Rhodes PhD *Cape Town*
S J Reid, BSc (Hons) PhD *Rhodes*
Senior Lecturers:
R A Ingle, BA (Hons) DPhil *Oxon*
P Meyers, BSc (Hons) PhD *Cape Town*
C O'Ryan, BSc (Hons) PhD *Cape Town*
L Roden, BSc (Hons) *Wits* PhD *Cantab*
Lecturers:
T Oelgeschläger Dr rer nat *Hanover*
S Murray, MSc *Natal* PhD *Edinburgh*
S Rafudeen, BSc (Hons), PhD *Cape Town*
J D E A Rodrigues, BSc (Hons) PhD *Cape Town*
Z L Woodman, BSc (Med Hons) PhD *Cape Town*
Emeritus Professors:
H Klump, Dr rer nat habil *Freiberg* Dipl Chem
J A Thomson, BSc *Cape Town* MA *Cantab* PhD *Rhodes*
Principal Scientific Officers:
M Chauhan
F Davids
Chief Scientific Officers:
A M Clennell, BSc (Hons) *Cape Town*
T Millard, BSc *Pret*
Senior Scientific Officers:
M D Krige, MSc *Stell*
Z McDonald, MSc *UKZN* PhD *Cape Town*
P Ma, MSc *Cape Town*
S Sattar, MSc *Cape Town*
Principal Technical Officer:
N Bredekamp
Chief Technical Officer:
U R Mutzeck
D September
Department Manager:
Y L Burrows
HR/Postgraduate Administrator:
E J Liebenberg
Finance Administrator:
C Sandwith

Procurement Administrator:
G Spannenberg
SAP Purchaser:
P Louw
Departmental Assistants:
M Andreas
K Diedericks
C Hendrickse
D A Human
M Josias
J Paulse
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, and Dr Rodrigues): the problem of desiccation in plants is being tackled by a combination of physiological and molecular approaches. Plant biotechnology (Professor Rybicki and Drs Ingle, Rafudeen and Roden): 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, Illing and Dr Roden): projects include regulation of transcription by steroid receptors, the role of chromatin modifications in regulating the onset of flowering, 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 Dr 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. Research in marine biotechnology (Associate Professor Coyne): includes genomic and proteomic studies of the effect of stress and disease on the abalone immune system, the role of marine microorganisms in abalone nutrition and disease resistance, and genomic / proteomic characterisation of the stress and disease of the red seaweed, *Gracilaria gracilis.* Research in microbiology (Associate Professors Abratt and Reid and Dr Meyers): includes molecular-genetic investigations of industrially and medically important anaerobic bacteria such as *Corynebacterium, Bacteroides fragilis, 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 an analytical-biochemistry facility (amino acid analysis, DNA sequencing, DNA synthesis and protein sequencing).

Undergraduate Courses

Second-Year Courses

MCB2014F MOLECULAR COMPONENTS OF CELLS
24 HEQF credits at level 6
NOTE: Entrance is limited to 140 students.
Course co-ordinator(s): Dr J Rodrigues
Entrance requirements: CEM1000W or equivalent, BIO1000F.

Course outline:
This course deals with the structures and properties of biological molecules and macromolecules as a basis to understanding the distinctive properties of living systems. Topics include: properties of water, pH, amino acids, protein primary and higher order structure, carbohydrates, lipids, membranes, nucleotides and nucleic acids, prokaryotic DNA replication, transcription and translation. Protein synthesis, chromatin structure, thermodynamics and enzymes are also covered.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Tutorials: One tutorial per week.
Practicals: One practical per week, Monday or Tuesday, 14h00-17h00.
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 paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB2015S METABOLISM

24 HEQF credits at level 6
NOTE: Entrance is limited to 140 students.
Course co-ordinator(s): Dr Z L Woodman
Entrance requirements: MCB2014F
Course outline:
This course deals with aspects of prokaryotic and eukaryotic metabolism. The following are covered: energetics and thermodynamics, glycolysis, citric acid cycle, oxidative phosphorylation, photosynthesis, gluconeogenesis, glycogen and the pentose phosphate pathway, lipid and amino acid metabolism and nitrogen fixation.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Tutorials: One tutorial per week.
Practicals: One practical per week, Monday or Tuesday, 14h00-17h00.
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 paper written in November counts 50%. A subminimum of 40% in the examination is required.

MCB2016F INTRODUCTION TO MICROBIOLOGY

24 HEQF credits at level 6
NOTE: Entrance is limited to 100 students.
Course co-ordinator(s): Associate Professor S Reid
Entrance requirements: CEM1000W or equivalent, BIO1000F.
Course outline:
Prokaryote cell structure and function; bacterial growth and control; microbial diversity and taxonomy.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week.
Practicals: One practical per week, Thursday or Friday, 14h00-17h00.
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

paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB2017S MICROBIAL BIOTECHNOLOGY

24 HEQF credits at level 6

Course co-ordinator(s): Dr S Rafudeen

Entrance requirements: MCB2016F

Course outline:

Microbial biotechnology; production of fine chemicals; basics of fermentation; water purification; introduction to bacterial genetics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week.

Practicals: One practical per week, Thursday or Friday, 14h00-17h00.

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 paper written in November counts 50%. A subminimum of 40% in the examination is required.

MCB2018F INTRODUCTION TO GENETICS

24 HEQF credits at level 6

NOTE: Entrance is limited to 90 students.

Course co-ordinator(s): Dr C O'Ryan

Entrance requirements: BIO1000F, BIO1004S, CEM1000W or equivalent

Course outline:

This course will cover an introduction to the basic principles of genetics. Topics include the chromosomal theory of inheritance, genome organisation, chromosome numbers, duplications, rearrangements and transposons, sex determination and sex-linked genes, basic genetic linkage and mapping, human genetics, extranuclear inheritance. An introduction will also be given to population genetics and conservation/evolution genetics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week.

Practicals: One practical per week, Wednesday, 14h00-17h00.

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 paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB2019S EUKARYOTIC GENE REGULATION & CELL SIGNALLING

24 HEQF credits at level 6

NOTE: Entrance is limited to 90 students.

Course co-ordinator(s): Professor N Illing

Entrance requirements: MCB2014F or MCB2018F

Course outline:

Principles of eukaryotic gene regulation including: gene structure; regulation of gene transcription and chromatin modification; post-transcriptional regulation: RNA processing, RNAi, RNA stability and storage; translation; post-translational modifications; protein degradation. Principles of cell signalling including receptors and signal transduction pathways. Integration of principles of genetics, eukaryotic gene regulation and cell signalling in a cellular context using the following examples: Drosophila axis determination, regulation of the cell cycle and apoptosis, cancer,

circadian rhythms.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week.

Practicals: One practical per week, Wednesday, 14h00-17h00.

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 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 HEQF credits

Course co-ordinator(s): Dr R Ingle

Entrance requirements: MCB3019F, MCB3020F or MCB3021F (or concurrent registration in MCB3022S, 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.

Practicals: Two afternoons per week

DP requirements: None

Assessment: Project counts 100%.

MCB3019F RECOMBINANT DNA, GENOMICS & PROTEOMICS

36 HEQF credits at level 7

NOTE: Entrance is limited to 90 students.

Course co-ordinator(s): Dr S Murray

Entrance requirements: Any two second year MCB semester courses, MAM1004F (or MAM1000W), STA1007S or STA1000F/S

Course outline:

This course includes recombinant DNA techniques and an introduction to genomic/proteomic and computational approaches to study molecular systems. Topics include: DNA isolation, restriction endonucleases, cloning, polymerase chain reaction, genetic and physical maps, DNA sequencing, databases, comparative genomics, gene expression analysis, proteomics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week.

Practicals: One practical per week, Friday, 14h00-17h00.

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 paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB3020F PROTEIN STRUCTURE & FUNCTION

36 HEQF credits at level 7

NOTE: Entrance is limited to 90 students.

Course co-ordinator(s): Dr T Oelgeschläger

Entrance requirements: MCB2015S, MAM1004F (or MAM1000W), STA1007S or STA1000F/S

Course outline:

This course deals with aspects of protein structure and function covering the following topics: protein purification, protein secondary, tertiary and quaternary structure, advanced aspects of enzymology, non-Michaelis Menten Kinetics, WMC model, cooperativity and allostery, Scatchard and Hill plots, haemoglobin, myoglobin, bisubstrate reactions, protein-DNA interactions, cell signalling, signal transduction, receptor structure, channels and neurotransmission.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Tutorials: One tutorial per week.

Practicals: One practical per week, Thursday, 14h00-17h00.

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 paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB3021F MOLECULAR MICROBIAL GENETICS

36 HEQF credits at level 7

NOTE: Entrance is limited to 60 students.

Course co-ordinator(s): Associate Professor V R Abratt

Entrance requirements: MCB2017S, MCB3019F highly recommended, MAM1004F (or MAM1000W), STA1007 or STA1000F/S

Course outline:

Bacterial genetics, recombination and repair, prokaryotic gene regulation.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week.

Practicals: One practical per week, Tuesday, 14h00-17h00

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 paper written in June counts 50%. A subminimum of 40% in the examination is required.

MCB3022S ADVANCED BIOTECHNOLOGY

36 HEQF credits at level 7

Course co-ordinator(s): Dr P Meyers

Entrance requirements: MCB2017S, MAM1004F (or MAM1000W), STA1007S or STA1000F/S

Course outline:

New venture planning; metabolic engineering, bioethanol; beer and wine biotechnology; biotransformations; heterologous gene expression; bioprocess technology; bioprocess kinetics.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Tutorials: One tutorial per week, Wednesday, 14h00-17h00

DP requirements: 40% test average; 50% average for assignments; attendance at tutorials.

Assessment: Tests count 20%; project counts 20%; one 3-hour paper written in November counts 60%. A subminimum of 40% in the examination is required.

MCB3023S MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT

36 HEQF credits at level 7

Course co-ordinator(s): Dr R Ingle

Entrance requirements: MCB2018F, MAM1004F (or MAM1000W), STA1007S or STA1000F/S MCB2019S and MCB3019F highly recommended.

Course outline:

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Tutorials: One tutorial per week.

DP requirements: 40% test average.

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

MCB3024S DEFENCE & DISEASE

36 HEQF credits at level 7

Course co-ordinator(s): Professor J Hapgood

Entrance requirements: Any two second year MCB semester courses, MAM1004F (or MAM1000W), STA1007S or STA1000F/S

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	5	5	5	5	5

Tutorials: One tutorial per week.

DP requirements: 40% test average.

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

Postgraduate Courses

MCB4002W BSc (HONS) IN MOLECULAR & CELL BIOLOGY

160 HEQF credits at level 8

(includes research project of 64 credits)

Course co-ordinator(s): Dr C O'Ryan

Entrance 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:

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. A six month research project.

DP requirements: Techniques examination 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%.

MCB5005W MASTERS IN MOLECULAR & CELL BIOLOGY

180 HEQF credits at level 9

General rules for this degree may be found in the front of the handbook. The Department provides facilities for research and supervision in the field of Molecular and Cell Biology. Candidates must carry out a research project leading to the presentation of a dissertation.

MCB5008W MASTERS IN BIOINFORMATICS

180 HEQF credits at level 9

NOTE: New registrations will not be offered in 2013.

Entrance requirements: An Honours degree in either Molecular & Cell Biology, Computer Science or Mathematics.

General rules for this degree may be found in the front of the handbook. Candidates must carry out a research project leading to the presentation of a dissertation.

MCB6002W PhD IN MOLECULAR & CELL BIOLOGY

360 HEQF credits at level 10

Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies. The Department provides facilities for research and supervision in the branches of Molecular Biology outlined in the preceding section on research in the Department.

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.

Professor and Head of Department:
C J C Reason, BSc (Hons) *Cape Town* MPhil *City* MSc PhD *British Columbia*
South African Research Chair in Modelling of the Coupled Ocean-Land-Atmosphere Phenomena Related to Climate:

Professor:
F A Shillington, BSc (Hons) *Wits* MSc PhD *Cape Town*
Senior Lecturers:
I J Ansorge, BSc *Plymouth* MSc PhD *Cape Town*
H N Waldron, BSc (Hons) *Swansea* MSc PhD *Cape Town*
Lecturer:
J A Veitch, MSc PhD *Cape Town*
Emeritus Professors:
G B Brundrit, BSc (Hons) PhD *Manchester*
Senior Scholar:
J G Field, BSc (Hons) PhD *Cape Town* FRSSAf
Honorary Professor in Oceanography:
L V Shannon, MSc PhD *Cape Town* FRSSAf
Senior Research Officer:
M Rouault, MSc PhD *Aix-Marseille*
Honorary Research Associates:
S Bernard, BSc *Soton* PhD *Cape Town* (CSIR)
D A Byrne, PhD *Columbia*
C M Duncombe Rae, BSc *Rhodes* BSc(Hons) PhD *Cape Town* (University of Maine)
K P Findlay, BSc (Hons) *Cape Town* MSc PhD *Pret* (Southern Whales)
J Hermes, BSc *Bangor* PhD *Cape Town* (SAEON)
M Krug, MSc PhD *Cape Town*
A Mavume, PhD *Cape Town*
P M S Monteiro, MSc PhD *Cape Town* (CSIR)
Departmental Librarian:
N Jabaar, ND (Cost accounting) *CPUT*
Principal Technical Officer:
P Truter, BSc *Stell*
Senior Scientific Officer:
R Roman, MSc PhD *Cape Town*
Administrative Officer:
C Khai, Nat. Dipl Bus Management *South Peninsula College*

NANSEN-TUTU CENTRE FOR MARINE ENVIRONMENTAL RESEARCH
Co-Directors:
F A Shillington, BSc (Hons) *Wits* MSc PhD *Cape Town*
J A Johannessen, PhD *Bergen*
Associates:
J A Veitch, BSc (Hons) PhD *Cape Town*
B Backeberg, BSc (Hons) PhD *Cape Town*

MARINE RESEARCH INSTITUTE (MA-RE)
Director:
C L Moloney, BSc (Hons) PhD *Cape Town*
Manager:
E Balarin, BSc (Hons) *Rhodes*
Scientific Officer:
P Pillay, BSc (Hons) MSc *Cape Town*
BASICS Science Co-Ordinator:
L Shannon, MSc PhD *Cape Town*
Administrative Assistant:
S Bosma, MSc *Cape Town*

RESEARCH IN OCEANOGRAPHY

Physical 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 (Professors C J C Reason, F A Shillington, and Drs I J Ansorge, M Rouault, J A Veitch and H N Waldron).

Undergraduate Courses

Second-Year Courses

SEA2004F PRINCIPLES OF OCEANOGRAPHY

24 HEQF credits at level 6

Course co-ordinator(s): Dr H N Waldron

Entrance requirements: CEM1000W, BIO1004S or GEO1009F.

Course outline:

A basic 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One tutorial or practical per week, Tuesday, 14h00-17h00.

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 paper written in June counts 60%.

SEA2005S MARINE SYSTEMS

24 HEQF credits at level 6

Course co-ordinator(s): Dr I J Ansorge

Entrance requirements: CEM1000W, BIO1004S or GEO1009F, SEA2004F

Course outline:

Building on the principles of oceanography, this advanced course will cover the main ocean and atmosphere systems. These include the physical forcing and response of upwelling ecosystems (coastal and equatorial upwelling and upwelling domes), coastal systems (waves and beaches), shelf circulation, western boundary systems, Southern Ocean and polar systems, and oligotrophic systems. Emphasis will be on treating the systems as a whole. The course comprises six 2-week modules, which cover the above topics. Oceanographic field visits and methods of data sampling and analysis will be covered in the tutorials and practicals.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One tutorial or practical per week, Tuesday, 14h00-17h00.

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 paper written in June counts 60%.

Third-Year Courses

SEA3004F OCEAN & ATMOSPHERE DYNAMICS

36 HEQF credits at level 7

Course co-ordinator(s): Dr J A Veitch

Entrance requirements: CEM1000W, PHY1031F or PHY1032S, 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 and climate change. Oceanographic field visits and methods of data sampling and analysis will be covered in the tutorials and practicals.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One tutorial or practical per week, Monday, 14h00-17h00.

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 paper written in October counts 60%.

Postgraduate Courses

SEA4001W BSc (HONS) IN OCEAN & ATMOSPHERE SCIENCE

160 HEQF credits at level 8

(includes research project of 48 credits)

Course co-ordinator(s): Dr I J Ansorge

Entrance 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 entrance requirements.

Course outline:

Scope: 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, such as Earth Systems Science I.

Content: Lecture-tutorials, seminars and practical work in advanced physical oceanography, meteorology and marine climatology, an introduction to earth systems science, including participation in a research cruise. First semester modules: physics of the ocean and atmosphere, regional dynamics of the ocean and atmosphere, variability and extreme events, introduction to regional modelling. Second semester modules: air-sea interaction influences on heat budget and climate variability, mesoscale and coastal oceanography and meteorology studies, remote sensing of the ocean and atmosphere, marine biogeochemistry. Student performance in each module will be

assessed by short research assignments at regular intervals and written 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 field trip 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%.

SEA5000W MASTERS IN OCEAN & ATMOSPHERE SCIENCE

180 HEQF credits at level 9

Candidates are required to undertake research and complete a dissertation on an approved topic. General rules for this degree may be found in the front of the handbook.

SEA5001W MASTERS IN PHYSICAL OCEANOGRAPHY

180 HEQF credits at level 9

Candidates are required to undertake research and complete a dissertation on an approved topic. General rules for this degree may be found in the front of the handbook.

SEA5009H and SEA5010W MASTERS IN OCEAN & CLIMATE DYNAMCS
(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor Dissertation: 90 HEQF credits at level 9

This Masters programme in Ocean & Climate Dynamics is designed for students who wish to gain advanced training in the ocean component of the climate system and how it interacts with the atmosphere, the cryosphere and the land surface. It is intended to be completed in one academic year.

Course co-ordinator(s): Professor C J C Reason

Entrance requirements: Students entering the programme must have completed an Honours degree in Oceanography, Ocean & Atmosphere Science, Atmospheric Science, Meteorology, or related field.

Course outline:

Prescribed coursework (SEA5009H): During the first semester, modules in ocean modelling and data analysis, climate dynamics, marine biogeochemistry, marine remote sensing and instrumentation must be completed. Participation in an oceanic research cruise and associated observational analyses is also required.

Minor dissertation (SEA5010W): 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: Coursework and dissertation each count 50% to the final assessment of the degree and both must be passed for the award of the degree. The dissertation will be formally examined.

SEA6000W PhD IN PHYSICAL OCEANOGRAPHY

360 HEQF credits at level 10

Applications for candidature are considered on merit. Candidates are required to complete an original research project and thesis on an approved topic. Rules for the degree may be found 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
The Departmental abbreviation for Physics is PHY.

Associate Professor and Head of Department:
A Buffler, MSc PhD HDE *Cape Town*
Professors:
D G Aschman, BSc (Hons) *Cape Town* DPhil *Oxon*
D T Britton, MSc PhD *London*
A Peshier, MA PhD *Dresden*
Associate Professors:
M S Allie, MSc PhD *Cape Town* (CHED)
M D Blumenthal, BSc *Wits* Dipl Phys *Bonn* PhD *Cantab*
R W Fearick, BSc (Hons) PhD *Wits*
M Härting, Dipl Phys *Regensberg* Dr. Ing BW *München*
H W G Weigert, Dipl Phys Dr rer nat habil *Regensburg*
Senior Lecturers:
I Govender, BSc (Hons) PhD *Cape Town* HDE *Unisa*
S M Wheaton, MSc PhD *Cape Town*
Lecturers:
A Hamilton, MSc PhD *Alberta*
W A Horowitz, MA MSc PhD *Columbia*
S W Peterson, MA PhD *Wisconsin*
D L Taylor, BSc (Hons) HDE *UKZN* MSc *Wits* (CHED)
Part-time Lecturer:
G Leigh, HDE MSc *Cape Town*
Senior Scholars:
J W A Cleymans, MSc D en Sc *Louvain* FRSSAf
C A Dominguez, MSc PhD *Buenos Aires* FRSSAf
Emeritus Professors:
S M Perez, BSc (Hons) *Wits* DPhil *Oxon*
R D Viollier, Dipl Phys Dr phil nat *Basel* FRSSAf
Emeritus Associate Professors:
C M Comrie, MSc *Natal* PhD *Cantab*
P E Spargo, BSc (Eng) MSc *Wits* Cert Ed *Cantab* FRSSAf
G N v d H Robertson, BSc (Hons) *Cape Town* DPhil *Oxon*
Honorary Professor:
Z Z Vilakazi, MA PhD *Wits*
Honorary Research Associate:
F E Lubben, MSc *Delft* MA *York* PGCE *Delft*
Chief Technical Officers:
J Dickson
G K Fowle
K J Ontong
Chief Scientific Officer:
J E Fearon, MSc *Cape Town*
Department Administrator:
N Lovric
Senior Secretary:
M Maich (part-time)
L C van Zyl

Librarian:
S Knox (part-time)
Laboratory Attendants:
M Christians
L Oliver
G Swartz
Departmental Assistant:
M Lawrence

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, 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, comprising: (a) Gamma ray spectroscopy with the AFRODITE array; (b) Giant resonance reactions with the magnetic spectrometer; (c) Fast neutron physics.
2. Theoretical Physics (J W A Cleymans, C A Dominguez, W A Horowitz, A Peshier, S M Perez, H W G Weigert, S M Wheaton 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; (i) Nuclear structure and models.
3. Experimental high energy physics (J W A Cleymans, A Hamilton), 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, D T Britton, C M Comrie and M Härting), comprising: (a) Research within the Nanosciences Innovation Centre; (b) Structural and electrical properties of thin films; (c) X-ray diffraction studies of strain fields and residual stress analysis; (d) Single electron transport and interactions.
5. Applied Physics (A Buffler, I Govender, S W Peterson, S M Wheaton), comprising: (a) Positron Emission Particle Tracking at PEPT Cape Town, iThemba LABS; (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 using neutrons; (e) Geo-neutrino detection (EARTH collaboration).
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.

First-Year Courses

PHY1004W MATTER & INTERACTIONS
36 HEQF credits at level 5
PHY1004W is an advanced calculus-based introductory course for Science students intending to continue with second-year Physics, featuring modelling of physical systems from fundamental principles, and computational problem solving using V Python.

Course co-ordinator(s): Associate Professor A Buffler

Entrance requirements: Students will be expected to have passed NSC Physical Science with at least 60%. 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:

MODERN MECHANICS: Conservation laws, the momentum principle, atomic nature of matter, conservation of energy, energy in macroscopic systems, energy quantization, multiparticle 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical or tutorial per week, Tuesday, 14h00-17h00.

DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one June 2-hour examination counts 25%; one November 2-hour examination counts 25%.

PHY1031F GENERAL PHYSICS A

18 HEQF credits at level 5

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.

Course co-ordinator(s): Dr S M Wheaton

Entrance requirements: Students will be expected to have passed NSC Physical Science with at least 60%.

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:

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, Dopper effect.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical or tutorial per week, Monday, Wednesday or Thursday, 14h00-17h00.

DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination counts 50%.

PHY1023H PRINCIPLES OF PHYSICS

18 HEQF credits at level 5

Course co-ordinator(s): Ms D L Taylor

Entrance requirements: Students will be expected to have passed NSC Physical Science at least 60%. The permission of the Dean or Head of Department is required prior to registration for this course.

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 PHY1004W and PHY1031F). PHY1023H is an algebra-based introductory course for Science students. Some calculus may be used. It 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. Note that students passing PHY1023H may proceed into PHY1031F. Students who pass PHY1023H and then register for and pass PHY1004W will gain credit for both courses.

Course outline:

TOOLS AND SKILLS: Essential mathematical, diagrammatic and conceptual tools and skills for Physics, coordinate 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, Dopper effect.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical or tutorial per week, Tuesday, 14h00-17h00.

DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination counts 50%.

PHY1032S GENERAL PHYSICS B

18 HEQF credits at level 5

An algebra-based introductory course for Science students who do not intend proceeding to second-year courses in Physics. Some calculus may be used.

Course co-ordinator(s): Dr S W Peterson

Entrance requirements: PHY1031F or PHY1023H

Course outline:

ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resitivity, 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

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical or tutorial per week, Monday, Wednesday, or Thursday, 14h00-17h00.

DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination counts 50%.

PHY1032F GENERAL PHYSICS B

18 HEQF credits at level 5

PHY1032F is an algebra-based introductory course usually taken by Science students who have completed PHY1023H. Some calculus may be used.

Course co-ordinator(s): Dr A Hamilton

Entrance requirements: PHY1023H or PHY1031F

Course outline:

ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss' law, electric potential, capacitance, current, current density, emf, resistance, resitivity, 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

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	3	3	3	3	3

Practicals: One practical or tutorial per week, Wednesday 14h00-17h00.

DP requirements: Minimum of 40% in class record, including 50% in laboratory assessment.

Assessment: Class record (weekly problem sets, class tests and laboratory record) counts 50%; one 2-hour written examination counts 50%.

Second-Year Courses

PHY2014F WAVES & ELECTROMAGNETISM

24 HEQF credits at level 6

Course co-ordinator(s): Associate Professor M D Blumenthal

Entrance requirements: PHY1004W or (PHY2009S and MAM1043H), a full first-year course in Mathematics, and MAM2000W or (MAM2004H and MAM2046W) as co-requisite.

Course outline:

VIBRATIONS AND WAVES: Harmonic oscillations, damped and forced oscillations, resonance, Fourier analysis, harmonic chains, waves, dispersion, interference, diffraction.

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One practical per week, Monday, 14h00-17h00.

Tutorials: One tutorial per week, Tuesday, 14h00-16h00

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

Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour examination written in June counts 50%. A subminimum of 45% is required in the final examination.

PHY2015S CLASSICAL & QUANTUM MECHANICS

24 HEQF credits at level 6

Course co-ordinator(s): Associate Professor R W Fearick

Entrance requirements: As for PHY2014F, and at least 40% in PHY2014F.

Course outline:

CLASSICAL MECHANICS: Review of Newton's laws; inertial and non-inertial frames; constraints and d'Alembert's principle; the Lagrangian formulation of mechanics; Noether's theorem; symmetries and conservation laws; applications from planetry motion to rigid body motion.

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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: One computational practical per week, Monday, 14h00-17h00.

Tutorials: One tutorial per week, Tuesdays 14h00-16h00

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

Assessment: Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour paper written in November counts 50%. A subminimum of 45% is required in the final examination.

Third-Year Courses

PHY3021F ADVANCED PHYSICS A

36 HEQF credits at level 7

Course co-ordinator(s): Associate Professor R W Fearick

Entrance requirements: PHY2014F and PHY2015S, and 40% in MAM2000W or (MAM2004H and MAM2046W).

Course outline:

ELECTROMAGNETISM: Maxwell's equations in vacuum and in matter, conservation laws, momentum and angular momentum in electromagnetic fields, electromagnetic waves, the Fresnel relations, laws of optics, absorption and dispersion, frequency dependence of permittivity, wave guides, gauge transformations, retarded potentials, electric and magnetic dipole radiation, power radiated by a point charge, special relativity, four-vectors, relativistic kinematics, relativistic electrodynamics, the electromagnetic field tensor.

THERMODYNAMICS AND STATISTICAL PHYSICS: Temperature, heat and work, First law of thermodynamics, Ensembles and entropy, Second law of thermodynamics, 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.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: Monday, 14h00-17h00; other days by arrangement.

Tutorials: By arrangement

DP requirements: Class record 40%, including 50% for laboratories and satisfactory completion of tutorial assignments.

Assessment: Class record (tests, essays, projects and laboratory reports) counts 50%; one 3-hour paper and one 2-hour paper count 50%. A subminimum of 45% is required in the final examination.

PHY3022S ADVANCED PHYSICS B

36 HEQF credits at level 7

Course co-ordinator(s): Professor D G Aschman

Entrance requirements: PHY2014F and PHY2015S, and at least 40% in PHY3021F.

Course outline:

ATOMIC PHYSICS: angular momentum, atomic structure and spectra, selection rules, spin, fine structure, Zeeman effect, time dependent and independent perturbation theory, molecular structure and spectra.

NUCLEAR AND PARTICLE PHYSICS: properties of nuclei, nuclear forces, nuclear structure and reactions, radioactivity, decay modes, interactions of elementary particles, quarks & leptons, symmetries and the gauge forces.

SOLID STATE PHYSICS: crystal structure; lattice vibrations, electron states in solids, energy band theory, semiconductor physics and devices.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	4	4	4	4	4

Practicals: Monday, 14h00-17h00; other days by arrangement

Tutorials: By arrangement.

DP requirements: Class record 40%, including 50% for laboratories and satisfactory completion of tutorial assignments.

Assessment: Class record (tests, essays, projects and laboratory reports) counts 50%; one 3-hour paper and one 2-hour paper count 50%; oral exam 2% (bonus). A subminimum of 45% is required in the final examination.

Postgraduate Courses

PHY4000W BSc (HONS) IN PHYSICS

160 HEQF credits at level 8

(includes research project of 40 credits)

Course co-ordinator(s): Professor A Peshier

Entrance 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 entrance 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 all modules, and is further

subject to the submininum 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.

PHY5000W MASTERS IN PHYSICS

180 HEQF credits at level 9

The Masters in Physics consists of the completion of a research project on an approved topic on which a dissertation must be presented. General rules for this degree may be found in the front of the handbook.

PHY5001W MASTERS IN THEORETICAL PHYSICS

180 HEQF credits at level 9

The Masters in Theoretical Physics is obtained by satisfactorily completing a research project on which a dissertation must be presented. Students are required to participate in courses which may be offered on topics such as quantum electrodynamics, relativistic quantum field theory, particle physics, electroweak and strong interactions. General rules for this degree may be found in the front of the handbook.

PHY5003W DISSERTATION COMPONENT OF THE MASTERS IN ASTROPHYSICS & SPACE SCIENCE

Minor dissertation: 90 HEQF credits at level 9

Entrance requirements: AST5003F

Students will work on an approved research topic on which a dissertation must be presented.

PHY5006W MASTERS IN TERTIARY PHYSICS EDUCATION

180 HEQF credits at level 9

The Masters in Physics consists of the completion of a research project on an approved topic on which a dissertation must be presented. General rules for this degree may be found in the front of the handbook.

PHY6000W PhD IN PHYSICS

360 HEQF credits at level 10

The PhD degree may be undertaken either in the field of Physics or of Theoretical Physics. In both cases students are required to complete an original research project on which an acceptable thesis must be presented. Students of Theoretical Physics, in addition, must participate successfully in an advanced course entitled Special Topics in Theoretical Physics and in the MSc courses in Theoretical Physics listed above, if these have not been attended previously. Candidates are referred to the rules for this degree as set out in Book 3, General Rules and Policies.

PHY6001W PhD IN TERTIARY PHYSICS EDUCATION

360 HEQF credits at level 10

Candidates for the PhD degree are required to complete an approved original research project on which an acceptable thesis must be presented. 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:
C Thiart, BSc Agric (Hons) *Stell* MSc PhD *Cape Town*
Professors:
G D I Barr, MSc PhD *Cape Town*
D J Bradfield, MSc PhD *Cape Town* HED *Unisa*
T T Dunne, BA (Hons) BSc (Hons) UED BEd *Natal* PhD *Cape Town* CStat
Associate Professors:
F Little, MSc PhD *Cape Town*
S Lubbe, MCom PhD *Stell*
Senior Lecturers:
B Erni, BSc (Hons) MSc *Cape Town* PhD *Basel*
F N Gumedze, MSc PhD *Cape Town*
J C Nyirenda BSc *Newcastle Upon Tyne* PhD *Cambridge*
LD Scott, MSc PhD *Cape Town*
K Stielau, BSc(Hons) *Natal*
M Varughese, BSc (Hons) MSc *Wits* DipAc&Tech *Edinburgh* PhD *Cape Town*
Lecturers:
A Clark, MSc *Cape Town*
G Distiller, BCom (Hons) MSc *Cape Town*
S Er, PhD *Istanbul*
H Gerber, MSc *NMMU* MSc *UPE*
D Katshunga, BSc (Hons) *DRC* MSc *Cape Town*
M J P Lacerda, MSc *Cape Town* PhD *Galway*
S Silal, MSc *Cape Town*
B J Stray, MSc *Arizona State* PhD *Stellenbosch*
N Watson, MSc *Cape Town*
Senior Scholars:
L G Underhill, MSc PhD *Cape Town*
R K Guo, BSc *Tsinghua* MSc PhD *Iowa State*
Emeritus Professors:
T J Stewart, BSc (Chem Eng) *Cape Town* MSc (OR) PhD *Unisa*
Emeritus Associate Professor:
J M Juritz, BSc (Hons) *UNISA*, MSc PhD *Cape Town*
Adjunct Professor:
L M Haines, BA MA *Cambridge* BSc (Hons) *Natal* MPhil *UCL* PhD *Unisa* FRSSAf
Principal Scientific Officer (Consultant):
K Mauff, BBusSci (Hons) MSc *Cape Town*
Administrative Manager:
B King, HDE *UWC*
Administrative Assistants:
A Davids Meyer
L Futuse
S Meyer, BComm *UNISA*
Senior Clerk:
K Jeptha
Receptionist:
C Jansen-Fielies

RESEARCH IN STATISTICAL SCIENCES

Research areas:

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 optimization; application to decision making and planning in private and public sectors (T J Stewart, L Scott, J Nyirenda, H Gerber).

BAYESIAN DECISION THEORY: General principles of Bayesian statistical analysis; applications in sequential stochastic optimization and other fields (T J Stewart, T T Dunne, R K Guo).

ECONOMETRIC 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 (G D I Barr, R K Guo, L M Haines).

RELIABILITY MODELLING AND QUALITY CONTROL: System Reliability and Maintenance Modelling and statistical quality control methods and applications (R K Guo, T J Stewart, T T Dunne).

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, particularly in the area of community health, and to provide statistical support to medical researchers in the form of short courses and consulting.

SPATIAL AND GIS MODELING: Statistics of large geoscience datasets. Geographic information systems (GIS). Geostatistics and spatial modeling (C Thiart, M M Varughese). Imprecise spatial data analysis (R K Guo). 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 (L G Underhill, 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, K Stielau, F Gumedze).

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 (T T Dunne).

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, L G Underhill)

Undergraduate Courses

NOTES

1. Students may not obtain credit for both STA2030S and either STA2004F or STA2005S.
2. Students may not obtain credit for both STA3030F and STA2004F.
3. Students who intend to specialise in Statistics are strongly advised to include Computer Science in their curriculum.
4. Note that MAM1000W is a prerequisite for STA3041F, STA3043S, STA3045F and MAM2000W is strongly recommended.
5. A major in Mathematical Statistics for the BSc requires STA2004F, STA2005S, STA3041F and STA3043S..
6. A non-Science major in Applied Statistics requires STA2020F (or STA2007F), STA2030S, STA3030F and STA3036S (See Commerce and Humanities handbooks).

First-Year Courses

STA1000F STATISTICS 1000

(No first year students)

18 HEQF credits at level 5

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

Course co-ordinator: Dr L Scott

Entrance requirements: A pass in any of MAM1004F/H or MAM1005H or MAM1006H or MAM1000W or MAM1017F/S or MAM1010F/S or STA1001F/S and/or decanted MAM1005H students.

Course outline:

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. Tests on means, variances and proportions. Determining sample size. Simple linear regression and measures of correlation.

Lectures: Monday to Friday, 1st or 4th period.

Tutorials: One compulsory tutorial per week and workshops during the semester, at times to be arranged.

DP requirements: Attendance and completion of all tests and assignments; class record of 35%.

Assessment: Class record counts30%, one 3 hour examination counts 70%.

STA1000S STATISTICS 1000

18 HEQF credits at level 5

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.

Course co-ordinator: Dr L Scott

Entrance requirements: A pass in any of MAM1004F/H or MAM1005H or MAM1010F/S or STA1001F/H/S. In addition students will be admitted to STA1000S if they are currently registered for MAM1000W or MAM1006H or MAM1012S or MAM1018S.

Course outline:

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. Tests on means, variances and proportions. Determining sample size. Simple linear regression and measures of correlation.

Lectures: Monday to Friday, 1st or 2nd or 4th period.

Tutorials: One compulsory tutorial per week and workshops during the semester, at times to be arranged.

DP requirements: Attendance and completion of all tests and assignments; class record of 35%.

Assessment: Class record counts30%, one 3 hour examination counts 70%.

STA1006S STATISTICS FOR MATHEMATICAL DISCIPLINES

18 HEQF credits at level 5

Course co-ordinator(s): Dr F Gumedze

Entrance requirements: At least 70% in NSC Mathematics. Concurrent registration on MAM1000W or MAM1006H or MAM1012S

Course outline:

Types of data variables. Exploratory data analysis. Grouping and graphing of data. Set theory. 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 distributions t, Chi-square, F and their tables. Point and interval estimation. Sample size estimation. Hypotheses testing: Z-test and t-test (means, difference between means: for independent samples). F-test (ratio of two independent variances). Chi-square-test. Meaning of p-values. Bivariate data; scatterplot, simple linear regression and correlation.

Lectures: Five lectures per week, Monday to Friday, 1st and 4th period.

Tutorials: One compulsory tutorial per week.

DP requirements: Attendance and completion of all tests and assignments; class record of 35%.

Assessment: Class record counts 30%; one 3-hour written examination in November counts 70%.

STA1007S BIONUMERACY

18 HEQF credits at level 5

Course co-ordinator(s): Mr G Distiller

Entrance requirements: At least 70% in NSC Mathematics. For foreign students a pass at A-level or a C-symbol at O-Level is required. A pass or concurrent registration with MAM1004F/H or equivalent.

Course outline:

Introduction to Biological Statistics; Scientific Method; Computing and Data Manipulation and Presentation; Measures of Central Tendency; Distributions and Functions; Probability Theory; Basic Inferential Statistics; Mathematical Modelling. There will be one research project that will serve as vehicles for instruction in the above areas. Students will be required to collect, manipulate, analyze (using a spreadsheet) and interpret data to answer research questions in a scientific way. The course is the equivalent of STA1000S, in a biological setting.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	

Tutorials: One compulsory tutorial per week, Friday, 1st period.

DP requirements: Attendance and completion of all tests and assignments; class record of 35%.

Assessment: Class record 30%; one 3-hour written examination in November counts 70%.

Second-Year Courses

STA2004F STATISTICAL THEORY & INFERENCE

24 HEQF credits at level 6

Course co-ordinator(s): Associate Professor C Thiart

Entrance requirements: MAM1000W and STA1006S.

Course outline:

DISTRIBUTIONS: Univariate and bivariate distributions. Moments (including conditional). Generating functions (moment, probability and cumulant). Convergence in distribution and central limit theorem Transformations of random variables. Sampling distributions from the normal distribution (chi-squared, t, F). Order statistics.

INFERENCE: Estimation. Maximum likelihood. Asymptotic theory. Least squares. Methods of moments. Sufficiency and efficiency. Exponential families. Hypothesis testing and likelihood ratio tests.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: One compulsory tutorial of 2 hours per week, by arrangement.

DP requirements: Attendance and completion of all tests and assignments; class record of 35%.

Assessment: Class record counts 30%; one 3-hour examination in June counts 70%.

STA2005S LINEAR MODELS

24 HEQF credits at level 6

Course co-ordinator(s): Mr A Clark

Entrance requirements: DP certificate for STA2004F.

Course outline:

REGRESSION: The multivariate normal; quadratic forms; the linear model; maximum likelihood; estimates of parameters in the linear model; the Gauss-Markov theorem; variable selection procedures; analysis of residuals.

APPLIED STATISTICS: Non-parametric methods. Design and analysis of experiments. Fixed, mixed and random effects models.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: One tutorial per week.

Practicals: One practical per week, by arrangement.

DP requirements: Class record of 35%.

Assessment: Class record counts 30%; one 3-hour examination in October/November counts 70%.

STA2007F APPLIED STATISTICAL MODELLING

24 HEQF credits at level 6

Course co-ordinator(s): Dr B Erni

Entrance requirements: (STA1000F/S or STA1007S or STA1006S) and (MAM1004F/H or MAM1000W or MAM1005H or equivalent).

Course outline:

Introduction to statistical notation, linear regression, design and analysis of experiments, generalized linear models. There will be a strong emphasis on the practical application of the above methods, using open-source statistical software such as R.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Tutorials: One 2-hour tutorial/practical per week, to be arranged.

DP requirements: At least 35% for class record and satisfactory completion of all projects (subminimum of 40% for each project).

Assessment: Two tests and two projects will count equally towards the class record. Class record counts up to 40%; one 2-hour paper written in June counts 60% (a subminimum of 40% is required in examinations).

STA2020F BUSINESS STATISTICS

24 HEQF credits at level 6

NOTE: This course will be counted as a non-Science credit.

Course co-ordinator(s): Mrs H Kroon

Entrance requirements: (MAM1000W or MAM1004F/H or MAM1005H or MAM1006H or MAM1012 or MAM1018 or STA1001) **and** (STA1000S or STA1006S)

Objective: To introduce business and commerce students to intermediate statistical techniques relevant to business and management problems.

Course Outline: Analysis of variance (ANOVA) and experimental design; Revision and extension of simple linear regression; Multiple regression; Econometric models; Time series analysis; Non-parametric statistics.
Lectures: Monday to Friday, period to be confirmed.
Tutorials: Tutorials/workshops by arrangement.
DP requirements: At least 35% for class record and satisfactory completion of the project.
Assessment: Class record counts 30%, one 3 hour examination counts 70%.

STA2020S BUSINESS STATISTICS

24 HEQF credits at level 6
Course co-ordinator(s): Mrs H Kroon
Entrance requirements: (MAM1000W or MAM1004F/H or MAM1005H or MAM1006H or MAM1002W or MAM1012 or MAM1003 or MAM1018 or STA1001) **and** (STA1000S or STA1006S)
Objective: To introduce business and commerce students to intermediate statistical techniques relevant to business and management problems.
Course Outline: Analysis of variance (ANOVA) and experimental design; Revision and extension of simple linear regression; Multiple regression; Econometric models; Time series analysis; Non-parametric statistics.
Lectures: Monday to Friday, 7th period.
Tutorials: Tutorials/workshops by arrangement.
DP requirements: At least 35% for class record and satisfactory completion of the project.
Assessment: Class record counts 30%, one 3 hour examination counts 70%.

Third-Year Courses

STA3041F MARKOV PROCESSES & TIME SERIES

36 HEQF credits at level 7
Course co-ordinator(s): Associate Professor S Lubbe
Entrance requirements: STA2004F and STA2005S, MAM2000W recommended (linear algebra and advanced calculus modules).
Course outline:
Markov Processes: Discrete Markov chains; application to experience rating; Poisson and renewal processes; continuous time Markov chains; Theory of Markov processes; Ruin theory.
Time Series Analysis: General concepts; filters; backward shift operators; concepts of AR, ARMA and ARIMA models; frequency domain analysis; multivariate autogressive models; identification, estimation and diagnosis of time series models; non-stationary and non-linear models; applications.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: Tutorials and practicals by arrangement.
DP requirements: Class record of 35% and submission of all projects.
Assessment: Class record counts 30%; one 3-hour examination in June counts 70%.

STA3043S DECISION THEORY & GLMs

36 HEQF credits at level 7
Course co-ordinator(s): Associate Professor F Little
Entrance requirements: STA2004F and STA2005S; MAM1000W (MAM2000W strongly recommended).
Course outline:
Decision and Risk Theory: Structure of decision making under uncertainty; 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.

Generalized Linear Models: Definition of a generalized linear model; estimation and testing procedures; applications including logistic regression and log-linear models.

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	1	1	1	1	1

Tutorials: Monday and Wednesday, 6th and 7th period.

DP requirements: Class record of 35% and submission of all projects.

Assessment: Class record counts 30%; one 3-hour examination in November counts 70%.

STA3045F ADVANCED STOCHASTIC PROCESSES

36 HEQF credits at level 7

Course co-ordinator(s): Dr M Varughese

Entrance requirements: STA1006S, STA2004F, STA2005S and concurrent registration for STA3041F and MAM2000W.

Course outline:

This course will cater to the needs of Actuarial Science students.

Module 1: Foundations of stochastic processes, Markov processes, Markov jump processes, two-state and general Markov models. (Lectures will be held simultaneously with BUS3018F).

Module 2: Advanced Time Series. (Content presumes prior experience of STA3041F Time Series).

	Period				
	Mon	**Tue**	**Wed**	**Thu**	**Fri**
Lectures:	2	2	2	2	2

Tutorials: One compulsory tutorial per week. Refer to department.

DP requirements: Class record of 35%, submission of all projects.

Assessment: Class record counts 30%; one 3-hour examination in June counts 70%.

Postgraduate Courses

STA4007W BSc (HONS) IN STATISTICAL SCIENCES

160 HEQF credits at level 8

(includes research project of 40 credits)

Course co-ordinator(s): Associate Professor F Little

Entrance requirements: Completion of STA2004F, STA2005S, STA3041F, STA3043S, or their deemed equivalents, at a satisfactory level (normally an average of 65% or more in the 3rd year courses at first attempt). Students without MAM2000W, but with a good statistical major will also be considered. 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 entrance requirements. Enrolments are limited to 22 in all, for the combined Honours programs made up of STA4007W, STA4019H, STA4006W and STA4010W.

Course outline:

Students are required to complete the following:

Core courses: 81 credits

Elective courses: $\geq$39 credits

Individual project: 40 credits

The core modules include statistical computing, matrix methods, theory of statistics, operations

research. Available electives vary from year to year, but typically include a variety of applied and theoretical topics in statistics, econometrics and operations research.

Assessment: Each coursework module comprises of 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. In addition, the student is required to obtain a mark of at least 50% in all core courses, at least 40% in each of the required elective modules and at least 50% for the individual project.

STA4019H STATISTICAL SCIENCES FOR ACTUARIES

104 HEQF credits

(includes research project of 40 credits)

Course co-ordinator(s): Associate Professor F Little

Entrance requirements: Completion of STA2004F, STA2005S, STA3041F, STA3043S, or their deemed equivalents, at a satisfactory level (normally 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 entrance requirements. Enrolments are limited to 22 in all, for the combined Honours program made up of STA4007W, STA4019H, STA4006W and STA4010W.

Course outline:

This course constitutes 65% of the 160 HEQF credit requirement for the BSc (Hons) in Actuarial Science. Students are required to complete the following:

Core courses: 25 credits

Elective courses: $\geq$39 credits

Individual project: 40 credits

The core modules include statistical computing, matrix methods, theory of statistics, operations research and professional communication. Available electives vary from year to year, but typically include a variety of applied and theoretical topics in statistics, econometrics and operations research.

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.

STA5000W MASTERS IN MATHEMATICAL STATISTICS

180 HEQF credits at level 9

This degree may be conferred after satisfactory completion of a dissertation embodying research under the guidance of an approved supervisor. The normal duration of the course is two years although, under exceptional circumstances, may be completed in one and a half years. General rules for this degree may be found in the beginning of the handbook.

STA5001W MASTERS IN OPERATIONAL RESEARCH

180 HEQF credits at level 9

This degree may be conferred after satisfactory completion of a dissertation embodying research under the guidance of an approved supervisor. The normal duration of the course is two years although, under exceptional circumstances, may be completed in one and a half years. General rules for this degree may be found in the beginning of the handbook.

STA5003W and STA5004W MASTERS IN STATISTICAL SCIENCES

(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor dissertation: 90 HEQF credits at level 9

The coursework component of the Masters degree in Statistical Sciences (STA5003W) aims to train students in more advanced statistical methodology and application in order to prepare them for either a vocational research career. Students need to complete the 4 core modules, Longitudinal Data Analysis, Advanced Topics in Regression, Multivariate Statistics, Simulation and Optimisation and 2 of the specialisation modules Statistical Inference and Design, Bayesian Decision Analysis, Biological Statistics (either Biostatistics, Bioinformatics or Ecological Statistics), Financial Statistics, Problem Structuring and Project Management, or modules from a different department. 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. In addition, students are required to submit a mini dissertation (STA5004W) that counts 50% towards the final mark for the degree.

Entrance Requirements: Honours degree in Statistics or closely related field or a four year Bachelor's degree like B.Business Science (not extended 3 year degree). At least 65% in 4th year of study.

Deadlines for applications for the following year: International Students, 30th September and local students, 31st October.

Assessment: Both coursework (STA5003W) and dissertation (STA5004W) components must be passed separately for the degree to be awarded. Of the coursework component, 6 components need to be passed where for each module class assessments will count a minimum of 40% and examinations will count a maximum of 60%. Subminima: a minimum of 40% needs to be obtained for both the class assessments and examination for each module.

STA5010W and STA5011W MASTERS IN OPERATIONAL RESEARCH IN DEVELOPMENT

(by coursework and minor dissertation)

Coursework: 90 HEQF credits at level 9

Minor Dissertation: 90 HEQF credits at level 9

NOTE: This course may not be offered in 2013.

Entrance requirements: Entry to the programme 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 programme, consideration will also be given to recommendations from at least two referees who are able to attest to the applicants academic abilities and suitability for the programme. Deadlines for applications for the following year: 30th September.

Course outline:

The aim of the programme 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. Operational Research 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 examples) socio-economic development and corrective actions, less reliable infrastructures, and a post-colonial need for community participation in all levels of planning.

Curriculum: The programme is structured over two years, although completion in 18 months may be possible.

The first academic year is based primarily on coursework (STA5010W), supplemented by group

discussions and case studies. The course work includes the basic techniques of operational research and statistics, specific developmental issues, problem structuring and decision analysis.

On successful completion of the coursework component, students will undertake an individual applied research project on a suitable topic, the results of which are to be written up as a minor dissertation (STA5011W). In some cases, the project might be undertaken on a local problem at the student's home base.

Assessment: In order to qualify for the Masters degree, the student will need to pass both the coursework and dissertation. A pass for the coursework requires an average of 50% over all modules, as well as a minimum of 50% for certain modules designated as core material.

STA6001W PhD IN STATISTICAL SCIENCES

360 HEQF credits at level 10

Supervision of research work towards this degree is provided by the Department. Candidates are referred to the rules for this degree as set out in book 3, General Rules and Policies.

INTER-FACULTY UNIT

Electron Microscope Unit

Director:
Associate Professor B T Sewell, MSc *Witwatersrand* PhD *Lond*
Principal Scientific Officer:
B W Weber, BSc (Hons), PhD *Cape Town*
Principal Technical Officer:
M A Jaffer, BSc (Hons) *Cape Town*
Principal Technical Officer (Part-time):
J Duncan
Chief Scientific Officers:
F Cummings, BSc (Hons) PhD *UWC*
M Waldron, BSc (Hons) *Swansea* MSc *Cape Town*
Technical Assistant:
S Karriem

The Electron Microscope Unit is housed in the R W James Building at 9 University Avenue and provides scanning, transmission 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 S440, equipped with a range of accessories including an X-ray analyser, cathodoluminescence detector and cryo facilities. The Unit also has three Transmission Electron Microscopes two of which are considered high resolution, namely the 200 kV Tecnai TF20 (FEG)TEM and the Tecnai G²20 energy-filter (EF)TEM equipped with a LaB6 filament. The third is a 120 kV Leo912 TEM equipped with an in-column energy filter and LaB6 filament. 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 http://sbio.uct.ac.za/webemu/

SCHEDULE OF COURSES - LECTURE AND PRACTICAL TIMES

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	ENTRANCE REQUIREMENTS
AGE1002S	AFRICA & WORLD ARCHAEOLOGY	5 M to Th	By arrangement; F 5th	None
AGE1004H	INTRODUCTION TO EARTH & ENVIRONMENT SCIENCES	2 M to F	One practical per week, F 14h00-17h00	See departmental entry
AGE2011S	HUMAN EVOLUTION	2 M to Th	One per week, by arrangement	See departmental entry
AGE2012F	SOUTHERN AFRICAN HUNTERS & HERDERS	2 M to Th	One per week, by arrangement	See departmental entry
AGE3006H	DIRECTED READING & RESEARCH	By arrangement	none	See departmental entry
AGE3011F	ROOTS OF BLACK IDENTITY	4 M to Th	One per week, by arrangement	See departmental entry
AGE3012S	GLOBAL INTERACTION & THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY	4 M to Th	One 2-hour practical 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 14h00-16h30	See departmental entry
AST2003H	ASTRONOMICAL TECHNIQUES	2 T, Th	W 14h00-1630	See departmental entry
AST3002F	STELLAR ASTROPHYSICS	2 M to F	W 14h00-16h30	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, M,Tu,W or 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 Th	M 14h00-17h00	BIO1000F, BIO1004S
BIO2011S	LIFE ON LAND: ANIMALS	4 M to Th	M 14h00-17h00	BIO1000F and BIO1004S
BIO2012S	LIFE ON LAND : PLANTS	2 M to F	Th 14h00-17h00	BIO1000F, BIO1004S
BIO2013S	LIFE IN THE SEA	3 M to Th	W 14h00-17h00	BIO1004S, GEO1009F
BIO3002F	MARINE ECOSYSTEMS	1 M to F	W 14h00-17h00	See departmental entry

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	ENTRANCE REQUIREMENTS
BIO3013F	GLOBAL CHANGE ECOLOGY	2 M to F	M 14h00-17h00	BIO1000F, BIO1004S
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	Th 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 M to F	W 14h00-17h00	See departmental entry
CEM1010F	CHEMISTRY 1010	4 M to F	Th 14h00-17h00	CEM1009H
CEM2007F	PHYSICAL CHEMISTRY & SPECTROSCOPY	3 M to F	Th 13h30-17h00	See departmental entry
CEM2008S	ORGANIC & INORGANIC CHEMISTRY	3 M to F	Th 13h30-17h00	See departmental entry
CEM3005W	CHEMISTRY 3005	3 M to F	W and F, 14h00-17h00	See departmental entry
CSC1010H	COMPUTER SCIENCE 1010	5 M to Th	Th 14h00-17h30	See departmental entry
CSC1011H	COMPUTER SCIENCE 1011	4 M to Th	M 14h00-17h30	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	See departmental entry
CSC2001F	COMPUTER SCIENCE 2001	2 M to F	One prac per week, 14h00-18h00	See departmental entry
CSC2002S	COMPUTER SCIENCE 2002	2 M to F	One prac per week, 14h00-18h00	See departmental entry
CSC2003S	COMPUTER GAMES	3 M to F	One prac per week, 14h00-18h00	CSC2001F, MAM1000W or equivalent
CSC3002F	COMPUTER SCIENCE 3002	2 M to F	Two pracs per week, 14h00-18h00	See departmental entry
CSC3003S	COMPUTER SCIENCE 3003	2 M to F	Two pracs per week, 14h00-18h00	As for CSC3002F
CSC3020H	THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN	3 M to F	4 hours per week, by arrangement	CSC2001F, CSC2002S and CSC2003S
CSC3022H	C++ WITH APPLICATIONS	3 M to F	4 hours per week, by arrangement	CSC2001F, CSC2002S and CSC2003S
EEE3067W	DIGITAL ELECTRONICS & MICROPROCESSORS	See Departmental entry	See Departmental entry	See Departmental entry
EEE3077W	DIGITAL & EMBEDDED SYSTEMS	See Departmental entry	See Departmental entry	See Departmental entry
EEE3078W	DIGITAL, EMBEDDED & ADAPTIVE SYSTEMS	See Departmental entry	See Departmental entry	See Departmental entry

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	ENTRANCE REQUIREMENTS
EEE3079W	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	INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES	None	F 14h00-17h00	DP in GEO1009F
EGS2013F	THE PHYSICAL ENVIRONMENT	5 M to F	F 14h00-17h00	See departmental entry
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
EGS3020F	ENVIRONMENTAL CHANGE & CHALLENGE	5 M to F	Th 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	See departmental entry
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	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 (second-year half course)	None	See departmental entry	GEO1006S, GEO2004S (co-requisite)
GEO3001S	STRATIGRAPHY & ECONOMIC GEOLOGY	2 M to F	Tu and Th 14h00-17h00	GEO2004S, DP in GEO3005F
GEO3005F	PETROLOGY & STRUCTURAL GEOLOGY	2 M to F	Tu and Th 14h00-17h00	GEO2001F, GEO2004S, first qualifying course in Chemistry
HUB2019F	INTRODUCTION TO HUMAN BIOLOGY	1 M to F	M or Tu	CEM1000W (or equivalent), BIO1000F
HUB2021S	HUMAN BIOLOGY : MAINTENANCE & INTEGRATION	1 M to F	M or Tu, 14h00-17h00	HUB2019F, CEM1000W or equivalent
HUB3006F	GENERAL & APPLIED PHYSIOLOGY	1 M to F	W or Th, 14h00-17h00	HUB2021S, CEM1000W (or equivalent)
HUB3007S	BIOPHYSICS & NEUROPHYSIOLOGY	1 M to F	W or Th, 14h00-17h00	HUB2021S, CEM1000W (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
MAM1004H	MATHEMATICS 1004	Three lectures per week, days to be arranged, in Meridian	By arrangement	See departmental entry
MAM1005H	MATHEMATICS 1005	1 M to Th	F 8h00-9h00, M 14h00-16h00	See departmental entry

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	ENTRANCE REQUIREMENTS
MAM1006H	MATHEMATICS 1006	1st, three days per week	1st, two days per week	See departmental entry
MAM1019H	FUNDAMENTALS OF MATHEMATICS	M, Th and alt Tu in Meridian	W 13h00-14h00	See departmental entry
MAM1043H	MODELLING & APPLIED COMPUTING	See departmental entry	One hour per week	See departmental entry
MAM1044H	DYNAMICS	See departmental entry	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 and MAM2002S	MATHEMATICS 2001, 2004 & 2002	5 M to F with options in 4th	Th or F 14h00-16h00	See departmental entry
MAM2043S	INTRODUCTION TO BIOLOGICAL MODELLING	5 M to F	F 14h00-16h00	MAM1004F or MAM1004H or MAM1005H
MAM2046W	APPLIED MATHEMATICS 2046	3 M to F	Th 14h00-16h00	See departmental entry
MAM2047H	APPLIED MATHEMATICS 2047	3 M to F	Th 14h00-16h00	MAM1043H, MAM1044H and MAM1000W
MAM2048H	APPLIED MATHEMATICS 2048	3 M to F	Th 14h00-16h00	MAM2047H
MAM2052S	QUANTITATIVE SKILLS FOR SCIENTISTS	4 M to F	F 10h00-11h00 or Th 12h00-13h00	MAM1004F or MAM1004H or MAM1005H or MAM1000W
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	3 M to F	Th 14h00-16h00	See departmental entry
MAM3042H	FURTHER BIOLOGICAL MODELLING	Average of two and a half per week, to be arranged	One every two to three weeks, to be arranged	MAM2043S
MAM3048H	APPLIED MATHEMATICS 3048	3 M to F	Th 14h00-16h00	MAM3041H
MCB2014F	MOLECULAR COMPONENTS OF CELLS	4 M to F	M or Tu 14h00-17h00	See departmental entry
MCB2015S	METABOLISM	4 M to F	M or Tu 14h00-17h00	MCB2014F
MCB2016F	INTRODUCTION TO MICROBIOLOGY	5 M to F	Th or F 14h00-17h00	CEM1000W or equivalent, BIO1000F
MCB2017S	MICROBIAL BIOTECHNOLOGY	5 M to F	Th or F 14h00-17h00	MCB2016F
MCB2018F	INTRODUCTION TO GENETICS	3 M to F	W 14h00-17h00	See departmental entry

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	ENTRANCE REQUIREMENTS
MCB2019S	EUKARYOTIC GENE REGULATION & CELL SIGNALLING	3 M to F	W 14h00-17h00	MCB2014F, MCB2018F
MCB3012Z	RESEARCH PROJECT IN MOLECULAR & CELL BIOLOGY	None	two afternoons per week	See departmental entry
MCB3019F	RECOMBINANT DNA, GENOMICS & PROTEOMICS	3 M to F	F 14h00-17h00	See departmental entry
MCB3020F	PROTEIN STRUCTURE & FUNCTION	4 M to F	Th 14h00-17h00	See departmental entry
MCB3021F	MOLECULAR MICROBIAL GENETICS	5 M to F	Tu 14h00-17h00	See departmental entry
MCB3022S	ADVANCED BIOTECHNOLOGY	2 M to F	W 14h00-17h00	See departmental entry
MCB3023S	MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT	3 M to F	One tutorial per week	See departmental entry
MCB3024S	DEFENCE & DISEASE	5 M to F	One tutorial per week	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
PHY1032F	GENERAL PHYSICS B	3 M to F	M or W or Th, 14h00-17h00	PHY1031F or PHY1023H
PHY2014F	WAVES & ELECTROMAGNETISM	4 M to F	M 14h00-17h00 Tu 14h00-16h00	See departmental entry
PHY2015S	CLASSICAL & QUANTUM MECHANICS	4 M to F	M 14h00-17h00 T 14h00-16h00	As for PHY2014F
PHY3021F	ADVANCED PHYSICS A	4 M to F	M 14h00-17h00	See departmental entry
PHY3022S	ADVANCED PHYSICS B	4 M to F	M 14h00-17h00	See departmental entry
SAN1015F	WORDS, DEEDS, BONES & THINGS	See departmental entry	See departmental entry	None
SEA2004F	PRINCIPLES OF OCEANOGRAPHY	4 M to F	Tu 14h00-17h00	See departmental entry
SEA2005S	MARINE SYSTEMS	4 M to F	T 14h00-17h00	See departmental entry
SEA3004S	OCEAN & ATMOSPHERE DYNAMICS	4 M to F	M 14h00-17h00	See departmental entry
STA1000F AND STA1000S	STATISTICS 1000	1st Sem: 1 or 4 M to F 2nd Sem: 1,2 or 4 M to F	By arrangement, one a week	See departmental entry
STA1006S	STATISTICS FOR MATHEMATICAL DISCIPLINES	1 or 4 M to F	one a week	See departmental entry
STA1007S	BIONUMERACY	1 M to Th	F 8h00-9h00	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

COURSE CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/ TUTORIAL TIMES	ENTRANCE REQUIREMENTS
STA2007F	APPLIED STATISTICAL MODELLING	2 M to F	One per week by arrangement	See departmental entry
STA2020F/S	BUSINESS STATISTICS	See departmental entry	By arrangement	See departmental entry
STA3041F	STATISTICS 3041	1 M to F	Tutorials and practicals by arrangement	See departmental entry
STA3043S	STATISTICS 3043	1 M to F	M and W, 14h00-16h00	See departmental entry
STA3045F	MARKOV PROCESSES & ADVANCED TIME SERIES	2 M to F	One tutorial per week, 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	INTRODUCTION TO HUMAN BIOLOGY	1	M or Tu, 14h00-17h00
HUB3006F	GENERAL & APPLIED PHYSIOLOGY	1	W or Th, 14h00-17h00
MAM1000W	MATHEMATICS 1000	1	By arrangement
MAM1004F	MATHEMATICS 1004	1	M or W, 14h00-16h00
MAM1005H	MATHEMATICS 1005	1	M 14h00-17h00
MAM1006H	MATHEMATICS 1006	1	By arrangement
SEA3002F	OCEAN CIRCULATION	1	M 14h00-17h00
STA3041F	MARKOV PROCESSES & TIME SERIES	1	By arrangement
STA1000F	STATISTICS 1000	1	By arrangement
STA2004F	STATISTICAL THEORY & INFERENCE	1	By arrangement
STA2020F	BUSINESS STATISTICS	1	By arrangement
First period, second semester			
HUB2021S	HUMAN BIOLOGY : MAINTENANCE & INTEGRATION	1	M or Tu, 14h00-17h00
HUB3007S	BIOPHYSICS & NEUROPHYSIOLOGY	1	W or Th, 14h00-17h00
EGS3012S	ATMOSPHERIC SCIENCE	1	Tu or W, 14h00-17h00
STA1000S	STATISTICS 1000	1	By arrangement
STA1006S	STATISTICS FOR MATHEMATICAL DISCIPLINES	1	By arrangement
STA1007S	BIONUMERACY	1	F 8h00-9h00
STA2005S	LINEAR MODELS	1	M and W, 14h00-16h00
STA3043S	DECISION THEORY & GLMs	1	M and W, 14h00-16h00

Second period, first semester

AGE1004H	INTRO TO EARTH & ENVIRONMENTAL SCIENCES	2	F 14h00-17h00
AGE2012F	SOUTHERN AFRICAN HUNTERS & HERDERS	2	By arrangement
AST2002H	ASTROPHYSICS	2	W 14h00-16h30
AST2003H	ASTRONOMICAL TECHNIQUES	2	W 14h00-16h30
AST3002F	STELLAR ASTROPHYSICS	2	By arrangement
BIO3010F	SYSTEMATICS & MACRO EVOLUTION	2	Tu and Th, 14h00-17h00
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	By arrangement
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	F 14h00-17h00
STA2007F	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	By arrangement
BIO2012S	LIFE ON LAND : PLANTS	2	Th 14h0-17h00
BIO3003S	INLAND WATER ECOSYSTEMS	2	M + one other, 14h00-17h00
BIO3014S	CONSERVATION: GENES, POPULATIONS & BIODIVERSITY	2	M 14h00-17h00
CSC2002S	COMPUTER SCIENCE 2002	2	By arrangement
CSC3003S	COMPUTER SCIENCE 3003	2	By arrangement
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
STA1000S	STATISTICS 1000	2	By arrangement

Third period, first semester

CEM2007F	PHYSICAL CHEMISTRY & SPECTROSCOPY	3	M or 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
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
MCB2018F	INTRODUCTION TO GENETICS	3	W 14h00-17h00
MCB3019F	RECOMBINANT DNA, GENOMICS & PROTEOMICS	3	F 14h00-17h00
PHY1004W	MATTER & INTERACTIONS	3	Tu 14h00 to 17h00
PHY1023H	PRINCIPLES OF PHYSICS A	3	Tu 14h00-17h00
PHY1031F	GENERAL PHYSICS A	3	W 14h00-17h00
PHY1032F	GENERAL PHYSICS B	3	W 14h00-17h00
STA2020F	BUSINESS STATISTICS	3	By arrangement

Third period, second semester

BIO2013S	LIFE IN THE SEA	3	Tu 14h00-17h00
BIO3017S	MARINE RESOURCES	3	F 14h00-17h00
CEM2008S	ORGANIC & INORGANIC CHEMISTRY	3	M or Th, 14h00-17h00
CSC2003S	COMPUTER GAMES	3	By arrangement
MCB2019S	EUKARYOTIC GENE REGULATION & CELL SIGNALLING	3	W 14h00-17h00
MCB3023S	MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT	3	None
PHY1032S	GENERAL PHYSICS B	3	M, W or Th 14h00-17h00

Fourth period, first semester

AGE3011F	ROOTS OF BLACK IDENTITY	4	By arrangement
CEM1000W	CHEMISTRY 1000	2/4	Tu, Th or F, 14h00-17h00
CEM1009H	CHEMISTRY 1009	4	M 14h00-17h00
CEM1010F	CHEMISTRY 1010	4	Th 14h00-17h00
CSC1011H	COMPUTER SCIENCE 1011	4	M 14h00-17h30
CSC1015F	COMPUTER SCIENCE 1015	4/5	M, Tu or W 14h00-17h30
MAM2001H	MATHEMATICS 2001	4	Th or F, 14h00-16h00
MCB2014F	MOLECULAR COMPONENTS OF CELLS	4	M or Tu, 14h00-17h00
MCB3020F	PROTEIN STRUCTURE & FUNCTION	4	Th 14h00-17h00
PHY2014F	WAVES & ELECTROMAGNETISM	4	M 14h00-17h00 and Tu 14h00-16h00
PHY3021F	ADVANCED PHYSICS A	4	M 14h00-17h00
SEA2004F	PRINCIPLES OF OCEANOGRAPHY	4	Tu 14h00-17h00
STA1000F	STATISTICS 1000	4	By arrangement

Fourth period, second semester

AGE3012S	GLOBAL INTERACTION & THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY	4	By arrangement
BIO2011S	LIFE ON LAND: ANIMALS	4	Tu 14h00-17h00
BIO3011S	GLOBAL CHANGE ECOLOGY	4	W and F, 14h00-17h00
BIO3017S	MARINE RESOURCES	4	F 14h00-17h00
CSC1016S	COMPUTER SCIENCE 1016	4/5	M, Tu or W 14h00-17h31
EGS3022S	GEOGRAPHIC THOUGHT	4	W 14h00-17h00
MCB2015S	METABOLISM	4	M or Tu, 14h00-17h00
PHY2015S	CLASSICAL & QUANTUM MECHANICS	4	M 14h00-17h00 and T 14h00-16h00
PHY3022S	ADVANCED PHYSICS B	4	M 14h00-17h00
SEA2005S	MARINE SYSTEMS	4	Tu 14h00-17h00
SEA3004S	OCEAN & ATMOSPHERE DYNAMICS	4	M 14h00-17h00
STA1000S	STATISTICS 1000	4	By arrangement
STA1006S	STATISTICS FOR MATHEMATICAL DISCIPLINES	4	By arrangement

Fifth period, first semester

BIO1000F	CELL BIOLOGY	5	M, Tu, W or Th 14h00-17h00
BIO1000H	CELL BIOLOGY	5	M to F
BIO3015F	ECOSYSTEM 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
EGS3020F	ENVIRONMENTAL CHANGE & CHALLENGE	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
MCB2016F	INTRODUCTION TO MICROBIOLOGY	5	Th or F, 14h00-17h00
MCB3021F	MOLECULAR MICROBIAL GENETICS	5	W 14h00-17h00
STA2020F	BUSINESS STATISTICS	5	By arrangement
STA1000F	INTRODUCTION TO ASTRONOMY	5	W 14h00-17h00

Fifth period, second semester

AGE1002S	AFRICA & WORLD ARCHAEOLOGY	5	F 12h00-13h00
BIO1004S	BIOLOGICAL DIVERSITY	5	M, Tu, W, Th or F 14h00-17h00
BIO3016S	SYSTEMATICS AND MACROEVOLUTION	5	Th 14h00-17h00
CSC1016S	COMPUTER SCIENCE 1016	4/5	M, Tu or W 14h00-17h31
EGS2014S	CONTEMPORARY URBAN CHALLENGES	5	F 14h00-17h00
GEO1006S	INTRODUCTION TO MINERALS, ROCKS & STRUCTURE	5	Th 14h00-17h00
GEO1007S	EARTH STEWARDSHIP	5	None
MAM2002S	MATHEMATICS 2002	5	Th or F, 14h00-16h00
MAM2043S	INTRODUCTION TO BIOLOGICAL MODELLING	5	F 14h00-16h00
MAM3003S	MATHEMATICS 3003	5	F 14h00-17h00
MCB2017S	MICROBIAL BIOTECHNOLOGY	5	Th or F, 14h00-17h00
MCB3024S	DEFENCE & DISEASE	5	None

Various

AGE3006H	DIRECTED READING & RESEARCH	By arrangement	None
EGS1004S	INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES	none	F 14h00-17h00
MAM1019H	FUNDAMENTALS OF MATHEMATICS	Meridian	W 13h00-14h00
MAM1004H	MATHEMATICS 1004	Meridian	By arrangement
MAM3042H	FURTHER BIOLOGICAL MODELLING	By arrangement	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 W J Bond
Professor S Bourne
Professor M R Caira
Professor K Chibale
Professor A Chinsamy-Turan
Professor T J Egan
Professor J Farrant
Professor C L Griffiths
Professor A P le Roex
Professor B D Reddy
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 are recipients, in the Faculty:

1983: Professor G M Branch (Zoology)
1984: Professor J H Webb (Mathematics)
1986: Associate Professor B R Davies (Zoology)
1990: Associate Professor H S T Driver (Physics)
1992: Dr J J Conradie (Mathematics)
1992: Professor J E Parkington (Archaeology)
1994: Professor J R Moss (Chemistry)
1996: Professor M J Hall (Archaeology)
1996: Dr M D Picker (Zoology)
1997: Dr N Morrison (Mathematics)
1998: Mr A N Rynhoud (Mathematics)
1998: Professor J A Thomson (Microbiology)
1998: Associate Professor I V Barashenkov (Mathematics)
1998: Professor J U M Jarvis (Zoology)
1999: Dr T Egan (Chemistry)
2000: Associate Professor D L Reid (Geological Sciences)
2001: Dr V Abratt (Molecular & Cell Biology)
2002: Professor J W Lutjeharms (Ocean & Atmosphere Science)
2002: Dr S Oldfield (Environmental & Geographical Science)
2002: Dr A Buffler (CHED/Physics)
2003: Dr D W Gammon (Chemistry)
2004: Dr B Davidowitz (CHED/Chemistry)
2004: Dr S Mundree (Molecular & Cell Biology)
2006: Dr R R Ackermann (Archaeology)
2008: Dr J O'Riain (Zoology)
2009: Associate Professor G Marsden (Computer Science)
2011: Dr G Smith (Chemistry)

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 over 70% 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 entrance 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 (max 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 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, CIV1004W, CON1004W, EEE1004W and MEC1004W do not count

Professional Communication courses do not count

Courses taught by Science for students in another Faculty

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, equivalence and conditions 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)
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 counts as a half course if result is 70% or more

PHY1013F/S counts as a half course if result is 70% or more
PHY1012F/S plus PHY1013F/S count as full course credit if both are passed with an average mark for the two courses of 75% or more (CX PHY1004W)

STA2020F, STA2030S, STA3022F, STA3030F and STA3036S count as non-science half courses

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UNIVERSITY OF CAPE TOWN TEACHING AND LEARNING CHARTER

Overview

This charter outlines the goals we have set for ourselves in Teaching and Learning at the University of Cape Town.

By accepting a place at the University each student accepts responsibility for his or her own learning. This requires a commitment to hard work, and to participate fully in academic activities. It also recognizes that if students approach their studies in an open-minded, questioning manner, they will enhance their own educational experience and that of their fellow students and the academic staff.

By taking up academic appointments at the University, academic staff accept responsibility to teach to the best of their ability, to provide all reasonable assistance to students to enable them to do as well as they can, and to endeavour to teach with enthusiasm, creativity and rigour, and in a manner which reflects and interprets the research-led identity of the institution.

The University community acknowledges that effective teaching is best encouraged in a constructive and supportive environment within broadly agreed principles of good practice. While heads of academic departments are formally responsible to Senate for teaching and learning in their departments, individual academic staff are accountable for their teaching contribution which is assessed according to agreed performance criteria.

Mutual commitment:

Students should undertake to:

1. Treat staff and fellow students with dignity and respect, especially in lectures, tutorials, laboratories and libraries.
2. Prepare for and attend all classes, tutorials, practicals and other activities scheduled for the courses in which they are registered.
3. Complete all submissions and any other course requirements to the best of their ability, handing in work on time.
4. Take responsibility for their own learning, while also interacting constructively with their fellow students, lecturers and tutors.
5. Address personal issues that might reduce the chances of success in good time so that these do not limit learning opportunities.
6. Not cheat, and not submit work of others as their own.
7. Complete course and lecturer evaluations for each course they are registered for.

Academic staff should undertake to:

1. Treat students and fellow staff with respect and dignity, and without discrimination or favouritism.
2. Teach to the best of their ability, striving to achieve clarity and to create an environment where questions and enquiry are encouraged.
3. Provide all reasonable assistance to students to enable them to do as well as they can, and to be available in clearly advertised ways to respond to student queries (e.g. by face-to-face consultations, email or other online means within a reasonable period and/or at reasonable times).
4. With respect to courses that they teach:
    a. Provide clear, written course outlines, stating what is expected of students, DP requirements, if any, and how performance in the course will be assessed;
    b. Adhere to agreed and published timetables for the courses;
    c. Provide lists of required and recommended readings, in advance, and ensure that such materials are available to students on paper or online. The University Libraries, in line with their collection development policy, will endeavour to make relevant material available to students;
    d. Design and implement a system of assessment for each course, which is consistent with the course design, content and objectives;
    e. Return work submitted for assessment within a reasonable period of time, with appropriate and constructive comments and other forms of evaluation, and ahead of formal examinations, so that students learn from this;
    f. Ensure consistent marking and effective moderation of marking;
    g. Organize an evaluation for each course and use the feedback to improve the course.

Students registered for Master's and Doctoral degrees, and staff supervising these studies, should read this charter in conjunction with the Memorandum of Understanding (MOU) between supervisors and students, which guides supervisor – student interactions and timelines.

The University strives to

- Provide a safe and effective learning environment.
- Provide support and developmental opportunities for teaching
- Provide all reasonable facilities and structures to support student success.

The University undertakes to

- Provide secure and reliable processes in respect of assessment and certification procedures.