MISSION STATEMENT

Our mission is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society.

*Educating for life* means that our educational process must provide:
- a foundation of skills, knowledge and versatility that will last a lifetime, despite a changing environment;
- research-based teaching and learning;
- critical inquiry in the form of the search for new knowledge and better understanding; and
- an active developmental role in our cultural, economic, political, scientific and social environment.

*Addressing the challenges facing our society* means that we must come to terms with our past, be cognisant of the present, and plan for the future. In this, it is central to our mission that we:
- recognise our location in Africa and our historical context;
- claim our place in the international community of scholars;
- strive to transcend the legacy of apartheid in South Africa and to overcome all forms of gender and other oppressive discrimination;
- be flexible on access, active in redress, and rigorous on success;
- promote equal opportunity and the full development of human potential;
- strive for inter-disciplinary and inter-institutional collaboration and synergy; and
- value and promote the contribution that all our members make to realising our mission.

*To equip people with lifelong skills* we must and will:
- promote the love of learning, the skill of solving problems, and the spirit of critical inquiry and research; and
- take excellence as the benchmark for all we do.

We are committed to academic freedom, critical scholarship, rational and creative thought, and free inquiry. It is part of our mission to ensure that these ideals live; this necessarily requires a dynamic process of finding the balance in a range of choices: choices between freedom and responsibility, rights and obligations, autonomy and accountability, transparency and efficiency, and permanence and transience; and of doing this through consultation and debate.
UNIVERSITY OF CAPE TOWN

FACULTY OF SCIENCE

2008

Postal Address: University of Cape Town
Private Bag
7701 RONDEBOSCH

Dean's & Faculty Offices: Room A200, P D Hahn Building
28 Chemistry Road
Upper Campus

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

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

Telex: 

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/misc/iapo/intro.htm

The Registrar's, General Enquiries and Cashier's offices are located in the Wilfred & Jules Kramer
Law School Building and remain open during the lunch hour. The Cashier's Office 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
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.
CONTENTS

General Information........................................................................................................... 2
  Officers in the Faculty .................................................................................................... 2
  Convenors for Degree Programmes in the Faculty of Science .................................... 3
  Student Advisers in the Faculty ................................................................................... 3
  Faculty Student Council ................................................................................................. 4
  Postgraduate Centre, The ............................................................................................ 4
  Fellows in the Faculty .................................................................................................... 4
  Distinguished Teachers in the Faculty .......................................................................... 5
  UCT Book Award .......................................................................................................... 5
  Prizes .............................................................................................................................. 5
  Fellowships .................................................................................................................. 6
  Minimum requirements for admission to undergraduate programmes ...................... 6
  Degrees Offered in the Faculty of Science ................................................................... 7

Rules for degrees / Degree Programmes ......................................................................... 8
  Rules for the degree of Bachelor of Science ................................................................. 8
  Explanatory Notes on Course Codes ........................................................................... 14
  Curriculum for the BSc degree Programmes SB006, SB012, SB013 and SB014 .......... 15
  Rules for the degree of BSc (Honours) ......................................................................... 24
  Rules for the degree of Master of Philosophy .............................................................. 25
  Rules for the degree of Master of Science .................................................................... 25
  Rules for the degree of Doctor of Philosophy .............................................................. 27
  Rules for the degree of Doctor of Science ................................................................... 28

Departments in the Faculty ............................................................................................... 30
  Department of Archaeology ......................................................................................... 30
  Department of Astronomy ........................................................................................... 36
  Department of Botany .................................................................................................. 40
  Department of Chemistry ............................................................................................ 47
  Department of Computer Science ............................................................................... 54
  Department of Environmental & Geographical Science .............................................. 62
  Department of Geological Sciences ............................................................................. 74
  Division of Geomatics (Faculty of Engineering and the Built Environment) ............. 81
  Department of Human Biology (Faculty of Health Sciences) .................................... 86
  Department of Mathematics and Applied Mathematics ............................................. 91
  Department of Molecular and Cell Biology ............................................................... 110
  Department of Oceanography .................................................................................... 118
  Department of Physics ................................................................................................. 122
  Department of Statistical Sciences ............................................................................... 130
  Department of Zoology ................................................................................................. 138

Inter-faculty Unit ............................................................................................................. 147
  Electron Microscope Unit ........................................................................................... 147

Schedule of courses ....................................................................................................... 148

Index .................................................................................................................................. 155
# Telephone Numbers of Departments in the Faculty of Science

<table>
<thead>
<tr>
<th>Department</th>
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<td>Mathematics and Applied Mathematics</td>
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<td>Molecular and Cell Biology</td>
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<td>Oceanography</td>
<td>650 3277</td>
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<td>Physics</td>
<td>650 3326</td>
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<td>Statistical Sciences</td>
<td>650 3219</td>
</tr>
<tr>
<td>Zoology</td>
<td>650 3603</td>
</tr>
</tbody>
</table>
**GENERAL INFORMATION**

**Officers in the Faculty**

**Dean of the Faculty of Science:**
Professor K A Driver, BSc (Hons) Wits MSc
*Stanford* PhD Wits

**Deputy Deans:**
Associate Professor D W Gammon, BSc (Hons)
PhD HDE *Cape Town*
Professor A P le Roex, BSc *Stell* BSc (Hons)
PhD *Cape Town*

**Secretary to the Dean:**
E Taladia
*Academic Administration:*

**Faculty Manager (Academic):**
K T Wienand, MSc *Cape Town*

**Senior Administrative Officer (Undergraduate):**
T Mohamed, BSc BCom (Hons) *UWC*

**Administrative Officer (Postgraduate):**
P Phillips, BA *Cape Town*

**Administrative Officer:**
Z Salie

**Senior Secretaries/Receptionists:**
S Adams
Z Hartley

A Rooks, BA PGCE *Cape Town*

**Communications & Marketing:**

**Faculty Manager (Communications, Development & Marketing):**
K Thomson, BA (Hons) HDE *Cape Town*

**Schools Liaison & Recruitment Officer:**
S Smith, BCom (Hons) *UWC*

**Finance and Operations Administration:**

**Faculty Manager (Finance):**
S Custers, BSc *Cape Town* BCompt *Unisa*

**Assistant Faculty Manager (Finance):**
V Stemmet, BCom (Hons) *UWC*

**Faculty Finance Officers:**
D Fielding
R Hendricks

---

**Human Resource Management:**

**Senior Human Resource Advisor:**
F Njobeni, BSocSci (Social Work) (Hons)
*Rhodes*

**Human Resource Advisor:**
K Edwards, BCom (Hons) *Rhodes*
Convenors for Degree Programmes in the Faculty of Science

Programme in Information Technology
Associate Professor S Berman  Rm 317 Computer Science Building
sonia.berman@uct.ac.za

Programme in Biology, Earth and Environmental Sciences
Dr M Picker (first semester)  Rm 3.31 John Day Zoology Building
mike-picker@uct.ac.za
Professor J J Bolton (second semester)  Rm 2.14 H W Pearson Building (Botany)
john.bolton@uct.ac.za

Programme in Chemical, Molecular & Cellular Sciences
Professor S Bourne  Rm A142 P D Hahn Building
susan.bourne@uct.ac.za

Programme in Mathematical, Physical and Statistical Sciences
Dr J Conradie  Rm 325 Mathematics Building
jurie.conradie@uct.ac.za

General Entry for Programmes in Science (GEPS)
Associate Professor B Davidowitz  Rm A133 P D Hahn Building (Chemistry)
bette.davidowitz@uct.ac.za

Student Advisers in the Faculty

Information Technology
Associate Professor G Marsden  Rm 316 Computer Science Building
gary.marsden@uct.ac.za
Dr M Kuttel  Rm 307 Computer Science Building
michelle.kuttel@uct.ac.za

Biology, Earth and Environmental Sciences
Dr K Winter  Rm 4.08 Environmental & Geographical Sciences Building
kevin.winter@uct.ac.za
Dr M M Muasya  Rm 3.12 H W Pearson Building (Botany)
muthama.muasya@uct.ac.za
Dr J O'Riain  Rm 1.37 John Day Zoology Building
justin.oriain@uct.ac.za

Chemical, Molecular and Cellular Sciences
Associate Professor N Ravenscroft  Rm A144 P D Hahn Building
neil.ravenscroft@uct.ac.za
Dr L Roden  Rm 435 Molecular Biology Building
laura.roden@uct.ac.za
Dr P Meyers  Rm 202 Molecular Biology Building
paul.meyers@uct.ac.za

Mathematical, Physical and Statistical Sciences
Associate Professor A Buffler  Rm 503 R W James Building (Physics)
andy.buffler@uct.ac.za
Mr K Rafel  Rm 206.1 Mathematics Buildings
Kenneth.Rafel@uct.ac.za
Dr J Nyirenda  Rm 334 P D Hahn Building
juwa.nyirenda@uct.ac.za

General Entry for Programmes in Science (GEPS)
Ms K Bennie  Rm 206.2 Mathematics Building
kate.bennie@uct.ac.za
Facility Student Council

Undergraduates:
The Science Students’ Council (SSC) is elected annually by the undergraduate students in the Faculty of Science. The SSC may be contacted via email: uct_ssc@science.uct.ac.za. The Chairperson of the SSC for 2008 is Mr K Matsimela.

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 SPGSA may be contacted via email: hlhleh001@uct.ac.za. The Chairperson of the SPGSA for 2008 is Mr P Hlahane.

The SSC & SPGSA form an important part of the Governance and Committee structures in the Faculty of Science (see booklet “Faculty of Science, Governance and Committees”).

The Postgraduate Centre

The Postgraduate Centre was recently established in the Otto Beit Building, Upper Campus. This state-of-the-art facility houses the executive committee of the Postgraduate Students Association (PGSA) as well as the Postgraduate Funding Office. The centre is equipped with IT facilities and includes a seminar room. This facility is open to all 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.

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 R I Becker
Professor W J Bond
Professor G M Branch
Professor A C Brown
Professor G C L Brümmer
Professor D M Butterworth
Professor M R Caira
Professor R D Cherry
Professor A Chinsamy-Turan
Professor J W A Cleymans
Professor M J de Wit
Professor G F R Ellis
Professor A P Fairall
Professor J G Field
Associate Professor C L Griffiths
Professor J J Gurney
Professor M J Hall
Professor K A Hardie
Professor J U M Jarvis
Professor H Klump
Professor D W Kurtz
Professor A P le Roex

Professor O A M Lewis
Professor G N Louw
Professor J R E Lutjeharms
Dr N A H Millard
Professor V C Moran
Professor J R Moss
Professor L R Nassimbeni
Professor J E Parkington
Professor E G Prout
Professor D E Rawlings
Professor B D Reddy
Associate Professor F T Robb
Professor A L Rodgers
Dr K H Schütte
Professor W R Siegfried
Professor A M Stephen
Professor J A Thomson
Professor L G Underhill
Professor C von Holt
Professor R D Viollier
Professor B Warner
Professor D R Woods
**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)
- 1989: Associate Professor H S T Driver (Physics)
- 1990: Associate Professor J E Parkington (Archaeology)
- 1992: Dr J J Conradie (Mathematics)
- 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 A Thomson (Microbiology)
- 1998: Associate Professor I V Barashenkov (Mathematics)
- 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)

**UCT Book Award**

The University makes a Book Award in recognition of the publication of books, written by University staff, that bring credit to the University.

- Professor G M Branch
- Professor G M Branch, Associate Professor C L Griffiths, Mrs M L Branch and Dr L E Beckley
- Professor B Warner

The Living Shores of South Africa 1985
Two Oceans - A guide to the Marine life of southern Africa 1995
Cataclysmic Variable Stars 1997

**Prizes**

(Further information regarding the value of prizes may be obtained from the Faculty Office.)

**J Barry Hawthorne Centennial Prize**

Awarded to the best student in third-year Geology who will be proceeding to Honours in the Department.

**Cape Natural History Prize**

Awarded to the most outstanding second year student, who will be proceeding to third-year in Environmental and Geographical Science.

**Chemistry Prize**

Awarded to the best student in second-year Chemistry who will be proceeding to third-year Chemistry.

**Dick & Dorothy Borcherds Prize**

Awarded to the student achieving the highest standard at the end of the second year in Botany or Astronomy.
6 GENERAL INFORMATION

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.

Joseph Arenow Prize
Awarded at the discretion of the Dean for 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.

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.

Ivor Lewin Memorial Scholarship Tenure 1 year
Awarded to the best student in second-year Physics who will be proceeding to third-year Physics.

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.

Minimum requirements for admission to an undergraduate degree

The minimum requirement for admission to study for a Bachelor's degree programme is a matriculation certificate, OR a certificate of exemption from the matriculation examination, OR a senior certificate issued by the South African Certification Council (SAFCERT) endorsed to the effect that a student has met the minimum requirements for university admission (matriculation) in South Africa, OR a certificate exempting the student from this university admission (matriculation) endorsement, issued by the Matriculation Board (Umalusi). 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.
Degrees Offered in the Faculty of Science

i) Bachelor of Science (BSc) degree
   
   SB006 - Programme in Information Technology
   
   SB012 - Programme in Biology, Earth & Environmental Sciences
   
   SB013 - Programme in Chemical, Molecular and Cellular Sciences
   
   SB014 - Programme in Mathematical, Physical and Statistical Sciences
   
   SB011 - General Entry for Programmes in Science (GEPS)
   
   Note: First-year students who are admitted onto this degree programme will register for one of the degree programmes listed above in subsequent years of study.

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 / DEGREE PROGRAMMES

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 degree programmes

FB1 Except by permission of Senate, all students registered for the first time in the Faculty of Science from 1999 onwards, will be subject to the rules and curricula for degree programmes SB006, SB011-SB014 inclusive. Transferring students will be subject to the rules and curricula for degree programmes SB006, SB011-SB014 inclusive. Note: except by permission of Senate, transferring students may not register on the General Entry for Programmes in Science (GEPS), SB011.

Duration of the BSc degree

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

The curriculum which includes the General Entry for Programmes in Science (GEPS), SB011, will usually extend over four academic years of study.

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 certain circumstances, as follows:

(a) where a student 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);
(b) where a first-time entering undergraduate in the first semester has obtained a weighted score of 55 points or more in the Senior Certificate examinations;
(c) waivers to students who satisfy (a) or (b) above will depend on an assessment, by a Student Adviser or Programme Convenor, of 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 be awarded to a student who has obtained marks from 40% to 49% in first-year courses in Mathematics. For MAM1000W, MAM1043H and MAM1044H, supplementary examinations will only be awarded to students who obtain from 45% to 49%.
(b) A supplementary examination may be awarded to a student who has obtained marks from 45% to 49% in a first-year course in any Science Faculty department.
(c) A department (other than Mathematics - see (a)) 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 other than a major 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

SB006, SB012, SCB013 and SB014 Degree Programmes (Bachelor of Science)

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

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

SB011 General Entry for Programmes in Science (Bachelor of Science)

FB5.3 Except by permission of Senate, a student who registered initially on the General Entry for Programmes in Science (GEPS), SB011, 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 specialisation, by the end of the first year;
(b) three full-year courses or the equivalent, including two and a half courses specific to a specialisation, 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-FB5.5, 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 Reregistration 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

FB6.1 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 applicable, as mutatis mutandis.

FB6.2 Except by permission of Senate, a student who, after a year or more in another faculty wishes to register in the Faculty of Science, may not register on the General Entry for Programmes in Science, SB011.

Exemptions on grounds of Advanced Level school examinations

FB7 A student who has passed certain subjects in Advanced Level school examinations with an A or B symbol may, on the recommendation of the Head of Department, be exempted from the equivalent course or courses in the curriculum for the degree.

NOTE: A candidate is exempted from, but not credited with the course, and will accordingly have to complete some other course in its stead.

Distinction

The Bachelor of Science (BSc) degree may be awarded with distinction, and with distinction in one or more specialisation.

FB8.1 Rules for distinction in a specialisation (for 2008)
(a) In order to obtain a distinction in a specialisation, a student will be required to obtain first class passes in the courses listed below, except as specified in (b) and (c):
Actuarial Science: Two of STA2004F, STA2005S, BUS2013F and two of BUS3022F, BUS3023S, STA3041F, STA3043S, STA3044S
Applied Computing: Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H
Applied Mathematics: MAM2046W (or two of MAM2047H, 2048H and 2043S) and MAM3040W (or MAM3041H and MAM3048H)
Archaeology: Four senior half-courses in Archaeology
Astrophysics: AST2002S, AST3002F, AST3003S
Atmospheric Science: Two of EGS2012S, SEA2003F (or SEA2000F), SEA2002S and two of EGS3012S, EGS3013F, SEA3002F
Biochemistry: MCB2000F, MCB2001S, MCB3020S, MCB3019F or MCB3024S or MCB3019S
<table>
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<tr>
<th>Program</th>
<th>Required Courses</th>
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<tbody>
<tr>
<td>Bioinformatics</td>
<td>One 2000-level CSC course, one 2000-level MCB course, one 3000-level CSC course, one 3000-level MCB course</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>MCB2009C, CHE2039D, MCB2007F, MCB3022S, MCB3010S, MCB3022S, MCB3019F or MCB3024S</td>
</tr>
<tr>
<td>Botany</td>
<td>Four senior half-courses coded BOT or BIO which are required for a specialisation in Botany</td>
</tr>
<tr>
<td>Chemistry</td>
<td>CEM2007F, CEM2008S and CEM3005W</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H</td>
</tr>
<tr>
<td>Computer Games Design</td>
<td>Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H</td>
</tr>
<tr>
<td>Demographics &amp; Statistics</td>
<td>EGS3016F, EGS3017S, EGS3018F and EGS3019S</td>
</tr>
<tr>
<td>Ecology</td>
<td>Four senior half-courses coded BOT, ZOO or BIO which are required for a specialisation in Ecology</td>
</tr>
<tr>
<td>Environmental &amp; Geographical Science</td>
<td>EGS2010F, EGS2011S or EGS2012S; Two of EGS3013F, EGS3012S, EGS3014S, EGS3015S</td>
</tr>
<tr>
<td>Genetics &amp; Development</td>
<td>MCB2003F, MCB2013S, MCB3019F, MCB3024S</td>
</tr>
<tr>
<td>Geoinformatics</td>
<td>APG1016S, APG2015F, APG3011F, APG3012S and APG4004A</td>
</tr>
<tr>
<td>Geology</td>
<td>GEO2001F, GEO2004S, GEO3005F and GEO3001S</td>
</tr>
<tr>
<td>Marine Biology</td>
<td>Two of BIO2004F, SEA2003F, BIO2005S; BIO3002S plus one of SEA3002F, BIO3001F, BIO3003S, BIO3006F</td>
</tr>
<tr>
<td>Mathematics</td>
<td>MAM2000W and MAM3000W</td>
</tr>
<tr>
<td>Microbiology</td>
<td>MCB2005F, MCB2006S, MCB3021F, MCB3019F or MCB3024S</td>
</tr>
<tr>
<td>Ocean &amp; Atmosphere Science</td>
<td>SEA2003F (or SEA2000F), SEA2002S, SEA3002F and EGS3012S</td>
</tr>
<tr>
<td>Physics</td>
<td>PHY2014F, PHY2015S, PHY3021F, PHY3022S</td>
</tr>
<tr>
<td>Physiology</td>
<td>HUB2019F, HUB2013S, HUB3006F and HUB3007S</td>
</tr>
<tr>
<td>Statistics</td>
<td>STA2004F, STA2005S; two of</td>
</tr>
</tbody>
</table>
STA3041F, STA3042F and/or
STA3043S, STA3044S

Zoology:
Four senior half-courses coded ZOO or
BIO which are required for a
specialisation in Zoology

(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 (for 2008)
To obtain a distinction in the degree as a whole, a student must
(a) obtain a distinction in at least one specialisation (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.

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 for the
award of a medal.

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:
   SB006, SB012 - SB014:
   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
   SB011:
   first year: two full courses
   second year: two full courses
   third year: three full courses, two of which must be senior courses
   fourth year: two full courses, one of which must be a third year course
(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.
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 (i.e. a "half-course") or over two semesters (i.e. a "full-course"). In this respect, the following codes are used:

A 1st term quarter-course
B 2nd term quarter-course
C 3rd term quarter-course
D 4th term quarter-course
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
Z any other combination

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

Every course in this handbook has a course name and a course code. With the introduction of the PeopleSoft Student Administration system, the structure of course codes has changed, by the addition of one numeric character (from a total of seven characters to a total of eight characters).

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

ZOO3002F  Marine Ecology
ZOO designates a Zoology course
3 designates a third-year course
002 serves to distinguish this from other third-year Zoology 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.
Rules for the Bachelor degree curricula in the Faculty of Science

Curriculum rules for SB006, SB012, SB013 and SB014 (Degree Programmes)
(Refer to rule FB1)

All bachelor degree curricula in the Faculty of Science include courses carefully selected to provide adequate foundation for and depth in one or more areas of specialisation, 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 specialisations.

Curricula are organised and managed in Programmes which bring together areas of specialisation which are in similar fields of scientific enquiry or have similar foundational requirements.

Students must choose one or more area of specialisation, with curricula including compulsory courses as outlined under rules FB9.6 and FB9.7 below. The general rules governing BSc curricula are rules FB9.1 to FB9.5 which stipulate the minimum number of courses required, and the range of choices possible.

All curricula can lead to postgraduate study.

Rules for curricula containing specialisation fields in programmes SB006, SB012, SB013 and SB014

Total number of courses
FB9.1 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. With the permission of the Programme Convenor, a maximum of three full-year courses or the equivalent may be taken from other Faculties.

Exceptions to this rule have been approved for the specialisations Actuarial Science and Business Computing, where the curriculum consists of five and five and a half (or equivalent) Science courses respectively.

Number of senior courses
FB9.2 The curriculum shall include the equivalent of at least four full-year senior courses or the equivalent, of which at least two shall be Science courses.

Mathematics
FB9.3 The curriculum shall include at least a half-course in Mathematics.

Elective courses
FB9.4 All courses in the Science Faculty may be taken as elective courses. Courses offered in other faculties may also be taken as elective courses with the permission of the Programme Convenor.
FB9.5 In order to satisfy the requirement of competencies including numeracy, computer literacy, problem solving and communication or as a measure of integrated assessment, the Programme Convenor may add one or more compulsory courses to a curriculum.

**Specialisation(s)**

FB9.6 The curriculum shall include a specialisation from the following list, grouped according to programmes:

**Programme in Information Technology (IT SB006)**
Applied Computing; Bioinformatics; Business Computing; Computer Engineering; Computer Games Design; Computer Science.

**Programme in Biology, Earth and Environmental Sciences (BEES SB012)**

*NOTE: The BEES Programme changed in 2005. These changes only affected those students entering the Programme for the first time in 2005. Specialisations available for students first registered before 2005 have not changed.*

BEES Specialisations for **students first registered before 2005:**
Archaeology; Atmospheric Science; Biodiversity & Evolutionary Biology; Botany; Ecology; Environmental & Geographical Science; Geology; Ocean & Atmosphere Science; Zoology

BEES Specialisations for **students entering first-year in 2005 or later:**
Archaeology; Atmospheric Science; Botany; Ecology; Environmental & Geographical Science; Biodiversity & Evolutionary Biology; Geology; Marine Biology; Ocean & Atmosphere Science; Zoology; Geoinformatics (Geoinformatics must be accompanied by a Science specialisation.)

**Programme in Chemical, Molecular and Cellular Sciences (CMCS SB013)**
Biochemistry; Chemistry; Genetics; Human Bioscience; Microbiology; Physiology (Physiology must be accompanied by a Science specialisation.)

**Programme in Mathematical, Physical and Statistical Sciences (MPSS SB014)**
Actuarial Science; Applied Mathematics; Astrophysics; Demographics & Statistics; Mathematics; Physics; Statistics.

FB9.7 The curriculum may include more than one specialisations which may be chosen from any programme in the Faculty of Science. If the curriculum includes specialisations from two or more programmes in the Faculty of Science, the student must indicate a primary specialisation and therefore in which programme they wish to be registered. A third-year module/course may be counted towards more than one specialisation. However, the curriculum must contain at least two distinct third-year semester courses recognised by the Faculty for each specialisation.

**Compulsory courses to be completed for each specialisation:**

*Note: The compulsory courses listed below are the minimum which a student must complete for the specialisation. Certain courses may supersede the courses specified eg. MAM2000W may supersede MAM2001H.*
Programme in Information Technology

Specialisation in APPLIED COMPUTING
1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent)
2000-level courses: CSC2001F, CSC2002S
3000-level courses: CSC3002F, CSC3003S and a full 3000-level course in another discipline

Note: It is possible to specialise in Geoinformatics by including the following courses:
CSC1015F or CSC1018F, CSC1016S, MAM1000W, CSC2001F, CSC2002S, CSC3002F,
CSC3003S, APG2015F, APG3011F and a half-course equivalent selected from
2LA is required for APG2014S.

It is possible to major in Psychology only if MAM1043H and STA1006H are taken in first
year, i.e. only in the case of the fully-prescribed curriculum comprising: CSC1015F or
CSC1018F, CSC1016S, MAM1000W, PSY1001W, MAM1043H, STA1006H, CSC2001F,
CSC2002S, three second-year semester courses in Psychology, CSC3002F, CSC3003S,
three third-year semester courses in Psychology (PSY3007F is compulsory.)

Specialisation in BIOINFORMATICS
1000-level courses: CEM1000W, CSC1015F or CSC1018F, CSC1016S, MAM1000W
(or equivalent), and STA1006/STA1000/STA1007
3000-level courses: CSC3002F, CSC3003S, MCB3012Z and two additional 3000-level
MCB courses
Note: MAM2004H and STA2004F are strongly recommended.

Specialisation in BUSINESS COMPUTING
1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent),
STA1006/1000S, and either BUS1004W or an approved full-course equivalent selected
from ACC1006F, ACC1011S, BUS1005F, ECO1010F, ECO1011S, ECO1006F
3000-level courses: CSC3002F, CSC3003S, INF3011F, INF3012S

Specialisation in COMPUTER ENGINEERING
1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent),
(PHY1031F + PHY1032S) or equivalent
3000-level courses: CSC3002F, CSC3003S and at least a half course equivalent selected
from EEE3067W (EEE3064W + EEE4096S), EEE3077W (EEE3064W + EEE3074W),
EEE3078W (EEE3064W + EEE3074W + EEE4096S) or EEE3079W (EEE3074W +
EEE4096S).
Note: BUS1004W is strongly recommended

Specialisation in COMPUTER GAMES DESIGN
1000-level courses: CSC1015F or CSC1018F, CSC1016F, MAM1000W (or equivalent),
MAM1043H
3000-level courses: CSC3002F, CSC3003S, CSC3020H
Note: MAM1044H is strongly recommended.
Specialisation in COMPUTER SCIENCE:
1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent), and one of MAM1043H or MAM1044H or STA1006S/H
3000-level courses: CSC3002F, CSC3003S
Note: BUS1004W is strongly recommended

Note: It is possible for IT programme students to take "language" courses (such as English) as part of their degree.

Programme in Biology, Earth and Environmental Sciences
NOTE: There are some changes to the BEES Programme biology curricula for 2008, and students who registered in 2007 or later will have slightly different Specialisation requirements, as below:

Specialisation in ARCHAEOLOGY
1000-level courses: ERT1000F (or ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W
3000-level courses: AGE3013H and at least one of AGE3011F and AGE3012S

Specialisation in ATMOSPHERIC SCIENCE
1000-level courses: ERT1000F, MAM1000W (or equivalent), PHY1031F + PHY1032S (or equivalent), CEM1000W (or equivalent)
3000-level courses: EGS3012, EGS3013F (or EGS3014S if no EGS2010F), SEA3002F

Specialisation in ENVIRONMENTAL & GEOGRAPHICAL SCIENCE
1000-level courses: ERT1000F (or ERT1002S), EGS1002S, MAM1004F + STA1000S (or equivalent) or MAM1000W
2000-level courses: EGS2010F plus EGS2011S or EGS2012S
3000-level courses: Two of EGS3012S, EGS3013F, EGS3014S, EGS3015S

Specialisation in GEOLOGY
1000-level courses: ERT1000F (or ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W, GEO1006S, CEM1000W (or equivalent)
3000-level courses: GEO3005F, GEO3001S
* field work course to be taken over second and third years of study

Specialisation in OCEAN & ATMOSPHERE SCIENCE
1000-level courses: ERT1000F (or ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W, PHY1031F (or equivalent)
2000-level courses: SEA2003F, SEA2002S
3000-level courses: SEA3002F, EGS3012S

Specialisation in GEOINFORMATICS
1000-level courses: CSC1015F, APG1016S, MAM1004F + STA1000S (or equivalent) or MAM1000W
2000-level courses: APG2015F, APG2018X. Any other courses towards a Science specialisation
3000-level courses: APG3011F. At least one full-course equivalent selected from APG2026F, APG3012S, APG2014S, APG4004A, APG3016C. Any other courses towards a Science specialisation.
Note: MAM1000W and either MAM2000W or MAM2001H (module 2LA plus any other module) are required for APG2014S.
This specialisation must be taken together with a Science specialisation.

BIOLOGY Specialisations for those entering first-year in 2006 or before:

Specialisation in BIODIVERSITY & EVOLUTIONARY BIOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: BIO3010F, BIO3005S

Specialisation in BOTANY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: Two of BIO3010F, BIO3006F, BIO3007S

Specialisation in ECOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: At least one from group A, and another from group A or group B
Group A: BIO3006F, BIO3002S, BIO3003S
Group B: BIO3004F, BIO3005F, BIO3010F, BIO3007S

Specialisation in MARINE BIOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), ERT1000F, CEM1000W
3000-level courses: BIO3002S plus SEA3002F or BIO3001F or BIO3003S or BIO3006F

Specialisation in ZOOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: BIO3001F and BIO3010F or BIO3003S or BIO3004F

BIOLOGY Specialisations for those entering first-year in 2007 or later:

Specialisation in BIODIVERSITY & EVOLUTIONARY BIOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: BIO3010F, BIO3005S

Specialisation in ECOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: BIO3006F, BIO3011S
Specialisation in MARINE BIOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), ERT1000F, CEM1000W
2000-level courses: BIO2004F, SEA2003F, BIO2009S or BIO2006S
3000-level courses: BIO3002S, BIO3011S

Specialisation in ZOOLOGY
1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W
3000-level courses: BIO3001F and BIO3011S or BIO3010F

Programme in Chemical, Molecular and Cellular Sciences

Specialisations for students first registered before 2007:

Specialisation in BIOCHEMISTRY
1000-level courses: CEM1000W, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S). Highly recommended: BIO1000F, first-year Physics
3000-level courses: MCB3020S, MCB3019F or MCB3024S or MCB2019S, MCB3012Z

Specialisation in BIOTECHNOLOGY
1000-level courses: CEM1000W, BIO1000F, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S)
3000-level courses: MCB3022S, MCB3019F or MCB3024S, MCB3012Z

Specialisation in CHEMISTRY
1000-level courses: CEM1000W (or equivalent), MAM1000W (or equivalent), PHY1031F + PHY1032S (or equivalent)
2000-level courses: CEM2007F, CEM2008S
3000-level courses: CEM3005W
Note: Completion of MAM2052F is highly recommended

Specialisation in GENETICS & DEVELOPMENT
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S)
3000-level courses: MCB3019F, MCB3024S, MCB3012Z.

Specialisation in HUMAN BIOSCIENCE
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S), PSY1001W
3000-level courses: HUB3006F, HUB3007S, PSY3007F/S, two of PSY3008F, PSY3009F, PSY3004S, PSY3005S or PSY3010S
Specialisation in MICROBIOLOGY
1000-level courses: CEM1000W, BIO1000F, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S)
3000-level courses: MCB3021F, MCB3019F or MCB3024S, MCB3012Z

Specialisation in PHYSIOLOGY
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S). Strongly recommended: first-year Physics
2000-level courses: HUB2019F, HUB2013S. Any SB013 Science full course or equivalent
3000-level courses: HUB3006F, HUB3007S. Any SB013 Science full course or equivalent.
Note: This specialisation must be taken together with a Science specialisation

Specialisations for those entering first-year in 2007 or later:

Specialisation in BIOCHEMISTRY
1000-level courses: CEM1000W, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S). Highly recommended: BIO1000F and 1000-level Physics
2000-level courses: MCB2014F, MCB2015S
3000-level courses: MCB3019F, MCB3020S, MCB3012Z.

Specialisation in CHEMISTRY
1000-level courses: CEM1000W (or equivalent), MAM1000W (or equivalent), PHY1031F + PHY1032S (or equivalent)
2000-level courses: CEM2007F, CEM2008S
3000-level courses: CEM3005W

Specialisation in GENETICS
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S)
2000-level courses: MCB2018F, MCB2019S
3000-level courses: MCB3019F, MCB3023S or MCB3024S, MCB3012Z.

Specialisation in HUMAN BIO SCIEN CE
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S), PSY1001W
3000-level courses: HUB3006F, HUB3007S, PSY3007F/S, two of PSY3008F, PSY3009F, PSY3004S, PSY3005S or PSY3010S

Specialisation in MICROBIOLOGY
1000-level courses: CEM1000W, BIO1000F, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S)
3000-level courses: MCB3021F + MCB3019F or MCB3022S or MCB3024S, MCB3012Z.
Specialisation in PHYSIOLOGY
1000-level courses: CEM1000W, BIO1000F, BIO1004S, MAM1000W (or MAM1004F/H or MAM1005H + STA1007S or STA1000S). Strongly recommended: 1000-level Physics
2000-level courses: HUB2019F, HUB2021S. Any SB013 Science full course or equivalent
3000-level courses: HUB3006F, HUB3007S. Any SB013 Science full course or equivalent.
Note: This specialisation must be taken together with a Science specialisation

Programme in Mathematical, Physical and Statistical Sciences
Specialisation in ACTUARIAL SCIENCE
1000-level courses*: MAM1000W, ECO1010F, ECO1011S, ACC1006F, ACC1011S, STA1006S, BUS1003S
3000-level courses: BUS3018F, BUS3024S, STA3041F, STA3043S, STA3045F
* It is possible for Actuarial Science students to take CSC1015F in the first semester of their first-year in addition to the courses listed above.
** The course BUS2019S is optional, but credit for all three of the courses ACC1006F, ACC1011S and BUS2019S is needed to be eligible for exemption from the CT2 examination of the Institute (and Faculty) of Actuaries. Normally BUS1010F/S is a prerequisite and ECO2003F and ECO2004S are co-requisites for BUS2019S, but these requirements will be waived for Actuarial Science students.

Please note that students who change from the specialisation in Actuarial Science to another specialisation will need to satisfy the requirements of that specialisation; in particular, their curriculum should include at least six full year Science courses.

Specialisation in APPLIED MATHEMATICS
1000-level courses: MAM1000W (or equivalent), MAM1043H, MAM1044H, STA1006S/H
2000-level courses: MAM2000W, MAM2046W
3000-level courses: MAM3040W

Specialisation in ASTROPHYSICS
1000-level courses: PHY1004W, MAM1000W (or equivalent), MAM1043H, MAM1044H or STA1006S/H, AST1000F highly recommended
3000-level courses: AST3002F, AST3003S, PHY3021F, PHY3022S or MAM3041H

Specialisation in DEMOGRAPHY AND STATISTICS
1000-level courses: MAM1000W, STA1006S/H or equivalent, ECO1010F, ECO1010S and DOH1000F or EGS1002S
3000-level courses: STA3041F, STA3043S, EGS3016F, EGS3017S, EGS3018F, EGS3019S

Specialisation in MATHEMATICS
1000-level courses: MAM1000W (or equivalent), MAM1043H, STA1006S/H
2000-level courses: MAM2000W
3000-level courses: MAM3000W
Specialisation in PHYSICS
1000-level courses: PHY1004W, MAM1000W (or equivalent), MAM1043H, MAM1044H or STA1006S/H
3000-level courses: PHY3021F, PHY3022S

Specialisation in STATISTICS
1000-level courses: MAM1000W (or equivalent), MAM1043H, STA1006S/H
2000-level courses: STA2004F, STA2005S
3000-level courses: STA3041F or STA3042F, STA3043S or STA3045F

Curriculum rules for the General Entry for Programmes in Science, SB011

The General Entry for Programmes in Science (GEPS) provides students with the opportunity to establish a sound educational foundation for further university studies. GEPS is run in association with the Academic Development Programme (ADP). GEPS comprises a combination of intensive first-year half-courses in Mathematics, Physics, Chemistry, Computer Science and Earth Systems Science. Admission onto GEPS is restricted and is offered to applicants at the Dean’s discretion.

All degree programmes, SB006, SB012 - SB014, offered in the Faculty of Science are accessible via GEPS, and students will register for one of these degree programmes after their first year of study.

A typical curriculum for the first year on the General Entry for Programmes in Science will consist of four (intensive) half-courses completed over the full year (i.e. "H" courses).

FB10.1 The curriculum for SB011, is subject to the general rules for the Bachelor of Science degree (FB10.1 - FB10.3 inclusive) and subject to individual requirements, e.g. course prerequisites as specified by each Department.

FB10.2 The standard curriculum for the degree programme SB011 is as follows:
MAM1005H and three from CEM1009H, CSC1010H, ERT1003H or PHY1023H.

FB10.3 Except with the approval of the Dean a student is constrained to the courses recorded in the curricula for the degree programme, SB011.

NOTE: The Faculty of Science reserves the right to change the details of the curricula for all degree programmes, SB006, SB011 - SB014, and reserves the right to change or add to degree programme curricula or to discontinue any degree programme curriculum offered in the Faculty of Science, depending on circumstances and demand.
Rules for the degree of 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 subjects:
Actuarial Science  Information Technology
Applied Mathematics  Mathematical Statistics
Archaeology  Mathematical & Theoretical Physics
Archaeology & Environmental Science  Mathematics
Astrophysics & Space Science  Mathematics of Computer Science
Atmospheric Science  Molecular & Cell Biology
Botany  Ocean & Atmosphere Science
Botany (Biodiversity & Evolutionary Biology)  Physics
Botany (Plant Ecology)  Statistics
Chemistry  Theoretical Physics
Computer Science  Zoology
Disaster Risk Science  Zoology (Avian Biology)
Environmental & Geographical Science  Zoology (Freshwater Biology)
Geochemistry  Zoology (Marine Biology)
Geology
Industrial Mathematics
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.

NOTE: Rule FH4 notwithstanding, students registered for BSc (Hons) in Actuarial Science may be permitted to repeat not more than one full-course (or two half-courses) which they have already passed at UCT, for the purposes of improving their marks in order to obtain exemption from the corresponding professional examinations. In this case they will register as occasional students concurrently with the Honours programme.

Rules for the degree of Master of Philosophy

(To be read with General Rules on Master Degrees (G and GM) in Book 3 of this series). 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 a four-year bachelors degree or honours degree 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.

Rules for the degree of Master of Science

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

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
FM3.1 The degree may be conferred in any one of the following subjects:
- Applied Marine Science
- Geochemistry
- Applied Mathematics
- Geology
- Archaeology
- Mathematical Statistics
- Astronomy
- Mathematics
- Astrophysics & Space Science
- Mathematics of Finance
- Bioinformatics
- Molecular & Cell Biology
- Botany
- Ocean & Atmosphere Science
- Chemical Crystallography
- Operational Research
- Chemistry
- Operational Research in Development
- Computer Science
- Physical Oceanography
- Conservation Biology
- Physics
- Disaster Risk Science (MPhil)
- Statistics
- Environmental & Geographical Science
- Structural Biology
- Environmental Management (MPhil)
- Systematics & Biodiversity Science
- Information Technology (MPhil)
- Theoretical Physics
- Zoology

Award of the degree
FM4.1 The degree of MSc 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 (MSc by dissertation only); or
(b) after a programme of advanced formal training and supervised research, for which a dissertation would be a partial requirement (MSc by coursework and dissertation).

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

FM4.3 The degree may be awarded with distinction. In the case of an MSc 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.
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 the degree of MSc.

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 (MSc by dissertation only) or two copies (MSc by coursework & 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 two unbound copies plus an electronic copy 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 degree of MSc 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 MSc dissertation
An MSc 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 Masters 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
Rules for the PhD degree may be found in Book 3, General Rules for Students. Where a candidate intends to submit his/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/her intention to do so by not later than 21 January or 20 June
respectively; the final dates for receipt of theses by the Doctoral Degrees Board Office are 15 February or 15 August. The University does not, however, undertake to reach a decision on the award of the degree by any specific date.

Length of the PhD thesis
The Senate has approved a recommendation from the Doctoral Degrees Board that a doctoral thesis should not exceed 80,000 words or 200 pages in length (this excludes appendices and illustrations). Any request to exceed the limit 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

FD1 The degree of Doctor of Science may be conferred on the following students:
(a) Bachelors in one of the Faculties of Humanities, Science, Health Sciences and Engineering and the Built Environment, of the University of not less than five years' standing
(b) graduates of any other university recognised by the Senate for the purpose;
   (1) such candidates must pursue an approved course of work under the supervision of the University for a period of not less than two years;
   (2) such candidates will not be admitted to the degree of Doctor of Science earlier than five years after having taken the degree of bachelor in another university;
   (3) such candidates must have or have had established research or teaching associations with the University of Cape Town.

FD2 Every candidate for the degree of Doctor of Science shall submit published work, which shall constitute an original and important contribution to learning. No work will be accepted which has already been accepted by another university for the purpose of obtaining a similar degree.

FD3 Candidates shall, if required by the Senate, present themselves for examination, conducted orally or otherwise, on the subject of the work presented.

FD4 The work must be satisfactory in arrangement and expression. Three copies must be presented, and also three copies of a brief summary of its contents. 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 be prepared to 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 rarely. In these respects the DSc at UCT is based on the DSc tradition followed by many universities in the United Kingdom. (Some South African universities, and others elsewhere, have a DSc degree which is the equivalent of a PhD - this is not the case at UCT.)
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. The work submitted for the DSc must constitute an original and important contribution to learning in the sense that
   (a) it is likely to be regarded as 'benchmark' research in the relevant field in years to come,
(b) it demonstrates that the candidate has achieved a leadership role internationally in that field of scientific research.

4. The emphasis in assessing the work of a DSc candidate will be on originality, substance and excellence.
DEPARTMENTS IN THE FACULTY

DEPARTMENT OF ARCHAEOLOGY

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

Professor and Head of Department (first semester):
J C Sealy, MSc PhD Cape Town

Professor and Head of Department (second semester):
J E Parkington, MA PhD Cantab

Emeritus Professor:
N J van der Merwe, MA PhD Yale

Emeritus Associate Professor:
A B Smith, PhD Berkeley

Associate Professor:
R R Ackermann, MA Arizona PhD Washington

Senior Lecturer:
S L Hall, MA Wits DPhil Stell

Lecturers:
D R Braun, MA PhD Rutgers
S Chiriku, MA PhD UCL
R Sithaldeen, BSc (Hons) Cape Town (CHED)

Principal Scientific Officer:
J L Lanham, BA (Hons) Cape Town

Scientific Officer:
L Hutten MSc Pretoria

Laboratory Assistants:
M Herbert
D H Jacobs

Administrative Officer:
L J Cable

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**

*NOTE: This semester course may not be taken by students who have obtained credit for AGE110S.*

Course co-ordinator(s): Dr D R Braun  
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.

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<td>Tutorials:</td>
<td>One tutorial/practical per week, Friday 5th period or as arranged.</td>
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<td>DP requirements:</td>
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<td>Examination requirements:</td>
<td>Essays and tests count 50%; one 3-hour examination in November counts 50%.</td>
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**SAN1015F  WORDS, DEEDS, BONES & THINGS**

Course co-ordinator(s): Dr S Levine  
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.  
Examination requirements: Assignments and class tests count 50%; one 2-hour examination in June counts 50%.

**ERT1000F  INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES 1000**

See course details under the Department of Geological Sciences.
ERT1003H FOUNDATIONS OF BIOLOGY, EARTH & ENVIRONMENTAL SCIENCES

A course for students on the General Entry for Programmes in Science (GEPS), providing a general introduction to the study of the earth and its living and non-living systems.

Course co-ordinator(s): Ms R Sithaldeen

Entrance requirements: This half course is taken by students on the General Entry for Programmes in Science, and is run over the whole year.

Course outline:
This introductory course in Earth System Science treats the earth as an integrated system, and seeks a deeper understanding of the physical, chemical, biological and human interactions which determine the past, current and future states of the earth. The course will provide the essential skills, including communication skills, necessary for students to continue in one or more of Biology, Earth and Environmental Sciences. Students will develop a basic understanding of the four primary Earth Systems (the earth, oceans, atmosphere and life), and how they affect, and interact with, one another. Particular focus will be the major effects and interactions of humans on our planet and its ecosystems. The aim is to provide a scientific understanding of the whole Earth System by describing how its component parts have evolved, how they function, and how they may be expected to continue to change in the future.

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

Examination requirements: Class record (comprising tests, practicals and tutorials) counts 50%; one 2-hour paper written in November counts 50%.

Second-Year Courses

AGE2011S HUMAN EVOLUTION

NOTE: This semester course may not be taken by students who have obtained credit for AGE3003S or AGE2002S.

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

Entrance requirements: Any first-year Science course, or any one of AGE1003F or AGE1002S 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 hominin 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.

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Practicals: One 2-hour practical per week at times to be arranged.

DP requirements: Attendance at practicals and completion of assignments.

Examination requirements: Essays and tests count 50%; one 3-hour examination in October/November counts 50%.
AGE2012F  SOUTHERN AFRICAN HUNTERS & HERDERS

Course co-ordinator(s): Professor J C Sealy

Entrance requirements: Any first year Science course, or any one of AGE1003F or AGE1002S 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 Khoisan 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 Khoisan 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.

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Practicals: One 2-hour practical per week, at times to be arranged.

DP requirements: Attendance at practicals, completion of assignments and participation in one-day field trip.

Examination requirements: Essays and tests count 50%; one 3-hour examination in June counts 50%.

Third-Year Courses

AGE3006H  DIRECTED READING & RESEARCH

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.

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

AGE3011F  ROOTS OF BLACK IDENTITY

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.

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Practicals: One 2-hour practical per week, at times to be arranged.

DP requirements: Attendance at practicals and completion of assignments.
Examination requirements: Essays and tests count 50%; one 3-hour examination in June counts 50%.

AGE3012S GLOBAL INTERACTION & THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY
Course co-ordinator(s): Dr S L 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.

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DP requirements: Attendance at practicals and completion of assignments.
Examination requirements: Essays and tests count 50%; one 3-hour examination in November counts 50%.

AGE3013H ARCHAEOLOGY IN PRACTICE
NOTE: This course is a three and a half week residential field-school during the July vacation.
Course co-ordinator(s): Professor J E Parkington
Entrance requirements: AGE2011S and AGE2012F, or both AGE2003F and AGE2002S, 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.
Examination requirements: Essays and tests count 30%; projects count 20%; one 3-hour theory examination in November counts 25%; one 3-hour practical examination in November counts 25%.

Postgraduate Courses
AGE4000W BSc (HONS) IN ARCHAEOLOGY
Course co-ordinator(s): Associate Professor R R Ackermann
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.
See also AGE4006W, Faculty of Humanities Handbook.

**ERT4000W  BSc (HONS) IN ARCHAEOLOGY & ENVIRONMENTAL SCIENCE**

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

**Entrance requirements:** A BSc degree with majors in both Archaeology and Environmental & Geographical Science, and an acceptable level of pass in both.

**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.

**AGE5000W  MSc/MPhil IN ARCHAEOLOGY**

Candidates will be required to present a dissertation on an approved topic.
See also AGE5006W, Faculty of Humanities Handbook.

**AGE6000W  PhD IN ARCHAEOLOGY**

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) 650-3342
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:
E de Blok, Diplom (MSc) PhD Groningen

Professor:
A P Fairall, BSc (Hons) Cape Town PhD Texas Assoc.RAS

Senior Lecturers:
T Medupe BSc (Hons) MSc PhD Cape Town
P A Woudt, Diplom Groningen PhD Cape Town

Emeritus Professor:
B Warner, BSc (Hons) PhD DSc London MA DSc Oxon Assoc.RAS FRSSAf

Honorary Professors:
M W Feast, BSc (Hons) PhD London DSc (h.c) Cape Town ARCS DIC Assoc.RAS FRSSAf

MASSAf
P A Charles, BSc (Hons) PhD London FRAS

Visiting Professor:
P A Whitelock, DIC London PhD London FRAS

Secretary:
M Armstrong

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, de Blok and Fairall, Dr Woudt) 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, Drs Woudt and Medupe), and observational and computational modeling of variable stars (Dr Medupe), Long Period Red Variables (eg. Miras), Cepheids and RR Lyrae Stars (Professor Feast). The history of astronomy in South Africa is also studied (Dr Medupe, Professor Warner).

Undergraduate Courses

First-Year Courses

AST1000F  INTRODUCTION TO ASTRONOMY
Course co-ordinator(s): Professor A P Fairall
Entrance requirements: None
Course outline:

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Practicals: Six afternoon sessions are held in the Planetarium (of Iziko Museums of Cape Town) on Wednesday afternoons. They incorporate the "Starfinder" course. Optional observatory tours and observing evenings are also offered.
**Second-Year Courses**

**AST2002S**  ASTROPHYSICS  
Course co-ordinator(s): Dr P A Woudt  
Entrance requirements: PHY1021F and PHY1022S (PHY1004W) or PHY1031F and PHY1032S (PHY1000W).  
Course outline:  

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<td>Tutorials:</td>
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**Third-Year Courses**

**AST3002F**  STELLAR ASTROPHYSICS  
*This course will not be offered if there are insufficient students.*  
Course co-ordinator(s): Dr T Medupe  
Entrance requirements: AST2002F, PHY2006H, PHY2013H, PHY3021F as corequisite  
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.

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**Examination requirements:** Class records count 50%; one 2-hour final examination counts 50%.

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**AST3003S**  GALACTIC & EXTRAGALACTIC ASTROPHYSICS  
*This course will not be offered if there are insufficient students.*  
Course co-ordinator(s): Professor R C Kraan-Korteweg  
Entrance requirements: AST2002F, PHY2006H, PHY2013H, PHY3021F as corequisite
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.

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Practicals: One practical or tutorial per week (14h00 to 16h30) by arrangement. One observing trip to Sutherland

DP requirements: Satisfactory attendance at lectures

Examination requirements: Class records count 50%; one 2-hour final examination counts 50%.

Postgraduate Courses

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

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

Entrance requirements: PHY3000W (PHY3021F and PHY3022S) or MAM3040W. Candidates with an Engineering background will also be considered. 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 quantum mechanics and spectroscopy *, classical 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 project and go on a number of field trips to the national facilities.

* students have the option of doing either this or the quantum mechanics course currently offered by the department of Physics.

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

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

Entrance requirements: This programme is open to honours graduates in Astronomy and Space Science (PHY4003W), Physics (PHY4000W, PHY4001W, PHY4002W) and Engineering.

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.
**AST5001W**  DISCUSSION COMPONENT OF THE MSc IN ASTROPHYSICS & SPACE SCIENCE

**Entrance requirements:** AST5003F

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

**AST5000W**  MSc IN ASTRONOMY

The normal route to an MSc in Astronomy is via PHY5002F and PHY5003W 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

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 BOTANY

The Department is housed in the H W Pearson Botany Building, 8 University Avenue
Telephone (021) 650-2447 Fax (021) 650-4041
The Departmental abbreviation for Botany is BOT. Courses jointly offered with the Zoology Department are designated BIO.

Professor and Head of Department:
J J Midgley, BSc (Hons) PhD Cape Town

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

H W Pearson Honorary Professor of Botany:
To be appointed

Honorary Professors:
R M Cowling, BSc (Hons) PhD Cape Town
H P Linder, BSc (Hons) PhD Cape Town

Professors:
J J Bolton, BSc (Hons) PhD Liverpool
T A Hedderson, MSc Memorial PhD Reading

Emeritus Honorary Professor:
B J Huntley, BSc Natal MSc Pretoria

Associate Professor:
M D Cramer, MSc Wits PhD Cape Town

Senior Lecturers:
E C February, BA (Hons) PhD Cape Town
A M Muasya, MPhil Moi PhD Reading
G A Verboom, BSc (Hons) PhD Cape Town

Lecturer:
S B M Chimphango, MSc Malawi PhD Cape Town
T G Mandiwana-Neudani, BSc (Hons) Venda MSc Cape Town

Honorary Research Associates:
R J Anderson, BSc (Hons) Wits PhD Cape Town
E J Moll, BSc (Hons) PhD Natal

Principal Technical Officer:
G A Aguilar, MSc Chile

Senior Technical Officer:
D Hattas, Nat Dipl (Pen Tech) B Tech (Cape Tech) MSc UWC

Technical Officer:
D I Barnes

Administrative Officer:
S Smuts

Senior Secretary:
N Thungalga

Departmental Assistants:
N Davids
R Jacobs
Z Jikumlambo

BOLUS HERBARIUM

Director:
J J Midgley, BSc (Hons) PhD Cape Town

Keeper:
T A Hedderson, MSc Memorial PhD Reading
The mission of the Department is to conduct high quality teaching and research in the physiology, ecology, evolution, systematics and conservation of terrestrial and aquatic plants. The courses offered in the Department have been designed to train students in basic and applied botany, as well as to play a leading role in the teaching of ecology, biodiversity and evolutionary biology.

Botanical research includes population, community and reproductive ecology (Professors W J Bond, J J Bolton, T A Hedderon and J J Midgley), ecophysiology (Dr S B M Chimphango, Associate Professor M D Cramer, Dr E C February), floristics, biogeography, ecology and economics of marine algae (Professor J J Bolton), angiosperm biosystematics (Drs A M Muasya and G A Verboom), plant molecular systematics, bryophyte evolution and ecology (Professor T A Hedderon and Ms T G Mandiwana-Neudani) as well as palaeoecology (Dr E C February). The Bolus Herbarium undertakes plant taxonomic research with an emphasis on the flora of the Cape Peninsula. In addition the Botany Department houses the Plant Conservation Unit which is involved in research on biological diversity and restoration ecology as well as dryland degradation and environmental history (Professor M T Hoffman and Dr L Gillson). The Department is also home to the Seaweed Research Unit of Marine and Coastal Management, under the direction of Dr R J Anderson, which conducts research into the biology of economic seaweed resources.
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). The minimum DP requirement is 35% for the class record.

**First-Year Courses**

**BIO1000F** CELL BIOLOGY

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

Entrance requirements: None, but admission will be restricted to students who have passed either Physical Science or Biology at Matriculation level.

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, follow. Sections dealing with genetics and cell division provide an introduction to molecular biology.

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<td>Lectures:</td>
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<tr>
<td>Tutorials:</td>
<td>One tutorial per week, by arrangement.</td>
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<tr>
<td>Practicals:</td>
<td>One afternoon per week. Monday or Tuesday or Wednesday or Thursday, 14h00-17h00.</td>
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<td>DP requirements:</td>
<td>Attendance at 70% of the practicals.</td>
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<td>Examination requirements:</td>
<td>Class record counts 45% (three class tests of 9% each and a practical book mark of 18%); one practical paper counts 15%; one 2-hour examination paper written in June counts 40%.</td>
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**BIO1004S** BIOLOGICAL DIVERSITY

For course details see entry under Department of Zoology.

**ERT1003H** FOUNDATIONS OF BIOLOGY, EARTH & ENVIRONMENTAL SCIENCES

A course for students on the General Entry for Programmes in Science (GEPS), providing a general introduction to the study of the earth and its living and non-living systems. For course details see entry under Department of Archaeology.

**Second-Year Courses**

**BIO2003S** ECOPHYSIOLOGY: HOW PLANTS & ANIMALS WORK

**BIO2004F** PRINCIPLES OF ECOLOGY

For course details see entry under the Department of Zoology.

**BIO2006S** MARINE & TERRESTRIAL PLANT DIVERSITY

Course co-ordinator(s): Ms T G Mandiwana-Neudani

Entrance requirements: BIO1000F/H, BIO1004S

Course outline:
Plants have diversified into every habitable environment on earth, and form the trophic platform on which almost all life is based. This course provides an introduction to the diversity and evolution of marine and terrestrial plants, from their distant origins to the present-day. The structure and
The evolution of major groups of seaweeds and phytoplankton is considered in relation to the evolution of similar forms in unrelated groups, driven by adaptation to aspects of the aquatic environment. Similarly, the evolution of land plants, from mosses to orchids, is considered in the light of a terrestrial existence. The emphasis here is on structural adaptations that enhance survival and reproduction in dry environments, and their consequences. Key objectives of the course include: (i) to familiarise students with the major groups of plants and their evolutionary relationships; (ii) to highlight the characteristics that distinguish the major plant groups; and (iii) to develop an understanding of the evolutionary forces that have shaped the modern world flora. Examples from the Cape flora and emphasized throughout, and students will learn to recognise and distinguish the major families that make up this flora.

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

**Examination requirements:** Essays, tests and a small project count 50%; two 2-hour examinations in November each count 25%.

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**BIO2008F PRINCIPLES OF EVOLUTION**

**Course co-ordinator(s):** Professor W J Bond  
**Entrance requirements:** BIO1000F, BIO1004S.

**Course outline:**  
This course focuses on processes underlying genetic and functional trait variation in both plants and animals. It includes a brief introduction to phylogeny and its use in evolutionary studies. Patterns in plant and animal life histories and behaviour are introduced. The evolution of sex, why organisms die and the diversity of mating systems are discussed using both plant and animal examples. The course also introduces the ecology and evolution of plant-animal interactions, including pollination, dispersal and herbivory. Applications of the subject matter in conservation biology and resource use are included where appropriate.

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

**Examination requirements:** Class mark counts 50%; one 2-hour theory paper and one 2-hour practical examination written in June each count 25%.

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**Third-Year Courses**

**BIO3005S MOLECULAR ECOLOGY**

**Course co-ordinator(s):** Professor T A Hedderson  
**Entrance requirements:** BIO3010F or MCB3019F

**Course outline:**  
The emerging field of Molecular Ecology employs cutting edge techniques to address evolutionary and ecological questions of critical importance to conservation biology, behavioural ecology, biodiversity distribution and forensic science. This course demonstrates how molecular data is revolutionizing evolutionary biology, and providing new insights into past population size, migration rates, and population connectivity. Throughout, there is a strong emphasis on the application of molecular techniques, for example in forensics (e.g. using DNA fingerprinting to identify rare stolen plants) and conservation biology (e.g. using knowledge of past distributions to plan reserve networks with future climate change in mind). Students will gain hands-on experience of how current gene distributions can be used to model evolution from a common ancestor, using knowledge of generation time, population size and mutation rate.
DEPARTMENT OF BOTANY

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<td>Tutorials:</td>
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<td>Practical:</td>
<td>Two practicals per week, Tuesday and Thursday, 14h00-17h00</td>
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<td>DP requirements:</td>
<td>Minimum of 40% for class record</td>
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<td>Examination requirements:</td>
<td>Tests count for 30%; practicals and tutorials count for 20%; two 2-hour examinations in November counts for 25% each.</td>
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BIO3006F  ECOSYSTEM ECOLOGY

This course is a residential two week field course occurring before term starts. During term time further lectures and various assignments need to be completed.

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


Course outline:
This course concentrates on the factors which determine the form and function of ecosystems, with mainly terrestrial African examples (forests, savannas, arid-lands and fynbos). The course features distinctive aspects of African ecology such as the incredible plant diversity of Cape fynbos and succulent Karoo, the role of large herbivorous mammals, the importance of fire and the long presence of people. The course is field-work orientated and provides computer skills. It should appeal to students interested in ecosystem dynamics/modelling, systems ecology, plant-animal interactions, conservation and management.

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<td>Tutorials:</td>
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<td>Practical:</td>
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<td>Examination requirements:</td>
<td>Project, essays and tests count 50%; one 2-hour theory examination and one 2-hour practical examination written in March/April each count 25%.</td>
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BIO3007S  ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE

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


Course outline:
This course focuses on how plants function and their influence on ecosystem functioning from local to global scales. It draws on a number of subdisciplines of biology to provide an integrated understanding of how the structure and function of plants is related to past and present environmental conditions. Topics covered in the course include plants and the global carbon cycle. Here attention is given to the ecological signifi ance of different photosynthetic pathways, photosynthesis and global productivity, environmental constraints on photosynthesis and respiration as a result of global change (temperature and atmospheric CO2 changes). The course also looks at the role of water in plant functioning especially water movement through plants and how plants deal with water shortages in terms of growth, survival and geographic distribution. Nutrient controls on plant functioning and geographic distribution are discussed together with a consideration of plant-soil and plant microbe interactions that enhance nutrient acquisition. Consideration is also given to plant functioning under different palaeoenvironmental conditions as a clue to how ecosystems might respond to future global change. Pollution problems of excess nutrients and their effects on plants
and ecosystems and the role of plants in other ecosystems and global process are dealt with as specialist topics.

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**Practicals:** Two practicals per week, Wednesday and Friday, 14h00-17h00.

**DP requirements:** Attendance of field excursion.

**Examination requirements:** Essays, tests and projects count for 50%; two 2-hour examinations in November count for 25% each.

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**BIO3010F** SYSTEMATICS & MACRO EVOLUTION

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

**Entrance requirements:** BIO2007S or MCB2018F

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

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**Tutorials:** To be arranged

**Practicals:** Tuesdays and Thursdays, 14h00 to 17h00, and a compulsory weekend excursion

**DP requirements:** Minimum of 40% for class record

**Examination requirements:** Tests count 30%; practicals and tutorials count 20%; two 2-hour written examinations in June counts 50%.

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**BIO3011S** GLOBAL CHANGE ECOLOGY

**NOTE:** Replaces BIO3007S: ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE from 2009.

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**Postgraduate Courses**

**BOT4000W** BSc (HONS) IN BOTANY

**Course co-ordinator(s):** Professor J J Bolton

**Entrance requirements:** A BSc degree with specialisation in Botany, Ecology or Biodiversity and Evolutionary Biology, or at the discretion of the Head of Department. 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. Students will also be expected to conduct research projects. Two options must be selected from the following topics: Ecology, Phycology, Physiology, Ecophysiology, Systematics.
**BOT4001W**  
BSc (HONS) IN BOTANY (PLANT ECOLOGY)  
**Course co-ordinator(s):** Professor J J Bolton  
**Entrance requirements:** A BSc degree with a specialisation in Botany or Ecology or a degree structure considered by the Department to be equivalent.  
**Course outline:**  
The programme is similar to that for the BSc (Hons) in Botany except that modules and projects must be selected from a limited range of ecologically orientated options including Ecology, Ecophysiology, Plant Conservation Ecology and others determined as suitable by the course convenor. Options offered by the Zoology Department may also be selected to fulfill the requirements of the programme.  
The honours course is designed to enrich the student's appreciation of theory through advanced coursework, essay writing, seminars, discussion groups and fieldwork. Students are also expected to conduct supervised research projects.

**BOT4002W**  
BSc (HONS) IN BOTANY (BIODIVERSITY & EVOLUTIONARY BIOLOGY)  
**Course co-ordinator(s):** Professor J J Bolton  
**Entrance requirements:** A BSc degree with a specialisation in Botany or Biodiversity and Evolutionary Biology or a degree structure considered by the Department to be equivalent.  
**Course outline:**  
The programme is similar to that for the BSc (Hons) in Botany except that modules and projects must be selected from a limited range of options including a compulsory module in Systematics. A second module must be selected from the range offered by either the Departments of Botany or Zoology but must be determined as suitable by the course convenor.  
The honours course is designed to enrich the student's appreciation of theory through advanced coursework, essay writing, seminars, discussion groups and fieldwork. Students are also expected to conduct supervised research projects.

**BOT5000W**  
MSc IN BOTANY  
General rules for this degree may be found at the front of the handbook.

**BOT6000W**  
PhD IN BOTANY  
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 Road
Telephone (021) 650-2446 Fax (021) 689-7499
The Departmental abbreviation for Chemistry is CEM.

Professor and Head of Department:
A L Rodgers, MSc PhD Cape Town

South African Research Chair in Drug Discovery:
K Chibale, BScEd Zambia PhD Cantab

Mally Professor of Organic Chemistry:
R Hunter, BSc (Hons) PhD London DIC

Jamison Professor of Inorganic Chemistry:
J R Moss, BSc (Hons) PhD Leeds CChem FRSC MSACI

South African Research Chair in Scientific Computing:
K J Naidoo, MSc Cape Town PhD Michigan

Professor of Physical Chemistry:
To be appointed

Professors:
S A Bourne, BSc (Hons) PhD Cape Town CChem MRSC MSACI
M R Caira, MSc PhD Cape Town Dr Hon Causa Univ Med Pharm 'Iuliu Hatieganu' Romania
T Egan, BSc (Hons) PhD Wits MSACI
G E Jackson, BSc (Hons) PhD Cape Town CChem FRSC MSACI

Emeritus Professors:
J R Bull, MSc Natal DPhil Oxon CChem FRSC FRSSAf Hon MSACI
P W Linder, MSc Natal PhD Cantab CChem MRSC MSACI
L R Nassimbeni, MSc Rhodes PhD Cape Town CChem FRSC FRSSAf MSACI
A M Stephen, MSc PhD Cape Town DPhil Oxon CChem MRSC MSACI

Associate Professors:
B Davidowitz, MSc PhD Cape Town MSACI
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

Senior Lecturer:
To be appointed

Lecturer:
G Smith, BSc Natal BSc (Hons) MSc PhD UWC MSACI

Contract Lecturers:
S S Botha, MSc UWC
C L Oliver, BSc (Hons) PhD Cape Town
S Wilson, BSc (Hons) PhD Cape Town

Senior Research Scholar:
L R Nassimbeni, MSc Rhodes PhD Cape Town CChem FRSC FRSSAf MSACI

Honorary Research Associates:
J R Bull, MSc Natal DPhil Oxon CChem FRSC FRSSAf Hon MSACI
S Churms, BSc (Hons) PhD Cape Town
R J Haines, MSc Natal PhD London FRSSAf
P W Linder, MSc Natal PhD Cantab CChem MRSC MSACI
E Singleton, BSc (Hons) PhD Leeds
E M Timme, BSc (Hons) Wits PhD Cape Town

Chief Scientific Officers:
D Jappie, BSc (Hons) Cape Town MSACI
C Lawrence, MSc Cape Town
To be appointed
Senior Scientific Officers:
A Gamieldien, BSc (Hons) HDE UWC
E Murray, BSc Med (Hons) Stell PhD Cape Town

Scientific Officer:
W W Mavuso, BSc (Hons) Sunderland PhD Cape Town

Principal Technical Officers:
K Achleitner
A de Jager

Chief Technical Officers:
A D Joseph
G Hesselink

Senior Technical Officers:
G Benincasa, BSc (Hons) Natal
N W Hendricks
P Roberts

Technical Officer:
K Willis

Assistant Technical Officer:
M McLean, N Dipl Anal Chem CPUT

Administrative Officer:
G Burke, BA Unisa BA (Hons) MA Cape Town

Administrative Assistant:
D Brooks

Senior Secretaries:
L Bezuidenhout
S D Naicker

Departmental Assistants:
S Y Dyule-Nozewu
Y Ely
N M Gushman
A F Hendricks
W A Hendricks
A M Khoapa
M Mentor
G M Mlungu
K M Sigam
C M Stanley

**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, Sun 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 Egan, D W Gammon, R Hunter, G E Jackson, 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, J R Moss, G Smith).

**Biophysical and structural chemistry** - the application of spectroscopic, diffraction and computational methods to the understanding of molecular and macromolecular phenomena (T Egan, G E Jackson, K J Naidoo, N Ravenscroft, A L Rodgers).

In addition, research is also carried out on aspects of **chemical 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

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**Undergraduate Courses**

**DP Requirements:**

All undergraduate Chemistry courses have the following DP requirements: Attendance and completion of all practicals, tests and tutorial exercises, and attainment of at least 35% (first-year courses) or 50% (senior courses) for the class record.

**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(d) 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 admitted to the General Entry for Programmes in Science or the Engineering Foundation 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 CEM0011S 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**

**Course co-ordinator(s):** To be advised

**Entrance requirements:** Students wishing to register for CEM1000W will normally be expected to have passed senior certificate Physical Science with at least an E symbol on the Higher Grade or at least a C symbol on the Standard Grade.
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.

Examination requirements: Class record (comprising tests and practicals) counts 40%; one 3-hour paper written in November counts 60%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

CEM1009H  CHEMISTRY 1009
This half course is taken by students who are admitted to the General Entry for Programmes in Science and is run over the whole year. Students who pass CEM1009H can register for CEM1010F during the following academic year. The half courses CEM1009H and CEM1010F together are equivalent to the first-year full course CEM1000W.

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

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.

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<td>Tutorials:</td>
<td>Two tutorials per week, Monday and Tuesday, 4th period.</td>
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<td>Practical:</td>
<td>One practical per week, Wednesday, 14h00-17h00.</td>
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<td>Examination requirements:</td>
<td>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.</td>
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CEM1010F  CHEMISTRY 1010
This half course is taken by students who have completed CEM1009H during the previous academic year and is offered in the first semester. 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.

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<td>Tutorials:</td>
<td>One tutorial per week, by arrangement.</td>
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<tr>
<td>Practical:</td>
<td>One practical per week, Thursday, 14h00-17h00.</td>
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Examination requirements: 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 specialisation field in Chemistry. CEM2013S is an elective course which may also be taken by non-chemistry majors.

CEM2007F PHYSICAL CHEMISTRY & SPECTROSCOPY
Course co-ordinator(s): Professor S A Bourne
Entrance requirements: CEM1000W (or equivalent), first-year full course in Physics, first-year full or semester course in Mathematics; concurrent registration for MAM2052F 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.

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<td>Tutorials:</td>
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<td>Practical:</td>
<td>One practical per week, Monday or Thursday, 14h00-17h00.</td>
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<td>Examination requirements:</td>
<td>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.</td>
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CEM2008S ORGANIC & INORGANIC CHEMISTRY
Course co-ordinator(s): To be advised
Entrance requirements: CEM1000W (or equivalent), first-year full course in Physics, first-year full or semester course in Mathematics. Completion of CEM2007F is strongly recommended.
Course outline:
Main-group chemistry and trends in the Periodic Table, chemistry of the transition metals and coordination 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.

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<td>Practical:</td>
<td>One practical per week, Monday or Thursday, 14h00-17h00.</td>
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<tr>
<td>Examination requirements:</td>
<td>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.</td>
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CEM2013S CHEMISTRY IN HEALTH & DISEASE
Course co-ordinator(s): Associate Professor D W Gammon
Entrance requirements: CEM1000W (or equivalent); MCB2000F is highly recommended.
Course outline:
Introduction to chemistry in health and disease; molecular structure of drugs and drug targets; physicochemical issues in drug design and development; chemical perspectives on African diseases (chemistry of vaccine development, role of chemistry in the understanding and treatment of
HIV/AIDS, chemical insights into malaria); bioinorganic chemistry - metals in living systems and as therapeutic agents; biomimeralization - role in crystal deposition disease.

**Third-Year Courses**

CEM3005W is the required course for students proceeding to a specialisation field in Chemistry. CEM3011F is an elective course which may also be taken by non-Chemistry majors. The Department also offers CEM3004Z: Physical Chemistry Laboratory, which may be taken by students in Chemical Engineering. Details may be found in the student handbook of the Faculty of Engineering and the Built Environment.

<table>
<thead>
<tr>
<th>CEM3005W CHEMISTRY 3005</th>
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<tbody>
<tr>
<td><strong>Course co-ordinator(s):</strong> Professor M R Caira</td>
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<tr>
<td><strong>Entrance requirements:</strong> CEM2007F and CEM2008S, first-year full course in Mathematics; completion of or concurrent registration for MAM2052F is highly recommended.</td>
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<tr>
<td><strong>Course outline:</strong> 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.</td>
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<td>Practicals:</td>
<td>Two practicals per week, Wednesday and Friday, 14h00-17h00.</td>
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<td><strong>Examination requirements:</strong> Class record (comprising tests, writing project and practicals) counts 40%; one oral examination in November counts 10% 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.</td>
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<tr>
<th>CEM3011F MEDICINAL CHEMISTRY</th>
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<tr>
<td><strong>Course co-ordinator(s):</strong> Professor R Hunter</td>
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<tr>
<td><strong>Entrance requirements:</strong> CEM2007F, CEM2008S, CEM2013S (or CEM2011S) and MCB2000F.</td>
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<tr>
<td><strong>Course outline:</strong> Strategies and synthesis in drug discovery and development; computational methods in Medicinal Chemistry; quantitative structure-activity relationships; Medicinal Chemistry of antibacterial agents; Medicinal Chemistry of anti-HIV drugs.</td>
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<td>Practicals:</td>
<td>One practical per week, Tuesday, 14h00-17h00.</td>
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<td><strong>Examination requirements:</strong> Class record (comprising tests, assignments and practicals) counts 50%; one 3-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.</td>
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Postgraduate Courses

**CEM4000W**  BSc (HONS) IN CHEMISTRY

Course co-ordinator(s): Professor T Egan

**Entrance requirements:** A BSc degree (or equivalent) with a specialisation in Chemistry at a sufficiently high standard to satisfy the Head of the Department of Chemistry. An average of 60% or more in the final-year BSc Chemistry examinations is the normal minimum prerequisite for admission. Entrance to the Honours course is competitive and applications are considered individually. Relevant work experience may be taken into account.

**Course outline:**
The programme opens at the beginning of February 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 beginning of February. 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.

**CEM5000W**  MSc IN CHEMISTRY

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

**CEM5002W and CEM5003W**  MSc IN CHEMICAL CRYSTALLOGRAPHY  (by coursework and dissertation)

The Department of Chemistry offers an MSc programme in Chemical Crystallography. Candidates are required: to complete a course (CEM5002W) involving studies in crystal symmetry, optical crystallography, diffraction theory, X-ray diffraction, photographic single crystal and powder methods, diffractometry, electron diffraction, detailed structure solution (vector and direct methods), and structure and bonding in solids, at the end of which they will be required to take formal written examinations; and to submit a minor dissertation (CEM5003W) in part fulfilment of the requirements for the degree. The course lasts one year. Candidates must have a relevant Honours degree.

**CEM6000W**  PhD IN CHEMISTRY

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.

Professor and Head of Department:
K J MacGregor, BSc Strathclyde MSc Glasgow

Professors:
E H Blake, BSc (Hons) Wits PhD London
P S Kritzinger, MSc (Eng) Wits PhD Waterloo

Associate Professors:
S Berman, BSc Rhodes MSc PhD Cape Town
G Marsden, BSc (Hons) PhD Stirling

Adjunct Professor:
A C M Hutchison, BSc MSc HDE (PG) Sec Cape Town PhD Zurich

Senior Lecturers:
A Bagula, MEng UCL MSc Stell PhD KTH
J E Gain, MSc Rhodes PhD Cantab
M Kuttel, MSc PhD Cape Town
H Le, BA BSc Hanoi PhD UTS
P C Marais, MSc Cape Town DPhil Oxon
A Mbogho, BS MS PhD City Univ of New York
A Potgieter MSc PhD Pretoria
H Suleman, MSc UDW PhD Virginia Tech

Lecturer:
G Stewart BSc (Hons) Cape Town

Computer System Managers:
---

Administrative Assistants:
E M Gill
S Valley

Senior Secretary:
J Wright

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.

ADVANCED INFORMATION MANAGEMENT (Co-ordinator: Associate Professor S Berman; Dr H Suleman; Professor K MacGregor). This laboratory deals with multiple facets of the information processing problem, exemplified by the following active research areas: databases; knowledge management systems; peer-to-peer computing; distributed computing; Web-based systems; component-based systems; digital libraries and information storage, retrieval and visualization; and issues of interfaces to digital libraries and information retrieval.

AGENTS (Co-ordinator: Dr A Potgieter). Research conducted in the lab falls into the collective intelligence and distribution cognition fields, with an emphasis on self-awareness, emergence and complex adaptive systems.

COLLABORATIVE VISUAL COMPUTING (Co-ordinator: Associate Professor G Marsden; Professor E Blake, Dr J Gain, Dr P Marais). Topics of research include: Collaborative Virtual Environments (focusing on authoring, user engagement and low-cost platforms); Usability and Human-Computer Interaction; Computer Graphics (especially real-time rendering, modelling and
geometric compression); Image Analysis applied to Medical Images; Virtual Reality and Behavioural Therapy; Allowing End-Users to Create Interesting Virtual Environments (interfaces to scripting systems and methodologies for determining interaction); Interaction with Mobile Computing Devices (and their use to bridge the digital divide); 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 and the Geometry Interest Group.

HIGH PERFORMANCE COMPUTING (Co-ordinator: Dr M Kuttel; Dr J Gain, Dr P Marais, Dr H Suleman). This laboratory hosts investigations into all aspects of high performance and high throughput computing, including: parallel architectures and algorithms; scientific computing; high performance visualization; large-scale information retrieval; high-performance digital archives; grid and volunteer computing; software optimization; and multi-core and GPU programming.

DATA NETWORK ARCHITECTURES (Co-ordinator: Professor P Kritzinger, Dr A Hutchison). Work in the DNA group focuses on the specification and analysis of computer protocols and associated software as well as fixed line communication networks. The group’s main research interest lie in the security, correctness, performance analysis, design, specification and modelling of stochastic concurrent communicating systems (SCCS) in general, and telecommunication systems in particular.

ADVANCED TELECOMMUNICATION RESEARCH (Co-ordinator: Dr A Bagula; Dr H Le, Prof K MacGregor, Prof G Marsden, Dr H Suleman, Prof E Blake). The centre aims to enhance the discipline of telecommunications through innovative applications with particular emphasis on socio-economic development; encourage the adoption of new telecommunications technologies through standardization; and promote the effective use of telecommunications in society through experimentation. Topics of interest include but are not limited to Wireless Sensor/Actuator Networks and RFID tag-enabled networks, Traffic and Network Engineering for next generation wired and wireless networks, Overlay networks with their application to efficient service delivery in wired and wireless networks, Efficient Frequency Management using cognitive Radio, Pan African Research and Education Network Infrastructures, Bandwidth Limitation and Information Accessibility in Developing Countries, Distributed Healthcare Data Networks, and Mobile Applications for the Developing World.

Undergraduate Courses

First-Year Courses

**CSC1010H  COMPUTER SCIENCE 1010**
This course is part of the General Entry for Programmes in Science.

**Course co-ordinator(s):** Mr G Stewart

**Entrance requirements:** The permission of the Dean or the Head of Department is required prior to registration for this course which forms part of the General Entry for Programmes in Science.

**Course outline:**
As for CSC1015F

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<td>This includes one tutorial per week.</td>
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**Practicals:** One practical per week, Thursday, 14h00-17h30.

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

**Examination requirements:** 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% for theory tests and examination.

**NOTE:** Credit will not be given for CSC1015F and CSC1016S together with any of the following: CSC1009F/S, CSC1010H, CSC1011H.
**CSC1011H** COMPUTER SCIENCE 1011  
This course is part of the General Entry for Programmes in Science.  
Course co-ordinator(s): Mr G Stewart  
Entrance requirements: CSC1010H, MAM1005H  
Course outline:  
As for CSC1016S with additional project work in the 1st semester.  

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This includes one tutorial per week.  
Practicals: One practical per week, Monday, 14h00-17h30.  
DP requirements: Minimum of 45% aggregate in practical work.  
Examination requirements: 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% for theory tests and examination.

**CSC1015F** COMPUTER SCIENCE 1015  
Course co-ordinator(s): Dr H Suleman  
Entrance requirements: Mathematics Higher Grade, at least a D symbol. Corequisite: MAM1000W.  
Course outline:  
Introduction to computing and applications. Problem solving, algorithm development and object-oriented programming in Java. Fundamental programming constructs and abstractions.  

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<td>Lectures:</td>
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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.  
Examination requirements: Theory tests count 15%; practical tests and practical assignments count 25%; one 3-hour paper written in June counts 60%. Subminima: 45% for practicals, 45% for theory tests and examinations.

**CSC1016S** COMPUTER SCIENCE 1016  
Course co-ordinator(s): Dr H Suleman  
Entrance requirements: CSC1015F (or supp for CSC1015F) or CSC1010H or registration for CSC1018F. Corequisite: MAM1000W.  
Course outline:  
Advanced programming constructs and techniques in the object-oriented paradigm. Linear abstract data structures including Lists, Stacks and Queues. Binary trees and their applications. Applets, event-driven programming, graphics and graphical user interfaces. Number representation, boolean algebra and logic gates. Ethics and professional issues in computing.  

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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.  
Examination requirements: Theory tests count 15%; practical tests and practical assignments count 25%; one 3-hour paper written in November counts 60%. Subminima: 45% for practicals and 45% for theory tests and examination.
CSC1018F  COMPUTER SCIENCE 1018
Course co-ordinator(s): Dr J Gain
Entrance requirements: Mathematics Higher Grade, at least a D symbol. Computer Studies Higher Grade, an A symbol. Passing a Java competency exam.
Co-requisites: MAM1000W
Objective: This course is an alternative to CSC1015F. It is intended for students who have mastered the Java programming language as part of Computer Studies at a school level and wish to learn an alternative programming paradigm.
Course outline:
The following fundamental Computer Science concepts are taught:
- The Object Orientated approach to program design and implementation
- General techniques for algorithmic Problem Solving
- Methodologies for Software Engineering, including the use of UML diagrams
This will be taught within the context of the Python OpenSource interpreted scripting language. The course will be timetabled with one lecture and practical assignment per week. This will be combined with structured self-learning.
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Practicals: One practical per week, by arrangement.
DP requirements: Minimum of 45% aggregate in practical work and 45% aggregate for theory (combined tests and exam).
Examination requirements: Tests count 15%; practical work counts 35%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals and 45% for theory.

Second-Year Courses
CSC2001F  COMPUTER SCIENCE 2001
Course co-ordinator(s): Dr P Marais
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:
CONCEPTS OF C++: C++ vs Java, Building a C++ program, Basic constructs, Overloading & Inheritance.
ADVANCED C++: Templates, Advanced STL Containers and Iterators, Operator Overloading, Exceptions, File I/O
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.
SOFTWARE ENGINEERING-1: Object Oriented Analysis, Design & Testing using UML.
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Lectures: 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.
Examination requirements: Tests count for 16.7%; practicals and projects count 33.3%; one 3-hour paper written in June counts 50%. Subminima: 45% for tests and examinations.
CSC2002S  COMPUTER SCIENCE 2002
Course co-ordinator(s): Dr P Marais
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:
ARCHITECTURE: Abstractions, performance, instructions, arithmetic, the processor: datapath & control, pipelining, memory hierarchy, peripherals and parallel processors.

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<td>Practical:</td>
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DP requirements: Minimum of 45% aggregate in practical work and minimum of 50% in practical test.
Examination requirements: Tests count for 16.7%; practicals, practical test and projects count 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% for tests and examinations.

CSC2003S  COMPUTER GAMES
Course co-ordinator(s): Professor E Blake
Entrance requirements: CSC2001F, MAM1000W or equivalent.
Course outline:
Introduction - History of Games, Genres of Games Playability and Design - Play, Narrative, Design Process, Design Documents. 2D Game Programming --- Game APIs, game technology, interaction. Game Software Engineering - Game SE Methodology. AI/Simulation - Simulation and Search Strategies, Text Based Games & Advanced Topics.

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<td>Practical:</td>
<td>One 4-hour practical per week, Monday to Friday, 14h00-18h00.</td>
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DP requirements: Minimum of 45% aggregate in practical work, minimum of 50% in practical test and minimum of 40% in theory tests.
Examination requirements: Tests count for 16.7%; practicals, practical test and projects count 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% for tests and examinations.

Third-Year Courses

CSC3002F  COMPUTER SCIENCE 3002
Course co-ordinator(s): Associate Professor S Berman
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, XML and Web-based computing.
### CSC3003S  COMPUTER SCIENCE 3003

**Course co-ordinator(s):** Associate Professor S Berman  
**Entrance requirements:** As for CSC3002F.  
**Course outline:**  
Compilers, Theory of Algorithms

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<td>Practicals:</td>
<td>Two 4-hour practicals per week, Monday to Friday, 14h00-18h00.</td>
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<td>DP requirements:</td>
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<td>Examination requirements:</td>
<td>Tests count 15%; practical work counts 35%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals; 45% for tests and examination.</td>
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### CSC3020H  THREE DIMENSIONAL & DISTRIBUTED GAMES DESIGN

**Course co-ordinator(s):** Professor E Blake  
**Entrance requirements:** CSC2001F, CSC2002S and CSC2003S.  
**Course outline:**  
Computer Graphics for Gaming, Agents in Gaming, Multi-User and Distributed Games, Game Design.

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<td>Practicals:</td>
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<td>DP requirements:</td>
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<td>Examination requirements:</td>
<td>Tests count 16.7%; practical work counts 33.3%; examinations count 50%. Subminima: 45% for practicals, 45% for tests and examinations.</td>
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### CSC3015D  THEORY OF ALGORITHMS (1/4 course)

**NOTE:** This course is offered in the second semester, fourth quarter.  
**Course co-ordinator(s):** Associate Professor S Berman  
**Entrance requirements:** CSC2001F & CSC2002S.  
**Course outline:**  
Algorithms are widely recognised as being central to computing. This course categorises algorithms according to their solution strategy and presents example problems and algorithmic solutions in each category. It also considers fundamental notions of algorithmic complexity and computability in a systematic way (30).

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<td>Practicals:</td>
<td>Unscheduled work in laboratories.</td>
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<td>45% subminimum for practical work.</td>
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<td>Examination requirements:</td>
<td>Tests count 15%; practical work counts 35%; one 1.5-hour paper</td>
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Courses Offered in Other Faculties

The Department of Computer Science also offers the course CSC4003W for students registered in the Commerce Faculty. Details may be found in the Commerce Faculty handbook.

Postgraduate Courses

CSC4000W  BSc (HONS) IN COMPUTER SCIENCE
Course co-ordinator(s): Dr A Potgieter
Entrance requirements: An average of at least 60% in CSC3002F and CSC3003S. Students must have a BSc degree in Information Technology from UCT.
Course outline:
A pamphlet outlining the year's programme is available from the Department. Two-thirds of the requirements for the course are made up of coursework. The courses given vary from year to year but will usually be a selection from: Computer Networks; Compiling Techniques; Distributed Systems; Database Systems; Human Computer Interaction; Computer Graphics; Computer Architecture; Software Engineering; Network Security.
Some courses may also be taken from the Departments of Mathematics and Applied Mathematics, and Statistics, from the Department of Electrical Engineering or from other departments, with approval of the Honours Course co-ordinator. The student will be required to complete a major project for a third of the requirements for the course. Work on this major project is spread over the entire academic year. In addition, completion of a short module on oral and written professional communication skills, at the start of the course, is required.

MAM4007W  BSc (HONS) IN MATHEMATICS OF COMPUTER SCIENCE
See details under the Department of Mathematics and Applied Mathematics.

CSC4016W  BSc (HONS) IN INFORMATION TECHNOLOGY
Course co-ordinator(s): Dr A Potgieter
Entrance requirements: An average of at least 60% in CSC3002F and CSC3003S or equivalent.
Course outline:
A pamphlet outlining the year's programme is available from the Department. Two-thirds of the requirements for the course are made up of coursework. The courses given vary from year to year but will usually be a selection from: Computer Networks; Compiling Techniques; Distributed Systems; Database Systems; Human Computer Interaction; Computer Graphics; Computer Architecture; Software Engineering; Network Security.
Some courses may also be taken from the Departments of Mathematics and Applied Mathematics, and Statistics, from the Department of Electrical Engineering or from other departments, with approval of the Honours course co-ordinator. The student will be required to complete a major project for a third of the requirements for the course. Work on this major project is spread over the entire academic year. In addition, completion of a short module on oral and written professional communication skills, at the start of the course, is required.
This course is intended for students who are NOT intending seeking accreditation from the British Computer Society.

CSC5000W  MSc IN COMPUTER SCIENCE
Course co-ordinator(s): Associate Professor G Marsden
Entrance requirements: 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.
Course outline:
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  MSc IN COMPUTER SCIENCE
(by coursework and dissertation)
Course co-ordinator(s): Associate Professor G Marsden
Entrance requirements: See CSC5000W.
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 minor dissertation (CSC5002W) in part fulfilment of the requirements for the degree. The course lasts at least one year. Candidates must have a relevant Honours degree.

CSC5003W and CSC5004W  CONVERSION MSc/MPhil IN INFORMATION TECHNOLOGY
Course co-ordinator(s): Associate Professor G Marsden
Entrance requirements: A Bachelors degree and access to the Internet.
Course outline:
CSC5003W is the taught component of the course comprising of eight modules in: Object-oriented programming; Human-Computer Interaction; Databases; Networks; Web Programming; Software Engineering; Cyberlaw and Ethics and Advanced Programming. All study is via on-line self-study materials. CSC5004W consists of a coursework module in Research Methods and a one year research project. The total period of study is 24 months.

CSC6000W  PhD IN COMPUTER SCIENCE
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.
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:
B C Hewitson, BSc Cape Town MSc PhD Penn State

Professor:
S M Parnell, MA PhD Wits

Associate Professors:
M R Sowman MSc PhD Cape Town
M F Ramutsindela, MA UNIN PhD London

Honorary Professors:
J Boardman, BSc (Hons) PhD Cantab
J Crush, MA Cantab MA Laurier PhD Queens
D S G Thomas, MA PhD Cantab

Emeritus Professors:
R J Davies, MSc Rhodes PhD London FSSAG
R F Fuggle, BSc (Hons) UED Natal MSc Louisiana PhD McGill

Senior Lecturers:
F D Eckardt, BSc (Hons) KCL MSc Cranfield DPhil Oxon
R C Hill, BSc (Eng) Cape Town Pr Eng PhD Cape Town
S E Oldfield, BA (Hons) Syracuse MA PhD Minnesota

Lecturers:
S E Butcher, BSc (Hons) Stell MSc Cape Town
K J Winter, BA (Hons) Cape Town MA London PhD Cape Town

Postgraduate Co-ordinator:

Research Fellow:
L Nathan BBus Sci/LLB Cape Town MPhil Bradford

Administrative Officer:
S Adams

Senior Secretary:
S Samsodien

Librarian:
S Reddy, BA PGDipLIS MPhil (Adult Educ) Cape Town

Laboratory Departmental Assistant:
S Hess

Library Assistant:
T George

ENVIRONMENTAL EVALUATION UNIT

Director:
M R Sowman, MSc PhD Cape Town

Deputy Director:
R P Wynberg, BSc (Hons) MSc MPhil Cape Town PhD Strathclyde

Senior Researchers:
J A Bodenstein, MA Cape Town
R Hamann, BSc (Hons) MSc Cape Town PhD UEA
R Hasler, MA Cape Town MA Rhodes GRAD.C.E. Zimbabwe PhD Michigin
M Hauck, MA (Criminology) Cape Town
Researchers:
V Mduduzi Zungu, BSocSci (Hons) MSc UKZN
S Williams, BA (Hons) MA UWC

Intern:
Q Williams BA (Hons) GES UWC

Office Manager:
S Saban

Secretary:
F Hartley

DISASTER MITIGATION FOR SUSTAINABLE LIVELIHOODS PROGRAMME (DiMP)
Director:
A Holloway, BA Soc Sci Massey MA Washington DrPH UCLA

Project Administrator:
S Prime

Risk Reduction Researchers:
X Mdandlu, BA (Hons) Rhodes and UWC
R Roomaney, BA (Hons) Cape Town
L Sonn, BSc MSc Cape Town

Knowledge Management Co-ordinator:
G Fortune, Nat.Dipl. IT CPUT

Data Capturer/Researcher:
L Mjuleni, Nat.Dipl. IT CPUT

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 Environmental Management 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 and Disaster Risk 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.

An area of growing concern relates to the increasing impact of natural and other threats. The Disaster Mitigation for Sustainable Livelihoods Programme (DiMP) focuses its teaching, research and policy advocacy efforts on promoting disaster mitigation as a key component of sustainable development.

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 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

ERT1000F  INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES 1000
See course details under the Department of Geological Sciences.

ERT1003H  FOUNDATIONS OF BIOLOGY, EARTH & ENVIRONMENTAL SCIENCES
A course for students on the General Entry for Programmes in Science (GEPS), providing a general introduction to the study of the earth and its living and non-living systems. For course details see entry under Department of Archaeology.

ERT1002S  INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES 1002
Note: ERT1002S is a tutorial-based reinforcement of ERT1000F. Credit will not be given for both ERT1000F and ERT1002S. No supplementary examination will be offered.
Course co-ordinator(s): To be advised
Entrance requirements: DP in ERT1000F.
Course outline:
As for ERT1000F.
Tutorials: One tutorial per week, Friday, 14h00-17h00.
Examination requirements: 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.

EGS1002S  HUMAN GEOGRAPHY
Course co-ordinator(s): Mrs S Butcher and Associate Professor M F Ramutsindela
Entrance requirements: Matric Geography on the Higher Grade, or ERT1000F
Course outline:
The course comprises an introduction to global systems of human organisations, including economic, social, political and cultural environments.

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Practicals: One practical per week, Monday, Tuesday or Thursday, 14h00-17h00.
DP requirements: Attendance and satisfactory completion of practical assignments.
Examination requirements: Essays, tests, practical assignments and tutorial work count 40%; one 3-hour theory paper written in November counts 45% (subminimum of 40% required), one 3-hour practical paper written in November counts 15%.

Second-Year Courses

EGS2010F  ENVIRONMENTAL PROBLEMS
Course co-ordinator(s): Dr K J Winter
Entrance requirements: ERT1000F (or ERT1002S) and EGS1002S
Course outline:
The course provides an analytical and interdisciplinary perspective of environmental issues and problems at a global, regional and local scale. Key themes of resources and resource utilisation, sustainability, climate change, disaster risk, population dynamics and human response characterise the content. The use of information technology and analytical techniques provide the skills component of the course.

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

DP requirements: Satisfactory completion of practicals and all written assignments, including essays and class tests.

Examination requirements: Essays, tests, practical assignments and tutorial work count 40%; one 3-hour theory paper written in June counts 60% (subminimum of 40% required).

EGS2011S  CITIES OF THE SOUTH
Course co-ordinator(s): Professor S Parnell
Entrance requirements: ERT1000F (or ERT1002S or EGS1002S) (or Social Science Foundation course and equivalent of at least two other first-year humanities full-year courses).

Course outline:
The course examines the rapidly growing urban centres of the developing world. The international urban context is set against core arguments drawn from political, social and cultural geography.

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

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

DP requirements: Satisfactory completion of practicals and all written assignments, including essays and class tests.

Examination requirements: Essays, tests and practical assignments count 50%; one 3-hour theory paper written in November counts 50% (subminimum of 40% required).

EGS2012S  PHYSICAL ENVIRONMENTAL PROCESSES
Course co-ordinator(s): Dr F Eckardt
Entrance requirements: ERT1000F (or ERT1002S)

Course outline:
The course examines fundamental elements of the atmospheric, geomorphological and biotic systems. The course provides a global overview but provides a multidisciplinary integration at regional and local scale with particular focus on anthropogenic impacts. Practical work focuses on developing relevant techniques, including quantitative data analysis and basic remote sensing skills. Applied aspects of these processes and patterns are explored in the context of resource and environmental issues (eg. geohazards, extreme climate and weather events, fire, aliens, floods, air and water pollution).

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

DP requirements: Satisfactory completion of practicals and all written assignments, including projects and class tests.

Examination requirements: Project work, tests and practical assignments count 40%; one 3-hour theory paper written in November counts 60% (subminimum of 40% required).
Third-Year Courses

EGS3012S  SYNOPTIC CLIMATOLOGY  
Course co-ordinator(s): Professor B C Hewitson  
Entrance requirements: ERT1000F (or ERT1002S), EGS2012S or SEA2002S or SEA2003F or approved second-year Science course or any Physics first-year 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.

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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. Attendance at a residential field camp during a University vacation is compulsory.

Examination requirements: Essays and tests count 20%; project reports and practicals count 20%; one 3-hour written examination in November counts 60% (subminimum of 40% required).

EGS3013F  ENVIRONMENTAL ANALYSIS  
Course co-ordinator(s): Mrs S E Butcher  
Entrance requirements: EGS2010F and either EGS2012S or EGS2011S

Course outline:  
The course deals with the fundamental methods in the collection, organisation, presentation, analysis and interpretation of a wide range of environmental data. The focus is on practical skills to enable the student to better understand observations and measurements associated with the study of the natural and built environment.

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Practicals: Two practicals per week, Wednesday and Friday, 14h00-17h00.

DP requirements: Satisfactory completion of practicals and all written assignments, including essays, project reports and class tests.

Examination requirements: Essays, tests and practical assignments count 30%; project reports count 30%; one 3-hour written examination in June counts 40% (subminimum of 45% required).

EGS3014S  ENVIRONMENTAL CHANGE  
Course co-ordinator(s): Professor M E Meadows  
Entrance requirements: EGS2010F or EGS2012S

Course outline:  
The course deals with environmental change, particularly as manifested in the Quaternary period, and its impacts on biogeographical and geomorphological processes. An attempt is made to view the dramatic environmental changes of the recent past in the context of long-term changes. The lessons of the past in terms of predicting and managing environmental change are evaluated. The geomorphological section of the course examines processes and stages of long-term landscape evolution with secondary focus on the southern African continent and its response to the climate of the Quaternary.
### EGS3015S URBAN GEOGRAPHY

**Course co-ordinator(s):** To be advised  
**Entrance requirements:** EGS2010F or EGS2011S  
**Course outline:** The course has two parts. In the first part, recent theoretical debates on cities drawn from the international urban studies literature are explored and its relevance to the South African city is debated. In the second section, the locational determinants of urban space are analysed to explain the daily functioning of the urban system.

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| **Practicals:** One practical per week, Wednesday, 14h00-17h00. **DP requirements:** Satisfactory completion of practicals and all written assignments, including essays, project reports and class tests. Attendance at a residential field camp during a University vacation is compulsory.  
| Examination requirements:** Essays, tests, project reports and practicals count 40%; one 3-hour theory examination in November counts 45% (subminimum of 40% required); one 2-hour practical examination in November counts 15%. |

### EGS3016F POPULATION DYNAMICS, MEASUREMENT & PROCESSES I

**NOTE:** This course is offered by Centre for Actuarial Research (CARe), Third floor PD Hahn Building.  
**Course co-ordinator(s):** Dr T Moultrie  
**Entrance requirements:** MAM1000W, STA1006H (or STA1005H) and a full second year course (or equivalent) in Mathematics, Statistics, Economics or Environmental and Geographical Science.  
**Course outline:** This course, together with its successor in the second semester (EGS3019S), teaches the basic skills of demographic data analysis and description. Topics covered in EGS3016F include:  
- Global and regional population change and growth;  
- Age-and sex composition of populations;  
- Standardisation;  
- Simple measurement of fertility, mortality, nuptiality and migration;  
- Sources of demographic data;  
- The construction, interpretation, and uses of life tables;  
- Stationary populations;  
- Basic population projections. Emphasis is placed on learning how to solve practical demographic problems.

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| **Tutorials:** One tutorial per week, Monday, by arrangement.  
| **Practicals:** One practical per week, Wednesday, 14h00-17h00.  
| **DP requirements:** Satisfactory completion of practicals and all written assignments, including essays, project reports and class tests.  
| **Examination requirements:** Essays and tests count 50%; two 3-hour written examinations in November count 50% (subminimum of 40% required). |
Examination requirements: Essays and tests count 40%; one 3-hour written examination in June counts 60%.
EGS3017S  POPULATION DYNAMICS, MEASUREMENT & PROCESSES II

NOTE: This course is offered by Centre for Actuarial Research (CARE). Third floor P D Hahn Building.

Course co-ordinator(s): Dr T Moultrie

Entrance requirements: EGS3016F.

Course outline:
This course develops and extends the material presented in EGS3016F, and relaxes many of the simplifying assumptions made in the earlier course.

Topics covered in EGS3017S include:
Further considerations on sources, uses and validation of demographic data including measures of data quality; the force of mortality; stable population theory; multiple-decrement life tables; survival analysis; period vs cohort measures of fertility; proximate determinants of fertility and child mortality; analysis of birth intervals and parity progression.

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<td>Tutorials:</td>
<td>One tutorial per week, Friday, 6th and 7th period.</td>
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<td>DP requirements:</td>
<td>Students must submit a research project as well as all tutorials and write all tests, and obtain a subminimum of 35% for the coursework component. A subminimum of 50% for the examination is required to pass the course.</td>
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<td>Examination requirements:</td>
<td>Essays and tests count 20%; research project report counts 30%; one 3-hour written examination in November counts 50%.</td>
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EGS3018F  INTRODUCTION TO POPULATION STUDIES

NOTE: This course is offered by Centre for Actuarial Research (CARE). Third floor P D Hahn Building.

Course co-ordinator(s): To be advised

Entrance requirements: EGS2011S or SOC2019F.

Course outline:
This course aims to enable the student to describe and understand the foundational material of population studies. The course will cover the size, distribution and growth of the populations of the main developing regions and countries; levels, trends and differentials in fertility, mortality and marriage in developing countries; the causes of mortality decline in the developing world; synergistic interactions associated with infectious diseases and child malnutrition; the social and economic consequences of rapid population growth; possible costs and benefits of having children for peasant couples; other factors affecting fertility. Additionally, the course will cover topics such as the spread of HIV/AIDS and its demographic implications; patterns and trends in migration and urbanisation in developing countries as well as the social, biological and economic influences on population growth rates, especially the role of famine, disease and war; the demographic and health transitions; the changing characteristics of the family; global trends in population ageing and their social and economic consequences for the elderly; theories and trends in migration; urbanisation.

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<td>DP requirements:</td>
<td>Students must submit and attend all tutorials and submit a long essay of not less than 4000 words, and obtain a subminimum of 35% for the coursework component. A subminimum of 50% for the examination is required to pass the course.</td>
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<td>Essays and tests count 40%; one 3-hour written examination in June counts 60%.</td>
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EGS3019S  POPULATION & DEVELOPMENT

NOTE: This course is offered by Centre for Actuarial Research (CARe). Third floor P D Hahn Building.

Course co-ordinator(s): To be advised
Entrance requirements: EGS3018F and EGS2011S or SOC2019F.

Course outline:
Beginning with the work of Thomas Malthus, this course traces the evolution of discourses of population and its relationships with society, economics and politics, through to the work of Paul Ehrlich (The 'population bomb') and the rise of a new consensus on population at the 1994 International Conference of Population and Development. The course critically examines the different analytic approaches to the main interrelationships between population changes and socio-economic development. Drawing on a variety of theoretical and historical experiences to address and explore these interconnections and the principal debates concerning them, the course aims to provide balance between theoretical understanding, knowledge of empirical processes, and implications for policy.

We address Malthusian, anti-Malthusian and neo-Malthusian perspectives on the linkages between population, socio-economic development and the environment, comparing and contrasting contemporary and historical evidence. A great deal of attention is devoted to an assessment of demographic transition theory in both its original and subsequent formulations. The implications of the theory for economic development, urbanisation and socio-structural change are debated.

In addition, we shall consider the role of the state in affecting population outcomes; the role of population policies, family planning programmes and the means and mechanisms of assessing the efficiency and efficacy of population programmes.

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Lectures: 3 3 3 3

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

DP requirements: Students must submit and attend all tutorials and submit a long essay of not less than 4000 words, and obtain a subminimum of 35% for the coursework component. A subminimum of 50% for the examination is required to pass the course.

Examination requirements: Essays and tests count 50%; one 3-hour written examination in November counts 50%.

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

Course co-ordinator(s): Professor B C Hewitson

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 dissertation, two seminar presentations, and course fieldwork. Students will also attend and present at the annual conference of the South African Society for Atmospheric Scientists.

**Examination requirements:** 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.

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**EGS4004W**  
**BSc (HONS) IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE**

Course co-ordinator(s): Dr S Oldfield

**Entrance requirements:** A BSc degree or the equivalent with a major in Environmental & Geographical Science or an equivalent major approved by the Head of Department. Qualifications in the following courses are highly recommended: a half course of university level Mathematics; for specialization in Development and Urban Geography, ECO1002W or ECO1004W (Economics), or SOC1001W (Sociology), or POL1003W (Political Studies). Intending students must, in addition to submitting an application to the University, complete and return a departmental application form (available from the Departmental website: www.egs.uct.ac.za/app.html) by 20 October.

**Course outline:**
There are four Honours streams within Environmental and Geographical Science: Environmental Management, GIS, Human Geography and Physical Geography. Students complete four advanced semester modules. In all streams, 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, Disaster Risk Science, Environmental Management, Geographical Information System, 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 convenor, 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 and Geographical Science.

**Examination requirements:** Courses will be examined at the end of each semester, and the marks combined with project, essay, field work and seminar presentation marks.

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**EGS4008W**  
**BSc (HONS) IN DISASTER RISK SCIENCE**

Course co-ordinator(s): Dr A Holloway

**Entrance requirements:** Students entering the programme must have completed a BSc degree in Environmental & Geographical Science or a related discipline. 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 at www.egs.uct.ac.za

**Course outline:**
The programme aims to provide students with an integrated understanding of disaster risk and its implications for sustainable development in southern Africa, with a specific focus on South Africa. The programme contextualises disaster risk as an outcome of the interplay between human and natural factors. Students select four coursework modules from a range of core and optional courses, including an introduction to disaster risk science and a foundation course in research methods, as well as a disaster risk research project.
Examination requirements: All coursework modules are examinable through open book and 3-hour written examinations; practicals, essays, reaction papers, projects and other assignments count 60% of the final mark in most instances. The research project counts 20%.

EGS5003W  MSc IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE
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 ENVIRONMENTAL MANAGEMENT
(by coursework and dissertation)
This MPhil programme is designed for students with diverse backgrounds who have an interest in environmental management. 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 R C Hill

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 of the restricted number of places in the Environmental Management programme, only selected students are admitted. 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 coursework modules in, for example, Environmental Management, Environmental Law (for non-lawyers), Social and Economic Impact Assessment, Environmental Research Methods, Theory & Ethics of Environmental Management. Assessment for these modules includes both written examinations and coursework assignments.

Research project (EGS5009W): In the second year students undertake a research project demonstrating the application of theory to practical issues in environmental planning, impact assessment and management. The work must be submitted in the form of a dissertation that counts 50% of the final course outcome.

EGS5010W and EGS5020W  MSc IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE
(by coursework and dissertation)

Course co-ordinator(s): Dr S Oldfield

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. At the discretion of the course convenor, in consultation with the Head of Department, students may
count one or two modules from outside the department towards the MSc degree in Environmental &
Geographical Science by coursework and dissertation.

**Examination requirements:** Modules are conventionally examined by 3-hour written papers in
combination with various coursework elements such as essays, projects, practical assignments etc.

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**EGS5011W  MPhil IN DISASTER RISK SCIENCE**

**Course co-ordinator(s):** Dr A Holloway

**Entrance requirements:** Students entering the programme must have completed an Honours degree in Disaster Risk Science or a closely related discipline. 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 at www.egs.uct.ac.za

**Course outline:**
The programme aims to provide students with an advanced understanding of disaster risk and its implications for sustainable development in southern Africa, with a specific focus on South Africa. The programme assumes an interdisciplinary perspective on disasters taking into consideration both biophysical elements (hazards) and social and economic forces that influence disaster vulnerability and resilience. Students select four advanced coursework modules and complete a major Disaster Risk Science research project.

**Examination requirements:** All coursework modules are examinable through open-book and 3-hour written examinations; practicals, essays, reaction papers, projects and other assignments count 60% of the final mark for these modules in most instances. The Master's research project counts 50% of the overall assessment for the degree.

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**EGS6003W  PhD IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE**

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.

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**PBL6036F  ENVIRONMENTAL LAW FOR NON-LAWYERS**

*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):** A R 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 ten 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:** 2nd and 3rd, Tuesdays

**DP requirements:** Satisfactory attendance of lectures and completion of essays.

**Examination requirements:** Short assignment counts 10%, essay counts 40%, one 3-hour examination in June counts 50%.
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.

**Professor and Head of Department:**
C Harris, MA DPhil Oxon

**Chamber of Mines Professor of Geochemistry:**
A P le Roex, BSc Stell BSc (Hons) PhD Cape Town

**Philipson-Stow Professor of Mineralogy and Geology:**
M J de Wit, BSc (Hons) Dublin PhD Cantab

**Emeritus Professors:**
J J Gurney, BSc (Hons) PhD Cape Town FRSSAf
W E L Minter, BSc Cape Town PhD Wits

**Associate Professors:**
J S Compton, BA San Diego PhD Harvard
D L Reid, MSc Wellington PhD Cape Town
S H Richardson, BSc (Hons) Cape Town PhD MIT

**Senior Lecturers:**
A N Roychoudhury, MSc Dhanbad PhD Georgia Tech
G C Smith, MA Cantab

**Lecturers:**
C D Rowe, PhD Santa Cruz

**Senior Research Officer:**
J Rogers, MSc PhD Cape Town

**Honorary Research Associates:**
H E Frimmel, PhD Vienna
H C Klinger, MSc Stell PhD Tubingen
R M Smith, MSc Wits PhD Cape Town

**Principal Scientific Officer:**
A Späth, MSc PhD Cape Town

**Senior Scientific Officers:**
R August, BSc (Hons) UDW MSc Natal
K Drost, PhD Dresden
P le Roux, PhD Cape Town

**Scientific Officer:**
F Rawoot, BSc UWC

**Administrative Officer (part-time):**
S Whitmore

**Senior Secretary:**
F Harribi

**SAP R/3 Administrator:**
J Butler

**Technical Assistant:**
P Sieas

**Thin Section Technicians:**
R Oliver
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, ion chromatograph, and X-ray diffraction equipment, a solution and laser ablation ICP-MS facility, 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 GIS work stations.

**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**

**ERT1000F  INTRODUCTION TO EARTH & ENVIRONMENTAL SCIENCES 1000**

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

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

**Entrance requirements:** Matric Physical Science or Biology or Geography on Higher Grade, or an 'A' on Standard Grade. Preference will be given to students registered in the Science Faculty.

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

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**Lectures:**
- Two lectures per week, Monday, Tuesday, Wednesday, Thursday, or Friday, 14h00-17h00.

**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.
Examination requirements: 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.

ERT1003H  FOUNDATIONS OF BIOLOGY, EARTH & ENVIRONMENTAL SCIENCES
A course for students on the General Entry for Programmes in Science (GEPS), providing a general introduction to the study of the earth and its living and non-living systems. For course details see entry under Department of Archaeology.

GEO1006S  INTRODUCTION TO MINERALS, ROCKS & STRUCTURE
Course co-ordinator(s): Professor C Harris
Entrance requirements: A minimum of 45% in ERT1000F or ERT1002S
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, 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.
Examination requirements: Class tests count 35%; field reports count 15%; one 2-hour theory examination written in November counts 50%. Subminimum of 40% is required in the theory examination paper.

GEO1007S  EARTH STEWARDSHIP
Note: This is a cross-disciplinary course intended for students of all faculties. Students who would like to learn more about how the Earth works and how Earth’s resources affect our lives and our future socio-economic welfare, are encouraged to attend.
Course co-ordinator(s): Professor M J de Wit
Entrance requirements: None
Course outline:
This course is divided into 3 sections:
1. Creating a habitable planet and analysing how Earth works as a gigantic recycling machine.
2. Managing habitable planet and evaluating Earth as a service industry.
3. Developing new robust contracts between (geo)science and society.
Topics include: Origin of the solar and Earth-Moon systems; geological (deep) time; origin, structure and history of Earth; introduction of rocks, minerals and soils; Earth systems and the rock cycle, the water cycle, the carbon cycle, the nitrogen cycle; origin and evolution of life and humans. Earth’s past punctuated record of extinctions, biodiversity collapses and recoveries; continental drift, plate tectonics and mountain building; snowball Earth and hothouse Earth; Earthquakes, volcanic eruptions, meteorite impacts and other natural disasters; exploring for and exhumation of Earth’s resources; greenhouse gases and global warming; economics of exhaustible resources; socio- and political-issues in the geoscience arena; energy needs and resource conflicts in Africa; landscapes and manscapes of Africa.
Period
Mon Tue Wed Thu Fri
Lectures:  5  5  5  5  5
Practicals: By arrangements on the website.

DP requirements: An aggregate of 30% for term assignments, attendance on field trip.
Examination requirements: Term assignments count 40%; a 3-hour November examination counts 60%.

Second-Year Courses

GEO2001F MINERALOGY & CRYSTALLOGRAPHY
Course co-ordinator(s): Associate Professor S H Richardson
Entrance requirements: ERT1000F (or ERT1002S) and GEO1006S, first qualifying course in Chemistry.
Course outline:

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.
Examination requirements: Marked class work, including tests, count 20%; one 2-hour practical examination written in June counts 35%; one 2-hour theory paper written in June counts 45%. Subminima of 40% are required in practical and theory examination.

GEO2004S PHYSICAL GEOLOGY
Course co-ordinator(s): Dr J Rogers
Entrance requirements: GEO2001F
Course outline:

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.
Examination requirements: 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)
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/southern Namibia, three days in Southwestern Cape, nine days in southern Cape.
DP requirements: Attendance at all field camps.
Examination requirements: Maps and reports count for 70%; three 2-hour practical examinations in June and November count for 30%.

Third-Year Courses

GEO3001S  STRATIGRAPHY & ECONOMIC GEOLOGY
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.

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<td>Practical:</td>
<td>Two practicals per week, Tuesday and Thursday, 14h00-17h00.</td>
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<td>DP requirements:</td>
<td>An average of 30% in all marked class work and class tests.</td>
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<td>Examination requirements:</td>
<td>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.</td>
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GEO3005F  PETROLOGY & STRUCTURAL GEOLOGY
Course co-ordinator(s): Dr C D Rowe
Entrance requirements: GEO2001F, GEO2004S, first qualifying course in Chemistry
Course outline:
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### Lectures:
Two practicals per week, Tuesday and Thursday, 14h00-17h00.

### Practical Requirements:
- Attend 80% of practicals and an average of 30% in all marked class work and tests.

### Examination Requirements:
- 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.

## Postgraduate Courses

### GEO4000W  BSc (HONS) IN GEOLOGY

**Course co-ordinator(s):** Professor C Harris

**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. An average of 60% or higher in the four senior semester courses in Geology is the normal prerequisite for admission for Science graduates; industry-based experience will be taken into account.

**Course Outline:**
Students are required to elect one of three streams of study - General Geology, Geochemistry or Petroleum Geology. A selection of compulsory and elective modules are available for each stream, and would normally include the following: Analytical Geochemistry, Applied Geophysics, Petroleum Sedimentology (offered at the University of Stellenbosch), Economic Geology, Igneous Petrology, Isotope Geochemistry, Mantle Petrology, Marine Geology, Marine Geochemistry, Marine Geology, Metamorphic Petrology, Petroleum Geology (offered at the University of the Western Cape), Sedimentology, 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.

**Examination Requirements:**
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 of 40% are required for overall exam mark and research project.

### GEO4001W  BSc (HONS) IN GEOCHEMISTRY

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

### GEO5000W  MSc IN GEOLOGY

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

### GEO5003W  MSc IN GEOCHEMISTRY

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

### GEO6000W  PhD IN GEOLOGY

Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.
GEO6001W PhD IN GEOCHEMISTRY
Prospective candidates are referred to the rules for the PhD degree in Book 3, General Rules and Policies.
The division of Geomatics is part of the Faculty of Engineering and the Built Environment. Geoinformatics is only offered as a specialisation for the BSc degree when taken in conjunction with another SB012 specialisation or with SB006 Applied Computing.

The Department is housed in the Menzies Building.
Telephone (021) 650-2675 Fax (021) 650-3572
The Departmental abbreviation for Geomatics Division is APG.

Emeritus Professor:
H Rüther, Dipl-Ing Bonn PhD Cape Town PrS(SA) FRSSAf

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

Senior Lecturers:
G Sithole, BSc Surveying (Hons) Zimbabwe MSc IGP ITC (NL) PhD TUDelft (NL) Zimbabwe
J L Smit, BSc (Surveying) PhD Cape Town
J F Whittal, BSc(Surv) MSc(Eng) Cape Town PrL(SA) MSAGI

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

Technical Officer:
P Chifamba

Senior Secretary:
S Shaffie

Laboratory Attendant:
S Smith

Undergraduate Courses

First-Year Courses

APG1016S GEOMATICS 1

Course co-ordinator(s): To be advised

Entrance requirements: APG1015F or CSC1015F or equivalent

Course outline:
Course aims: To provide a foundation in geomatics as a measurement science by introducing key concepts, instrumentation, techniques and conventions in the discipline.
Course Content: Introduction to geomatics, measurement as a science, spatial reference systems, use of computing software, information management and remote sensing, data acquisition instrumentation and techniques, representation of spatial data, setting out works, areas and volumes, profiles.

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<td>Practicals:</td>
<td>One practical per week, Wednesday 6th to 8th period.</td>
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<td>Assessment:</td>
<td>Tests, Practical Assignments, 3-hour Examination (sub minimum 40%).</td>
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<td>DP requirements:</td>
<td>Completion of practical assignments to the satisfaction of the course convenor.</td>
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Second-Year Courses

APG2014S  GEOMATICS II
Course co-ordinator(s): Associate Professor C Merry
Entrance requirements: APG1015F or CSC1017F or CSC1015F or CSC1018F, MAM1003W or MAM1000W, APG1016S

Course outline:
Course Aims: This course builds further upon the introduction to co-ordinate systems provided in Geomatics I, and extends it to cover co-ordinate transformations, 3-D co-ordinate systems and time variations. The student is also introduced to the method of least squares as a means of solving over-determined systems of equations, with applications in co-ordinate transformations.
Course Content: Introduction to error theory and error propagation, method of least squares - parametric case, software applications in Geomatics, two-dimensional co-ordinate systems, motions of the Earth, time, satellite orbits, three-dimensional co-ordinate systems.

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Lectures: One practical per week, Monday 6th to 8th period.
Assessment: Tests, practical assignments, 3-hour examination (sub minimum 40%).

DP requirements: Completion of practical assignments to the satisfaction of the course convenor.

APG2026F  ELEMENTARY SURVEYING
Course co-ordinator(s): Dr G Sithole
Entrance requirements: STA1001F or MAM1003W, or MAM1004F and STA1000S, or equivalent

Course outline:
Course Aims: This course is designed to provide understanding of graphical and spatial concepts and skills of plane surveying for students of the built environment who are not intending to study higher courses in surveying. To teach problem solving skills in relation to practical surveying problems. To equip the student with group work and technical report writing skills.
Course Content: The content of the course includes the South African co-ordinate system; introduction to reduction of observations to a reference surface and projection to a mapping surface. Joins, Polars, error, traversing, theodolite and level instruments and their calibration, height determination by levelling and trigonometric heighting, distance measurement, tacheometry and map creation and interpretation, GIS as a tool for representation and analysis of spatial data, construction surveying: setting out of horizontal works and vertical alignment, calculation of volumes from plan, introduction to GPS as a data collection tool.

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Lectures: One practical per week, Monday 1st to 4th period.
Assessment: Tests, practical assignments, 3-hour examination (sub minimum 40%).

DP requirements: Completion of practical assignments to the satisfaction of the course convenor and a test average of 35% or more.

APG2015F  GEOGRAPHIC INFORMATION SYSTEMS I
Course co-ordinator(s): Dr J Smit
Entrance requirements: CSC1015F or CSC1017F or CSC1018F or APG1015F, MAM1000W or MAM1003W or (MAM1004F with STA1000S), APG1016S
Course outline:
Course Aims: To provide knowledge and skills in the fundamental concepts of geographic information systems and remote sensing.
Course Content: GIS concepts, spatial relationships, topology, spatial and non-spatial data structures and algorithms, vector databases, raster data structures, data capture for raster GIS, spatial analysis using the raster data model, relational database management systems, data modelling, data display and presentation, theory of map projections.

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<td>Practical:</td>
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Assessment: Tests, practical assignments, 3-hour examination (sub minimum 40%)

DP requirements: Completion of practical assignments to the satisfaction of the course convenor (test average of 35% or more).

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APG2018X  GEOGRAPHIC INFORMATION SYSTEMS CAMP

Course co-ordinator(s): To be advised

Entrance requirements: APG1016S, APG2015F or equivalent (co-requisite)

Course outline:
Course Aims: To consolidate knowledge and skills learnt in the course GIS I. To further teach problem solving skills in relation to practical GIS problems, and to equip the student with group work skills and engender tolerance of diversity.
Course Content: This 1-week camp is structured to teach problem solving skills in relation to practical spatial data management challenges in the GIS environment. Groups are made up of students who will work together in a simulated project environment. The camp covers the basic steps of GIS project planning with a focus in project layout, data acquisition, needs analysis, user requirements, system implementation and maintenance. The successful team will present a GIS solution to a spatial project, showing the project layout, data acquisition, needs analysis, user requirements.

Assessment: Project 100%

DP requirements: Completion of practical assignments to the satisfaction of the course convenor

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Third-Year Courses

APG3011F  GEOGRAPHIC INFORMATION SYSTEMS II

Course co-ordinator(s): Dr J Smit

Entrance requirements: CSC1015F or CSC1017F or CSC1018F, APG2015F or equivalent, APG2018X

Course outline:
Course Aims: This course builds on the theory developed in the GIS I course. By the end of this course the student should have developed the knowledge and skills required to design and implement specialised GIS applications and an understanding of the theory, capabilities and limitations of various spatial analysis and optimisation techniques that are currently applied in the business of GIS. Furthermore the student should be aware of graphic design and presentation methods and have a grasp of the algorithms that are used in digital mapping. Certain legal and management issues are also addressed.
Course Content: multidimensional GIS and advanced data structures, spatial data infrastructures and metadata, distributed GIS, digital cartography, GIS application design and development using software engineering tools, GIS project management, spatial analysis, copyright and privacy issues.
APG3012S GEOMATICS III
Course co-ordinator(s): Dr G Sithole

Entrance requirements: APG1015F or CSC1017F or CSC1015F and APG1016S and MAM1000W or MAM1003W

Course outline:
Course Aims: To provide the fundamental knowledge and skills in photogrammetry. To teach problem solving skills in relation to practical spatial data acquisition. To equip the student with group work skills.

Course Content: Basic mathematics of photogrammetry, stereo photogrammetry, orientation techniques, relative orientation, absolute orientation, collinearity, complanarity, bundle adjustment, DLT, camera calibration, image measurement and co-ordinate refinement, introduction to digital photogrammetry. Aerotriangulation and close range network design. DTM production, rectification, ortho-rectification, mosaicing and automation in digital photogrammetry, laser scanning.

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Practicals: One practical per week, Monday 6th to 8th period.
Assessment: Tests, practical assignments, 3-hour examination (sub minimum 40%)

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

APG3016C SURVEYING II
Course co-ordinator(s): Ms J Whittal

Entrance requirements: APG1016F and APG2015F; for BSc Geomatics students APG2016W is also a prerequisite

Course outline:
Course Aims: To provide insight into the origins of the surveying discipline. To introduce some specialised instruments and methods used currently. To equip the student with a theoretical and working knowledge of satellite positioning methods. To further equip the student with group work, technical report writing, research, oral presentation, and problem solving skills, and to encourage critical enquiry.

Course Content: The history of surveying in southern Africa is self-taught through reading and assessed by essay; two lectures will be delivered on essay writing and related skills. Some additional surveying instrumentation/methods not mentioned in pre-requisite courses are introduced, and students are expected to research and present a 20-minute seminar on a surveying technique, interesting surveying equipment, or a surveying project. Surveying with the global positioning system is covered in detail and consists of 80% of the course.

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Practicals: One practical per week, Wednesday 6th to 8th period.
Assessment: Tests, practical assignments/seminars, 1.5-hour examination (sub minimum 40%)

DP requirements: Completion of all assignments with an average of 50%; 35% average test mark.
APG3020X  SPATIAL DATA ANALYSIS PROJECT
Course co-ordinator(s): Dr J Smit
Entrance requirements: APG2015F or equivalent, APG3011F or equivalent (co-requisite)
Course outline:
Course Aims: To provide practical experience in processing, management, analysis and representation of spatial data.
Course Content: This will vary from project to project, but will be at an advanced level. The project may include (but is not limited to) acquisition, manipulation and management of spatial data, data analysis and representation, analysis of off-the-shelf software packages, and programming.
Assessment: Project 100%
DP requirements: Completion of project to the satisfaction of the course convenor.

APG4004A  REMOTE SENSING
Course co-ordinator(s): To be advised
Prerequisites: APG1015F or CSC1015F or CSC1017F, APG1016S, APG2015F or equivalent
Course outline:
Course Aims: To broaden the knowledge of remotely sensed imagery and its use in spatial information systems. To equip the student with problem solving skills for application in remote sensing.
Course Content: The concept of computer processing of remote sensing images: image morphological operations, digital image processing, physical principles of remote sensing, spatial statistics prediction and simulation, classification and spatial sampling schemes. Remote Sensing and Decision Support Systems.
Period
Mon Tue Wed Thu Fri
Lectures: 1 1 1 1 1 first quarter only
Practicals: One practical per week, Thursday 6th to 8th period.
Assessment: Tests, practical assignments, 1.5-hour examination (sub minimum 40%)
DP requirements: Completion of practical assignments to the satisfaction of the course convenor.
DEPARTMENT OF HUMAN BIOLOGY

The Department of Human Biology is part of the Faculty of Health Sciences. Physiology is only offered as a specialisation (SB013) for the BSc degree when taken in conjunction with another SB013 specialisation.

The Department is housed in the Anatomy Building, Medical School
Telephone (021) 406-6235
The Departmental abbreviation for Human Biology is HUB.

Professor and Head of Department
S H Kidson, BSc (Hons) MSc PhD Wits HDE (JCE)

Hyman Goldberg Professor of Biomedical Engineering:
C L Vaughan, BSc (Hons) Rhodes PhD Iowa

Discovery Health Chair of Exercise and Sports Science:
T D Noakes, MBChB MD DSc Cape Town FACSM

Professors:
E V Lambert, BSc (Agric) Natal BA (Phys Ed)(Hons) Rhodes MSc South Carolina PhD Cape Town
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:
E W Derman, MBChB Pret BSc Med (Hons) PhD Cape Town FACSM
M I Lambert, BSc (Agric) Natal BA (Phys Ed)(Hons) Rhodes MSc South Carolina PhD Cape Town
G J Louw, DVSc Pret

Senior Lecturers:
R Alexander, PhD Cape Town
A N Bosch, BSc Natal BA (PhysEd)(Hons) MA Rhodes PhD Cape Town
T S Douglas, BSc (Eng) Cape Town MS Vanderbilt PhD Strathclyde
L A Kellaway, MSc PhD Cape Town
D M Lang, Dr rer Nat Konstanz
E Ojuka, BSc ME (Makerere) PhD Bingham Young
D Querido, MSc PhD Cape Town
C P Slater, MBChB Cape Town FFRad(T) SA
E L van der Merwe, Nat Dip Med Tech Cape Town, BSc (Med) Hons MSc Cape Town
C Warton, MBChB Rhodes LRCP MRCS London

Senior Lecturer and Chief Medical Officer:
D A Boonzaier, MBChB Cape Town DIC London

Senior Lecturer and Principal Biomedical Engineer:
M A J Poluta, BSc (Eng) Wits

Honorary Senior Lecturer and Senior Scientist:
M R Collins, BSc(Hons) Stell PhD Cape Town

Lecturers:
E Badenhorst, BA(Hons) Stell
G Gunston, MBChB Cape Town
S Prince, PhD Cape Town
W Viljoen, PhD Cape Town

Honorary Lecturers:
J de Beer
S Meltzer
K Murphy
E Nunziata MSc London

Senior Scientific Officers:
G de Bie, BSc Rhodes BSc(Hons) UOFS
M P Phillips, BSc Cape Town
Principal Technical Officer:
B Dando Dip Med Tech

Chief Technical Officers:
B Möhr, BSc Cape Town
T Wiggins, Dip Med Tech BSc(Med)(Hons) Cape Town

Senior Technical Officers:
C Harris
A M Mkize, BSc Zululand M.Tech ML Sultan Technicon
C Powrie, BA HDE Dpl Adv Adusl Edu Cape Town
B Young, Dip Med Tech Nat Dip Hort

Technical Officers:
I Fakier

Undergraduate Courses

Second-Year Courses

**HUB2019F**  INTRODUCTION TO HUMAN BIOLOGY

*NOTE: Entrance is limited to 60 students.*

**Course co-ordinator(s):** Dr E Ojuka

**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, urin ary and nervous systems. The course includes the study of homeostasis, the chemistry of life, membranes, electrophysiology, nutrition and metabolism.

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<td>Fridays may be used for tutorials, guest lectures and tests.</td>
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**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

**Examination requirements:** Class tests count 20%; assignments count 10%; practicals count 20%; examinations (theory and practical) count 50%. An oral examination may be required in the case of selected students.

**HUB2021S**  HUMAN BIOLOGY : MAINTENANCE & INTEGRATION

*NOTE: Entrance is limited to 60 students.*

**Course co-ordinator(s):** Dr R Alexander

**Entrance requirements:** HUB2019F, CEM1000W (or equivalent)

**Course outline:**

The course contains lectures and tutorials on the physiology, anatomy and histology of organ systems in the human body including the endocrine, nervous, reproductive, cardio respiratory, immune and excretory systems. In practical sessions, students work in small sessions to a) study the electrical, mechanical and chemical events in the contraction of skeletal and cardiac muscles using the oscilloscope and other electronic equipment, b) learn various principles of measuring the activities and concentration of enzymes and hormones c) study anatomical parts of the human body from cadavers and histological sections under a microscope.
DEPARTMENT OF HUMAN BIOLOGY

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Fridays may be used for tutorials, guest lectures and tests.

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

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

Examination requirements: Class tests count 20%; assignments count 10%; practicals count 20%; 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
Course co-ordinator(s): Professor V A Russell, Dr 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.

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Lectures: | 1   | 1   | 1   | 1   | 1   |

Practicals: One practical per week, 14h00-17h00 Wednesdays and Thursdays. 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.

Examination requirements: Class tests count 20%; assignments count 10%; practicals count 20%; examinations (written and practical) count 50%. An oral examination may be required in the case of selected students.

NOTE: A student may not count more than three full courses or the equivalent from the set HUB2019F and HUB2013S, HUB3006F, HUB3007S, HUB3002S and RAY2001W towards the senior courses required for the degree.

HUB3007S BIOPHYSICS & NEUROPHYSIOLOGY
Course co-ordinator(s): Professor V A Russell
Entrance requirements: HUB2021S, CEM1000W (or equivalent)
Course outline:
Advanced lectures on topics on neuroscience, such as: electrophysiological techniques, membrane physiology, neural communication, reticular formation, motor systems, vision, pain, hypothalamus, biorhythms, learning and memory, development of nervous system imaging.

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Lectures: | 1   | 1   | 1   | 1   | 1   |

Practicals: One practical per week, 14h00-17h00 Wednesdays and Thursdays. 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.
**Examination requirements:** Class tests count 20%; assignments count 10%; practicals count 20%; examinations (theory and practical) count 50%. An oral examination may be required in the case of selected students.

*NOTE:* A student may not count more than three full courses or the equivalent from the set HUB2019F and HUB2021S, HUB3006F, HUB3007S, HUB3002S and RAY2001W towards the senior courses required for the degree.

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**HUB3010F FUNCTIONAL ANATOMY & HISTOLOGY**

*NOTE:* This course will not be offered in 2008.

**Course co-ordinator(s):** Professor A Morris

**Entrance requirements:** Suitable first-year courses (e.g. BIO1000F, BIO1004S) in Biological sciences. Students with Archaeological courses will also be considered.

**Course outline:**
Basic human anatomy, imaging, biomechanics, anthropometry and growth. Human embryology and histology.

**Lectures:** Four lectures per week.

**Tutorials:** One tutorial per week.

**Practicals:** One per week.

**Examination requirements:** Class mark counts 50%; June examination counts 50%.

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**HUB3011S COMPARATIVE ANATOMY & BIOLOGICAL ANTHROPOLOGY**

*NOTE:* This course will not be offered in 2008.

**Course co-ordinator(s):** Professor A Morris

**Entrance requirements:** Suitable first-year or second-year level courses in Biological or Archaeological sciences.

**Course outline:**
Overview of human anatomy from the perspective of what makes a human different to other species; humans and other primates; the human skeleton; anthropometry and growth; human variation; skeletal biology.

**Lectures:** Four lectures per week.

**Tutorials:** One tutorial per week.

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

**DP requirements:** Satisfactory completion of practicals and assignments.

**Examination requirements:** Course work counts 50%; examinations count 50% (theory and practical).

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**Postgraduate Courses**

**HUB4040W BSc (HONS) IN PHYSIOLOGY**
See Faculty of Health Sciences Handbook.

**HUB4000W BSc (HONS) IN CELL BIOLOGY**
See Faculty of Health Sciences Handbook.

**HUB4002W BSc (HONS) IN APPLIED ANATOMY**
See Faculty of Health Sciences Handbook.

**HUB4001W BSc (HONS) IN BIOLOGICAL ANTHROPOLOGY**
See Faculty of Health Sciences Handbook.
HUB4041W  BSc (HONS) IN EXERCISE SCIENCE
See Faculty of Health Sciences Handbook.

HUB5004W  MSc IN PHYSIOLOGY
**Entrance requirements:** HUB4040W BSc (Hons) in Physiology

**Course outline:**
A research project must be carried out in the field of physiology and the results presented in the form of a dissertation. In addition, an oral examination may be required.
General rules for this degree may be found in the front of the handbook.

HUB6001W  PhD IN PHYSIOLOGY
**Course outline:**
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 field of Physiology.
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.

Associate Professor and Head of Department:
C R A Gilmour, MSc PhD Cape Town

South African Research Chair in Computational Mechanics:
B D Reddy, BSc(Eng) Cape Town, PhD Cantab FRSSAf

Professors:
IV Barashenkov, MSc Moscow PhD Dubna
D S Butterworth, MSc Cape Town PhD London
P K S Dunsby, BSc PhD London
G Janelidze, MSc PhD Tbilisi Georgia DSc St Petersburg
H P A Künzi, MSc PhD Berne

Visiting Professor and Principal Research Officer:
P A Whitelock, PhD London

Emeritus Distinguished Professor of Complex Systems:
G F R Ellis, BSc (Hons) BCom (Hons) Cape Town PhD Cantab DSc (hc) 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

Associate Professors:
B A Bassett, MSc Cape Town PhD Trieste
V Brattka, PhD Hagen, Germany
C W Hellaby, BSc (Hons) St Andrews MSc PhD Queen's (Ontario)
A B Ianovsky, MSc Sofia PhD Dubna
T G Myers, BSc (Hons) Leicester PhD Leeds

Emeritus Associate Professor:
R W Cross, MA St Andrews PhD London DSc London

Honorary Research Associate:
F D Richardson, BSc (Agric) Nottingham PhD London PhD Cape Town

Senior Lecturers:
P V Bruyns, MA Dphil Oxon LRSM MSc Cape Town
C A Clarkson, BSc (Hons) Edinburgh PhD Glasgow
J J Conradie, MSc Stell PhD Cantab
D T Gay, AB Harvard PhD Berkeley
F Ebobisse Bille, PhD Pisa
J L Frith, MSc PhD Cape Town
K R Hughes, BSc (Hons) PhD Cape Town PhD Warwick
H de G Laurie, BA Stell BSc Unisa BSc (Hons) PhD Cape Town
E E Plagányi-Lloyd, BSc Natal MSc PhD Cape Town
R N Prince, BSc (Hons) UWC MSc Cape Town (CHED)
A N Rynhoud, MSc Cape Town
A Schauerte, BSc (Hons) Natal MSc Cape Town PhD McMaster

Lecturers:
NV Alexeeva, MSc Sofia PhD Cape Town
M L Archibald, MSc PhD Wits
K Bennie, BA(Hons) Natal MPhil Cape Town
T Chinyoka, MSc Zimbabwe PhD Virginia Tech
E Fredericks, BSc (Hons) MSc Wits
V Frith, MSc HDE Cape Town (CHED)
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 Formal 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, N R C Robertson, J H Webb, D L Wilcox)
- Financial Mathematics (R Becker, D L Wilcox)
- Cryptography (C S Swart, H Spakowski)
- Dynamical Systems (A B Ianovský)
- 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, T G Myers)
- Logic, Formal Aspects of Computer Science and Theory of Algorithms (V Brattka, H Spakowski)
- Low Dimensional Geometry and Topology (D T Gay)
- Mathematical Ecology (H de G Laurie)
- Mathematics Education (K Bennie, J J Conradie, G F R Ellis, J L Frith, V Frith, C R A Gilmour, H de G Laurie, R N Prince, K Rafel, A N Rynhoud, J H Webb)
- Nonlinear Dynamics and Mathematical Physics (I V Barashenkov, N V Alexeeva)
Number Theory, K-Theory and Higher Forms, Non-Commutative Geometry and Mechanics (K R Hughes, R N Prince, C S Swart)
Partial Differential Equations of Mechanics, Numerical Analysis, Dynamical Systems (B D Reddy)
Combinatorics, Analysis of Algorithms (M L Archibald)
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)
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:*

*Mathematical Physics:*
MAM1043H, MAM1044H, MAM2046W, MAM3040W with courses in Physics, Astronomy and Mathematics.

*Biomathematics and Life Sciences:*
MAM1043H, MAM1044H, STA1006H, MAM2046W, MAM2043S, MAM3042H, 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
NOTE: This course can be taken in conjunction with MAM1044H or STA1006H because lectures are arranged so that this is possible.

Course co-ordinator(s): To be advised
Entrance requirements: MAM1000W (corequisite), or already have an equivalent knowledge of Mathematics.

Course outline:
Programming in a higher level computing language (Matlab or Octave), numerical methods, introduction to dynamical systems, modelling and simulation of discrete and continuous processes. Exposure to research methodology.

Lectures: First Semester: 2nd period Monday, Wednesday, Friday. Second Semester: 2nd period Monday, Wednesday.
Practicals: One practical every second week, Friday, 6th and 7th periods.

DP requirements: A class record of 30% or more.
Examination requirements: Class record counts up to 33%; one no longer than 3-hour paper written in October/November makes up the balance.

MAM1044H  DYNAMICS
NOTE: This course can be taken in conjunction with MAM1043H because lectures are arranged so that this is possible.

Course co-ordinator(s): To be advised
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 Tuesday, Thursday, Friday.
Practicals: One practical every second week, Friday, 6th and 7th periods.
DP requirements: A class record of 30% or more.
Examination requirements: 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

Course co-ordinator(s): To be advised
Entrance requirements: MAM1004F or MAM1004H or MAM1005H

Course outline:

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Tutorials: One tutorial per week, Friday, 6th and 7th periods, plus an alternative day as chosen by class.
**DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS**  

**DP requirements:** Minimum of 30% in class tests.  
**Examination requirements:** Class record counts 35%; 2-hour paper written in October/November counts 65%.

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**MAM2046W  APPLIED MATHEMATICS II**

**Course co-ordinator(s):** To be advised  
**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 2MM 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)
- **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)
- **2MM INTRODUCTION TO MATHEMATICAL MODELLING** (coded as MAM2044F for Engineering students)

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**Lectures:** One tutorial per week, Thursday, 14h00-16h00.  
** DP requirements:** A class record of 30% or more is required in each module of the course.  
**Examination requirements:** For each module the year mark counts 30% and one no longer than 2-hour examination paper counts 70%.

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**MAM2047H  APPLIED MATHEMATICS 2047**

**Course co-ordinator(s):** To be advised  
**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.
Examination requirements: Please refer to the MAM2046W examination requirement entry for the class record and exam weighting for each module.

MAM2048H  APPLIED MATHEMATICS 2048
Course co-ordinator(s): To be advised
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.
Examination requirements: Please refer to the MAM2046W examination requirement entry for the class record and exam weighting for each module.

MAM2052F  QUANTITATIVE SKILLS FOR SCIENTISTS
Course co-ordinator(s): To be advised
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 convenor. 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.

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Lectures: 4 4 4 4 4
Tutorials: Friday 3rd or Thursday 5th period.
DP requirements: A class record of 35% or more.
Examination requirements: Class record counts up to 40%; one no longer than 2-hour paper written in June makes up the balance.

Third-Year Courses in Applied Mathematics

MAM3040W  APPLIED MATHEMATICS III
Course co-ordinator(s): To be advised
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 3ND, 3FD, 3AN and 3GR. Modules 3AN and 3ND will be offered in the first semester, and modules 3FD, 3GR and 3MP in the second semester.

Syllabuses:
3MP METHODS OF MATHEMATICAL PHYSICS (coded as MAM3043S for Engineering students)
The Fourier-transform solution of linear PDEs on the line. The long-term asymptotic behaviour of solutions: the methods of Laplace, stationary phase and steepest descents. Nonlinear waves: the

3ND NONLINEAR DYNAMICS (-coded as MAM3052F for Engineering students)


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


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.

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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.

Examination requirements: For modules 3GR and 3FD the year mark counts 25% and the examination counts 75%. For modules 3MP, 3AN and 3ND, the year mark counts 35% and the examination counts 65%. The papers for module 3AN and 3ND 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 III (half course)

Course co-ordinator(s): To be advised

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.

Examination requirements: Please refer to the MAM3040W examination requirements entry for the class record and exam weighting for each module.

MAM3042H FURTHER BIOLOGICAL MODELLING

Course co-ordinator(s): To be advised

Entrance requirements: MAM2043S
Course outline:
Biological modelling concepts introduced in MAM2043S are extended: age-structured models including Leslie matrices, bioeconomic harvesting theory, diffusion, statistical power testing, introduction to generalised linear models and numerical methods.

Lectures: Average of two and a half per week, to be arranged.
Tutorials: One every two to three weeks, to be arranged.

DP requirements: A class record of 30% or more.
Examination requirements: Class record counts 35%; 2-hour paper written in October/November counts 65%.

MAM3048H APPLIED MATHEMATICS 3048

Course co-ordinator(s): To be advised
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.

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.
Examination requirements: Please refer to the MAM3040W examination requirements for the class record and exam weighting for each module.

Undergraduate Courses in Mathematics

First-Year Courses in Mathematics
One full course in Mathematics is offered in the Science Faculty in 2008, MAM1000W. (The full course MAM1002W is intended for Business Science students and the full course MAM1003W for Engineering students. Details of these can be found in the Handbooks for the Faculties of Commerce and 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. No student may register for more than one of MAM1000W, MAM1004F, MAM1004H, MAM1005H and MAM1006H simultaneously.
The course STA1001F/S carries no credit in the Faculty of Science. 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 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 MAM1000W, MAM1004F, MAM1005H and MAM1006H are encouraged to go there for help with their mathematics problems.

MAM1000W MATHEMATICS I

Course co-ordinator(s): To be advised
Entrance requirements: Registration for MAM1000W in February will be provisional, and will only be confirmed at the beginning of the second quarter. A pass in Mathematics with at least 50% on the Higher Grade (or at least a D symbol at A-level) is normally required for such provisional registration. Students who have not reached a satisfactory level (to be defined at the beginning of the course) at the end of the first quarter will have their provisional registration for MAM1000W cancelled, but will be allowed to register for MAM1005H at the beginning of the second quarter.
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.

Examination requirements: Year mark counts 33.3%; two no longer than 3-hour papers written in
October/November make up the balance.

MAM1004F  MATHEMATICS 1004
Course co-ordinator(s): To be advised

Entrance requirements: Any student unconditionally admitted to the Science Faculty will
automatically be admitted to MAM1004F. Registration for MAM1004F in February will be
provisional, however, and will only be confirmed at the beginning of the second quarter. A pass in
Mathematics on the Higher Grade or a pass with at least 80% at the Standard Grade (or at least an E
symbol at A-level) is normally required for such provisional registration. Students who have not
reached a satisfactory level (to be defined at the beginning of the course) at the end of the first
quarter will have their provisional registration for MAM1004F cancelled, but will be allowed to
register for MAM1004H (see below) at the beginning of the second quarter. Students who have been
admitted to MAM1004F without a background of Higher Grade Mathematics are expected to make
up the difference between the syllabuses for themselves.

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

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<td>DP requirements:</td>
<td>Minimum of 30% in class tests, and at least 80% attendance at tutorials.</td>
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</tbody>
</table>
| Examination requirements: | Year mark counts up to 40%; one no longer than 3-hour paper written in
June makes up the balance. |

MAM1004H  MATHEMATICS 1004
Course co-ordinator(s): To be advised

Entrance requirements: MAM1004H starts at the beginning of the second quarter. Admission to
MAM1004H is normally restricted to those students who have not achieved a sufficiently high
standard in MAM1004F. (See entrance requirements for MAM1004F.) In special cases (with
approval of the relevant student adviser) students may be permitted to register for MAM1004H
without first registering for MAM1004F, and will be subject to the usual entrance requirements for
MAM1004F.

Course outline:
This course is intended for students who would otherwise register for MAM1004F, but who are not
likely to pass that course by the end of the first semester. The syllabus is the same as for
MAM1004F, but is spread over two semesters.

Lectures: Three lectures per week, days to be arranged, in Meridian.

Tutorials: By arrangement.

DP requirements: As for MAM1004F.
Examination requirements: Year mark counts up to 40%; one no longer than 3-hour paper written in October/November makes up the balance.

MAM1005H  MATHEMATICS 1005
Course co-ordinator(s): To be advised
Entrance requirements: A pass in Mathematics at the Higher Grade or a pass with at least 80% at the Standard Grade (or at least an E symbol at A-level). All students admitted to the General Entry for Programmes in Science must register for MAM1005H. In addition, students attending the full-year courses in Mathematics may be placed onto MAM1005H at the end of the first quarter. Other students who meet the entrance requirements will be permitted to register for MAM1005H as long as there is capacity on the course, and such students must have their registration approved by the Student Adviser for their programme, as well as the course co-ordinator for MAM1005H. The Dean may in special cases allow students who do not meet the entrance requirements to register for MAM1005H.
Course outline:
Differential and integral calculus of functions of one variable.

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<tbody>
<tr>
<td>Lectures:</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tutorials:</td>
<td>Friday, 1st period.</td>
<td>Workshops:</td>
<td>Monday, 6th and 7th period.</td>
<td></td>
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</tbody>
</table>

DP requirements: Minimum of 35% for class record and very satisfactory attendance at all lectures, workshops and tutorials.
Examination requirements: Year mark counts up to 40%; one 2-hour paper written in October/November makes up the balance.

MAM1006H  MATHEMATICS 1006
Course co-ordinator(s): To be advised
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 were 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.
Examination requirements: Year mark counts up to 40%; one 2-hour paper written in October/November makes up the balance.

Second-Year Courses in Mathematics
MAM2000W  MATHEMATICS II
Course co-ordinator(s): To be advised
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. Credit will not be given for module 2AC if a student has completed MAM2046W in 2003 or earlier.
5. Credit will not be given for module 2DE if a student has completed MAM2046W or MAM2047H or is currently registered for MAM2046W or MAM2047H.
6. 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.

Lectures: 5th period Monday to Friday. Some modules in 4th period, but 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.
Examination requirements: 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 is a half-course in Mathematics at second-year level. It is the minimum requirement for students in the Computer Science stream of the Information Technology programme, but such students are encouraged to register for the full course MAM2000W instead.
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): To be advised
Entrance requirements: MAM1000W (or equivalent).
Course outline:
Each half course consists of two modules. Students in MAM2001H must take modules 2DS and 2FM. A student may register for a half course in the same year as MAM2000W or in a subsequent year.
Lectures: For MAM2001H: 4th period Monday to Friday. For MAM2004H, 2002S: 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.
Examination requirements: As for MAM2000W except that the examination consists of two 2-hour papers.

Modules for Second-Year Courses

<table>
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<tr>
<th>Module</th>
<th>Description</th>
<th>Semester</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>2AC</td>
<td>Advanced Calculus</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2DE</td>
<td>Differential Equations</td>
<td>2</td>
<td>Modules 2AC and 2LA</td>
</tr>
<tr>
<td>2DS</td>
<td>Discrete Structures</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2FM</td>
<td>Fourier Methods</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>2HI</td>
<td>History of Mathematical Ideas</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>2IA</td>
<td>Introductory Algebra</td>
<td>2</td>
<td>Module 2LA</td>
</tr>
<tr>
<td>2LA</td>
<td>Linear Algebra</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2RA</td>
<td>Real Analysis</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>
Syllabuses


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.


2IA INTRODUCTORY ALGEBRA: Further Linear Algebra (projections, direct sums, spectral theorem, singular value decomposition, Cayley-Hamilton theorem). Introduction to groups, rings and fields. Applications to number theory, coding theory and geometry.


Third-Year Courses in Mathematics

MAM3000W MATHEMATICS III
Course co-ordinator(s): To be advised
Entrance requirements: MAM2000W.

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. A written project and short oral presentation will be a compulsory component of the 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.

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<tr>
<td>Lectures:</td>
<td>5</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Tutorials:</td>
<td>Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.</td>
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</table>

**DP requirements:** A class record of 30% or more and at least 50% for the project.

**Examination requirements:** 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-semmeister modules in October/November.

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**MAM3001W** MATHEMATICS 3001

**Course co-ordinator(s):** To be advised

**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.

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<td>Lectures:</td>
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<tr>
<td>Tutorials:</td>
<td>Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.</td>
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**DP requirements:** A class record of 30% or more.

**Examination requirements:** 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-semmeister modules in October/November.

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**MAM3002H and MAM3003S** MATHEMATICS 3002 & MATHEMATICS 3003

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):** To be advised

**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.

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<td>Lectures:</td>
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<td>5</td>
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<td>5</td>
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</tr>
<tr>
<td>Tutorials:</td>
<td>Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.</td>
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</table>

**DP requirements:** A class record of 30%.

**Examination requirements:** As for MAM3000W, except that the examination consists of two papers of up to 2 hours each.
Modules for Third-Year Mathematics Courses

<table>
<thead>
<tr>
<th>Module</th>
<th>Course Description</th>
<th>Semester</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AL</td>
<td>Algebra</td>
<td>1</td>
<td>Module 2IA</td>
</tr>
<tr>
<td>3CA</td>
<td>Complex Analysis</td>
<td>2</td>
<td>Module 2RA</td>
</tr>
<tr>
<td>3LC</td>
<td>Logic and Computation</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3MS</td>
<td>Metric Spaces</td>
<td>1</td>
<td>Module 2RA</td>
</tr>
<tr>
<td>3TA</td>
<td>Topics in Algebra</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>3TN</td>
<td>Topics in Analysis</td>
<td>2</td>
<td>Module 3MS</td>
</tr>
</tbody>
</table>

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: Intended to allow students who wish to apply for the MSc in Financial Mathematics to build a sound mathematical base for this Masters course.

Students registering for MAM3000W in 2008 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
MAM1002W Mathematics 1002

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT
MAM1003W Mathematics 1003
MAM1042S Engineering Statics
MAM1045S Modelling and Programming with MATLAB for Electrical Engineers
MAM2003Z Mathematics 2003
MAM2044F Introduction to Mathematical Modelling
MAM2050S Boundary-value Problems
MAM2053S Numerical Analysis and Scientific Computing
MAM2080W Mathematics 2080
MAM2082F Computer Programming in MATLAB
MAM3004Z Mathematics 3004
MAM3043S Methods of Mathematical Physics
MAM3049S Introduction to General Relativity
MAM3050F Numerical Modelling
MAM3052F Non-linear Dynamics
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 Sciences

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 for 2008. 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: To be advised.

MAM4000W BSc (HONS) IN MATHEMATICS

Course co-ordinator(s): To be advised

Entrance requirements: A BSc degree with MAM3000W. See the MAM3000W entry for recommended undergraduate modules.

Course outline:
Each module offered at Honours level carries a credit rating, and a minimum of 30 credits is required for the Honours degree. A module consisting of three lectures and one tutorial per week has a credit rating of four. Each student will be required to do a project (with a credit rating of three). 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, Topology, Algebraic Topology, Functional Analysis, Category Theory,

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: The aim of this stream is to allow students who wish to apply for the MSc in Financial Mathematics to build a sound mathematical base for this Masters course by doing appropriate modules in Mathematics, Applied Mathematics and Statistics, mostly (but not exclusively) at Honours level. Curricula must be approved by the Course Convenor. Students who have completed this stream may be allowed to do an MSc in Financial Mathematics, but may have to do additional work before being admitted to an MSc in Mathematics.

MAM4001W  BSc (HONS) IN APPLIED MATHEMATICS
Course co-ordinator(s): To be advised
Entrance requirements: A BSc degree with MAM3040W, or an equivalent course at the discretion of Head of Department.
Course outline:
A number of modules are offered at Honours level; these have a weighting of either one, one and a half, or two units, where one unit is equivalent to approximately 25 lectures. A complete Honours degree requires a total of at least 12 units, although students are encouraged to take 14 units rather than the minimum of 12. Among the modules which have been offered in recent years are: Advanced Mathematical Methods, Project, Seminar, Optimisation, Environmental Modelling, General Relativity and Cosmology, Continuum Mechanics. It is a requirement that all Honours curricula include the modules Advanced Mathematical Methods, 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 should include no fewer than 8 units from Applied Mathematics.

MAM4007W  BSc (HONS) IN MATHEMATICS OF COMPUTER SCIENCE
Course co-ordinator(s): Associate Professor V Brattka
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:
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 and a minor project for a sixth of the requirements for the course. 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.

MAM4008W  BSc (HONS) IN INDUSTRIAL MATHEMATICS
Course co-ordinator(s): To be advised
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 project. 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.

**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)
For course details see entry under Department of Astronomy.

**AST5003F** TAUGHT COMPONENT OF THE MSc IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme)
For course details see entry under Department of Astronomy.

**MAM5005W** DISSERTATION COMPONENT OF THE MSc IN ASTROPHYSICS & SPACE SCIENCE
Entrance requirements: AST5003F
Dissertation: Students will work on an approved research topic on which a dissertation must be presented.

**MAM5000W** MSc IN MATHEMATICS
Supervision of research towards the MSc 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** MSc IN APPLIED MATHEMATICS
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.

**MAM5002W and MAM5003W** MSc IN MATHEMATICS OF FINANCE
(by coursework and dissertation)
This programme is designed for students seeking employment in of financial markets, especially bond- and derivatives trading, risk measurement and management, quantitative finance and structured products. It develops, in a rigorous fashion, the mathematical and statistical techniques for developing, pricing and hedging modern financial instruments. The programme runs over two years, and is divided into two equally weighted components: Coursework (MAM5002W) and Dissertation.
DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

(MAM5003W). The coursework component is completed in a very intensive first year, whereas the second year is devoted to researching a topic of the student's choice, and writing up a dissertation. Visit http://www.mth.uct.ac.za/graduatestudies/financialmaths/ for more information. You can also download the Student Handbook which contains course outlines, lectures, times and venues, etc. Please note that the course is open to full-time students only.

Course co-ordinator(s): Professor R Becker

Entrance requirements: The programme is open to honours graduates in Commerce, Engineering and the Built Environment and Science. Candidates should, at the very minimum, have completed a second year level course in Mathematics, including linear algebra and advanced calculus or real analysis. Moreover, candidates should possess a high level of mathematical ability.

Course outline:
PRESCRIBED COURSEWORK MAM5002W:
Courses offered are:
The coursework component may vary from year to year.
DISSEPTION MAM5003W: Work on the dissertation starts at the end of the first year and must be completed in the second. Research will be on a topic of the student's choice, will typically be of a current interest in the theory of finance, have a practical application, and may involve significant interaction with financial institutions.

MAM6000W PhD IN MATHEMATICS
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
As for MAM6000W.
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 Rhodes BSc (Hons) PhD Cape Town

Professors of Biochemistry:
J M Farrant, BSc (Hons) PhD Natal
J P Hapgood, BSc (Hons) PhD Cape Town
G G Lindsey, BSc (Hons) PhD Sussex

Professors of Microbiology:
E P Rybicki, MSc PhD Cape Town
J A Thomson, BSc Cape Town MA Cantab PhD Rhodes

Emeritus Professor:
H Klump, Dr rer nat habil Freiberg Dipl Chem

Associate Professors:
V R Abratt, BSc (Hons) Rhodes PhD Cape Town
W F Brandt, BSc (Hons) PhD Cape Town
N Illing, MSc Cape Town DPhil Oxon
S J Reid, BSc (Hons) PhD Rhodes

Senior Lecturer:
C O’Ryan, BSc (Hons) PhD Cape Town

Lecturers:
P Meyers, BSc (Hons) PhD Cape Town
S Rafudeen, BSc (Hons), PhD Cape Town
L Roden, BSc (Hons) Wits PhD Cantab
J D E A Rodrigues, BSc (Hons) PhD Cape Town

Principal Scientific Officer:
P Thompson, BSc Cape Town

Chief Scientific Officers:
M Chauhan
A M Clennell, BSc Stell BSc (Hons) Cape Town
F Davids
M D James
T Millard, BSc Pretoria

Senior Scientific Officers:
A Lilelo, BSc (Hons) UWC
S Grové BSc (Hons) MSc Stell

Chief Technical Officers:
N Bredekamp
U R Mutzeck

Senior Technical Officer:
D September

Research Assistant/Technical Officer:
P Ma, MSc Cape Town

Finance Officer/Manager:
Y L Burrows

Administrative Assistants:
N Campbell
E J Liebenberg

SAP R/3 Administrator:
R Ferguson
RESEARCH IN MOLECULAR AND CELL BIOLOGY

The Department has interests and expertise in diverse areas of biology. Plant desiccation research (Professor Farrant, Associate Professors Brandt, Illing and Lindsey and Dr Rodrigues): the problem of desiccation in plants is being tackled by a combination of physiological and molecular approaches. Desiccation stress is also being investigated in yeast. Plant biotechnology (Professors Rybicki and Thomson and Drs Rafudeen and Roden): research is focussed on developing virus-resistant and drought-tolerant crops, and improving transgene expression. 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 (Professor Hapgood, Associate Professor Illing and Dr Roden): projects include regulation of transcription by steroid receptors, the role of chromatin modifications in regulating the onset of flowering, the regulation of gene expression during neuronal differentiation, the role that histone H1 plays in regulating gene expression in yeast, and the role of histone methylation in chromatin structure. 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 papillomaviruses, HIV and other viruses in plants and in insect cells for use as human and animal vaccines, and on the genetic diversity and molecular biology of single-stranded DNA viruses. Research in marine biotechnology (Associate Professor Coyne): includes studies on the immune response of the abalone (*Haliotis midae*), the bacteria involved in abalone nutrition, and the stress response system in the marine alga, *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 the fibre-degrading bacteria in the ostrich gut. South African soil and marine actinomycete bacteria are being screened for novel antibiotics. Analytical services (Associate Professor Brandt and Dr Rodrigues): the Department runs an analytical-biochemistry facility (amino acid analysis, DNA sequencing, DNA synthesis, MALDI mass spectrometry and protein sequencing) and a Microarray Facility (capar) (Associate Professor Illing).

Undergraduate Courses

*NOTE:* Oral examinations in place of supplementary examinations may be held outside of the examination period.

Second-Year Courses

**MCB2014F**  MOLECULAR COMPONENTS OF CELLS

*NOTE:* Entrance is limited to 140 students.

Course co-ordinator(s): Dr J Rodrigues

Entrance requirements: CEM1000W
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.

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

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

Examination requirements: Essays and tests count 40%; practicals count 10%; one 3-hour paper written in June counts 50%. Oral examinations may be held at the discretion of the department.

**MCB2015S METABOLISM**

*NOTE: Entrance is limited to 140 students.*

Course co-ordinator(s): Professor G Lindsey

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.

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

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

Examination requirements: Essays and tests count 40%; practicals count 10%; one 3-hour paper written in November counts 50%. Oral examinations may be held at the discretion of the department.

**MCB2016F INTRODUCTION TO MICROBIOLOGY**

*NOTE: Entrance is limited to 100 students.*

Course co-ordinator(s): Dr M S Rafudeen

Entrance requirements: CEM1000W, BIO1000F.

Course outline:
Prokaryote cell structure and function; bacterial growth and control; microbial diversity and taxonomy.

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

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

Examination requirements: Tests and essays count 40%; practicals count 10%; one 3-hour paper written in June counts 50%. Oral examinations may be held at the discretion of the department.
MCB2017S  MICROBIAL BIOTECHNOLOGY
Course co-ordinator(s): Dr P Meyers
Entrance requirements: MCB2016F
Course outline:
Microbial biotechnology; production of fine chemicals; basics of fermentation; water purification.

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MCB2018F  INTRODUCTION TO GENETICS
Course co-ordinator(s): Dr C O'Ryan
Entrance requirements: BIO1000F, BIO1004S, CEM1000W
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.

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MCB2019S  EUKARYOTIC GENE REGULATION & CELL SIGNALLING
Course co-ordinator(s): Associate 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: GPCRs, tyrosine receptors, steroid receptors, channels, signal transduction pathways, neurotransmission, plant receptors and signalling 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.

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

**DP requirements:** 40% test average; 50% average for assignments; attendance at all practicals.

**Examination requirements:** Tests and essays count 40%; practicals count 10%; one 3-hour paper written in November counts 50%. Oral examinations may be held at the discretion of the department.

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**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.*

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**MCB3012Z  RESEARCH PROJECT IN MOLECULAR & CELL BIOLOGY**

Course co-ordinator(s): Professor J Hapgood

**Entrance requirements:** MCB3019F or MCB3021F

**Course outline:**
Pairs 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

**Examination requirements:** Project counts 100%.

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**MCB3019F  RECOMBINANT DNA, GENOMICS & PROTEOMICS**

Course co-ordinator(s): Dr L Roden

**Entrance requirements:** Any two second year MCB courses, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)

**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.

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**Lectures:** One practical per week, Wednesday, Thursday or Friday, 14h00-17h00.

**DP requirements:** 40% test average; 50% average for assignments; attendance at all practicals.

**Examination requirements:** Tests and essays count 40%; practicals count 10%; one 3-hour paper written in June counts 50%. Oral examinations may be held at the discretion of the department.

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**MCB3020S  PROTEIN STRUCTURE & FUNCTION**

Course co-ordinator(s): Associate Professor W Brandt

**Entrance requirements:** MCB2001S or MCB2014F, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)

**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.

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**Lectures:**
DP requirements: 40% test average; 50% average for assignments.

Examination requirements: Tests and essays count 40%; one 3-hour paper written in November counts 60%. Oral examinations may be held at the discretion of the department.

MCB3021F  MOLECULAR MICROBIAL GENETICS

NOTE: Entrance is limited to 60 students.

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

Entrance requirements: MCB2016F or MCB2018F, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)

Course outline:

Bacterial genetics, recombination and repair, prokaryotic gene regulation.

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MCB3022S  ADVANCED BIOTECHNOLOGY

Course co-ordinator(s): Dr P Meyers

Entrance requirements: Any two 2nd year MCB courses, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)

Course outline:

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

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MCB3023S  MOLECULAR EVOLUTIONARY GENETICS & DEVELOPMENT

NOTE: This course will not be offered in 2008.

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

Entrance requirements: MCB2018F, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)

Course outline:

Molecular data used in evolutionary genetics; neutral theory of evolution; advanced population genetics; behavioural genetics; Principles of mouse molecular genetics applied to vertebrate eye and limb development; Evolution of development and genetics of morphological variation.

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

Examination requirements: Tests and essays count 40%; one 3-hour paper written in November counts 60%. Oral examinations may be held at the discretion of the department.
MCB3024S  DEFENCE & DISEASE
Course co-ordinator(s): Professor E Rybicki
Entrance requirements: Any two second year MCB courses, MAM1000W (or MAM1004F/H or MAM1005H and STA1007S or STA1000S)
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 viruses, such as HIV, and how they evade the immune system in order to infect their host. Finally, the course will focus on strategies to produce vaccines that enable immunity to viral infection.

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DP requirements: 40 % test average; 50 % average for assignments.
Examination requirements: Tests and essays count 40%; one 3-hour paper written in November counts 60%. Oral examinations may be held at the discretion of the department.

Postgraduate Courses

MCB4002W  BSc (HONS) IN MOLECULAR & CELL BIOLOGY
Course co-ordinator(s): Associate Professor S J Reid
Entrance requirements: BSc degree in one of the Molecular & Cell Biology specialisations.
Course outline:
Nine week techniques course including gel electrophoresis, ELISAS, recombinant DNA technology, radiation safety, PCR, sequencing, bioinformatics. Choice of modules in advanced topics in Biochemistry, Genetics & Development, Microbiology and Biotechnology. Five month research project.
DP requirements: Techniques examination 50% to continue course.
Examination requirements: Two 3-hour techniques examinations written in May count 15%; essays count 20%; oral presentations count 15%; one 4-hour examination written in November counts 10%; projects count 40%.

MCB5005W  MSc IN MOLECULAR & CELL BIOLOGY
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.

MCB5007W  DISSERTATION COMPONENT OF MSc IN STRUCTURAL BIOLOGY
Course co-ordinator(s): Associate Professor T Sewell
Entrance requirements: MCB5006W (offered for the last time in 2007)
Course outline:
This MSc level course in Structural Biology constitutes inter-disciplinary study in fields at the interface of biology and the physical sciences, that seeks an understanding of the functions of biological molecules such as proteins and nucleic acids in terms of their molecular structures. The MSc in Structural Biology will be offered jointly by the Universities of Cape Town and the Western Cape. It aims to provide a course that provides an in-depth training in theoretical aspects of Structural Biology, and includes a research project in an associated laboratory in academia or industry.
MCB5008W MSc IN BIOINFORMATICS
Course co-ordinator(s): Associate Professor C Seoighe

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
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:**
F A Shillington, BSc (Hons) Wits MSc PhD Cape Town

**South African Research Chair in Modelling of the Coupled Ocean-Land-Atmosphere Phenomena Related to Climate:**
S G H Philander, BSc (Hons) Cape Town PhD Harvard

**Professors:**
J R E Lutjeharms, MSc DSc Cape Town PhD Washington FRSSAf
C J C Reason, BSc (Hons) Cape Town MPhil City MSc PhD British Columbia

**Emeritus Professor of Physical Oceanography:**
G B Brundrit, BSc (Hons) PhD Manchester

**Honorary Professor in Oceanography:**
L V Shannon, MSc PhD Cape Town FRSSAf

**Senior Lecturer:**
H N Waldron, BSc (Hons) Swansea MSc PhD Cape Town

**Lecturer:**
I J Ansorge, BSc Plymouth MSc PhD Cape Town

**Senior Research Officer:**
M Rouault, MSc PhD Aix-Marseille

**Honorary Research Associates:**
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)
P M S Monteiro, MSc PhD Cape Town (CSIR)
G Siedler, PhD rer.nat Kiel

**Departmental Librarian:**
E Sithole, BSocSci P Dip LIS Cape Town

**Principal Technical Officer:**
P B Hanekom, BSc Cape Town

**Senior Scientific Officer:**
C Whittle, MSc Cape Town

**Diving Supervisor:**
P Truter, BSc Stell

**Administrative Officer:**
R Harris

**MARINE RESEARCH INSTITUTE (MA-RE)**

**Director:**
J G Field, BSc (Hons) PhD Cape Town FRSSAf

**Manager:**
E Balarin, BSc (Hons) Rhodes

**Administrative Assistant:**
H King

**RESEARCH IN OCEANOGRAPHY**

**Undergraduate Courses**

**Second-Year Courses**

In addition to forming part of the specialisations in Atmospheric Science and Ocean and Atmosphere Science, the undergraduate course SEA2003F in the Oceanography Department is intended for second- or third-year Science students specialising in related disciplines, with an interest in the marine environment.

---

**SEA2003F**  INTRODUCTORY PHYSICAL OCEANOGRAPHY & MARINE DISASTERS

**Course co-ordinator(s):** Dr I J Ansorge  
**Entrance requirements:** PHY1031F or PHY1032S or EGS1002S or ERT1000F (ERT1002H/S)  
**Course outline:**  

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**DP requirements:** Attendance at tutorials and practicals and a class mark of at least 40%.

**Examination requirements:** Tutorials/practicals and tests count 40%; one 3-hour paper written in June counts 60%.

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**SEA2002S**  COASTAL OCEANOGRAPHY

**Course co-ordinator(s):** Dr H N Waldron  
**Entrance requirements:** SEA2003F (or SEA2000F)  
**Course outline:**  
The study of the South African coastal ocean environment from the shore to the shelf edge. Wave and current dynamics; beach processes. Implications for biology and geology. Practical work in the field.

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**DP requirements:** Attendance at tutorials and practicals and a class mark of at least 40%.

**Examination requirements:** Tutorials/practicals and tests count 40%; one 3-hour paper written in November counts 60%.

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**Third-Year Courses**

**SEA3002F**  OCEAN CIRCULATION

**Course co-ordinator(s):** Professor F A Shillington/ Professor C J Reason  
**Entrance requirements:** MAM1004F or MAM1005H, PHY1031F or PHY1032S, SEA2003F, SEA2002S
Course outline:
The physical and dynamical basis of large-scale processes in the ocean. An overview of the ocean-atmosphere environment. Fundamental forces and balances, a framework for geophysical dynamics and circulation studies. Case studies of physical processes in practical situations.

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

DP requirements: Attendance at practicals and a class mark of at least 40%.

Examination requirements: Essays and midterm tests count 50%; one 3-hour paper written in June counts 50%.

Postgraduate Courses

SEA4001W  BSc (HONS) IN OCEAN & ATMOSPHERE SCIENCE
Course co-ordinator(s): Dr H N Waldron

Entrance requirements: A BSc degree with a major/specialisation in Ocean & Atmosphere Science.

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 "how to build a habitable planet".

Content: Lecture-tutorials (70%), seminars (20%) and practical work (10%) in advanced physical oceanography, meteorology and marine climatology, an introduction to earth systems science, including participation in a research cruise. First semester modules: physical properties of the ocean and atmosphere, large scale ocean and atmosphere, synoptic variability and South African regional dynamics of the ocean and atmosphere. 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, ocean waves and atmospheric convection processes. 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 and account for 30% of the grade. Students will be expected to present a seminar on their projects at the year's end.

Examination requirements: Essays and tests counts 70%; projects count 30%. Module assessment by submission of research portfolio.

SEA5000W  MSc IN OCEAN & ATMOSPHERE SCIENCE
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  MSc IN PHYSICAL OCEANOGRAPHY
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.

SEA5002H and SEA5003W  MSc IN APPLIED MARINE SCIENCE
(by coursework and dissertation)
This MSc programme is offered in Operational Oceanography. It is designed to attract students with proven quantitative skills from Science and Engineering and to provide them with expertise and experience in Operational Oceanography.

Course co-ordinator(s): Professor C J C Reason
Course outline:
Prescribed coursework: Students must complete a compulsory programme of introductory coursework in all aspects of Oceanography, including field work. This is followed by advanced coursework in observations, analysis, interpretation and forecasting in aspects of operational oceanography, supplemented by skills and professional practice.
Dissertation: A short research project must be completed and submitted for formal examination, which addresses a particular aspect of operational oceanography.

SEA6000W PhD IN PHYSICAL OCEANOGRAPHY
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.

Professor and Head of Department:
D G Aschman, BSc (Hons) Cape Town DPhil Oxon

Professor of Physics:
R D Viollier, dipl phys Basel Dr phil nat Basel FRSSAf

Professor of Theoretical Physics:
J W A Cleymans, MSc D en Sc Louvain FRSSAf

Emeritus Professors:
F D Brooks, DSc Rhodes
C A Dominguez, MSc PhD Buenos Aires FRSSAf
S M Perez, BSc (Hons) Wits DPhil Oxon

Associate Professors:
M S Allie, MSc PhD Cape Town (CHED)
D T Britton, MSc PhD London
A Buffler, MSc PhD HDE Cape Town (CHED)
C M Comrie, MSc Natal PhD Cantab
R W Fearick, BSc (Hons) PhD Wits

Emeritus Associate Professors:
J W F Juritz, MSc Cape Town
P E Spargo, BSc (Eng) MSc Wits Cert Ed Cantab FRSSAf
G N v d H Robertson, BSc (Hons) Cape Town DPhil Oxon

Senior Lecturers:
I Govender, BSc (Hons) PhD Cape Town HDE Unisa
A T M Muronga, MSc Cape Town PhD Minnesota
Z Z Vilakazi, MA PhD Wits (on long leave)

Lecturer:
M R Nchodu, MSc PhD Cape Town

Temporary Lecturers:
T S Volkwyn, MSc Cape Town
S M Wheaton, MSc PhD Cape Town

Part-time Lecturers:
G Leigh, HDE MSc Cape Town
C R Spargo, BSc (Hons) London Cert Ed Cantab

Senior Research Associate:
G B Tupper, MSc Berkeley PhD Oklahoma

Principal Technical Officer:
D Boulton

Chief Technical Officers:
G K Fowle
K J Ontong
L N van Heerden, BSc Stell

Department Administrator:
N Lovric

Senior Secretary:
L J Jennings

Senior Secretary (part-time):
K A Newton

Librarian:
S Knox
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, positron physics, X-ray diffraction 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: gamma ray spectroscopy, giant resonance reactions with the magnetic spectrometer, neutron cross sections, applied neutron physics (Professor D G Aschman, Associate Professors M S Allie, A Buffler and R W Fearick and Dr M R Nchodu).

2. Research in Theoretical Physics comprising:
   (a) Structure of elementary particles.
   (b) Weak interactions: Coherent neutrino interaction with matter, weak decays of particles.
   (c) Quantum field theory: Quantum electrodynamics and chromodynamics in free space and in the cavity. Confinement. Vacuum structure.
   (d) Heavy neutrino astrophysics and cosmology.
   (e) Dark matter and energy, Brane cosmology.
   (f) Structure of nuclei: Alpha and exotic decay, alpha and exotic cluster structure of nuclei, relativistic nuclear mode (Professor R D Viollier and Dr A T M Muronga).

3. UCT-ALICE research centre: Relativistic heavy ion collisions within the ALICE collaboration at CERN, Geneva, Switzerland (Professor J Cleymans, Associate Professor R Fearick and Dr Z Vilakazi).

4. Solid state physics: Structural and electrical properties of thin films (Associate Professor C M Comrie). Surface, near-surface and bulk defect studies using positron annihilation (Associate Professor D T Britton). X-ray diffraction studies of strain fields and residual stress analysis (Associate Professor M Härting).

5. Physics education: Problem solving in physics, curriculum design and evaluation, language in science, students' understanding of measurement and uncertainty, modelling and visualization (Associate Professors M S Allie and A Buffler).

6. Applied Physics: Particulate flow and interaction characterization in engineering and biological systems by computational and mechanistic modelling, and measurement techniques (Dr I Govender).

Undergraduate Courses

Credit will not be given for both PHY1023H and PHY1031F. Credit will not be given for both of PHY1024F and PHY1032S.

First-Year Courses

PHY1004W INTRODUCTORY PHYSICS

A calculus-based introductory course for Science students intending to continue with second-year Physics.

Course co-ordinator(s): Associate Professor R W Fearick

Entrance requirements: Students will normally be expected to have passed senior certificate Physical Science with at least a C symbol on the Higher Grade. MAM1000W (or equivalent) must have been passed or be taken concurrently.

Course outline:
MODERN MECHANICS: Matter and interactions, 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, semiconductor devices.

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| Examination requirements: | Class record (weekly problem sets and class tests) counts 25%;
| laboratory record (weekly laboratory marks and two laboratory examinations) counts 25%;
one June 2-hour examination counts 25%; one November 2-hour examination counts 25%. |

PHY1023H FOUNDATIONS & PRINCIPLES OF PHYSICS

A calculus-based introductory course primarily for students on the General Entry for Programmes in
Science (GEPS). It is possible for students from other courses to transfer to this course during the
year.

Course co-ordinator(s): Associate Professor M S Allie

Entrance requirements: This course is taken by students on the General Entry for Programmes in
Science.

Course outline:
The first half of this course provides students with the essential tools and skills that are required for
dealing successfully with physics at first-year university level. The three broad areas that are
covered are (a) mathematical techniques and their relationship with physical phenomena, (b)
experimental procedures and (c) communication skills, in particular report writing. The second half
of the course covers material similar to that of the first half of PHY1004W.

Second semester:
Mechanics: vectors, kinematics, dynamics, work, energy power, conservative and non-conservative
forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational
inertia, rotational energy, angular momentum, static equilibrium, gravitation.
Properties of matter: elasticity, elastic moduli, hydrostatics, hydrodynamics.
Vibrations and waves: simple harmonic motion, damped oscillations, forced oscillations, resonance,
travelling waves, phase velocity, superposition, standing waves, sound intensity, Doppler effect.

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<td>DP requirements:</td>
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| Examination requirements: | Class record (weekly problem sets and two class tests) counts 25%;
laboratory record (weekly laboratory marks and a two-hour laboratory examination) counts 25%;
one 3-hour written examination counts 50%. |

PHY1024F PHYSICS OF RADIATION & MATTER

A calculus-based introductory course usually taken by students who have completed PHY1023H.

Course co-ordinator(s): Dr A T Muronga

Entrance requirements: PHY1023H, MAM1000W (or equivalent) must have been passed or be
taken concurrently.

Course outline:
ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss’ law, electric potential,
capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot-
Savart law, Ampere’s law, electromagnetic induction, inductance, alternating currents.

THERMAL PHYSICS: temperature, heat, kinetic theory of gases, thermodynamics.

MODERN PHYSICS: electromagnetic waves, interference, diffraction, the electron, quantum physical phenomena, atomic structure, wave-particle duality, X-rays, elementary nuclear physics, radioactivity.

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<td>Practicals:</td>
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DP requirements: Minimum of 30% in class record; 50% in laboratory assessment.

Examination requirements: Class record (weekly problem sets and two class tests) counts 25%; laboratory record (weekly laboratory marks and a two-hour laboratory examination) counts 25%; one 3-hour written examination counts 50%.

PHY1031F  PHYSICS OF NATURAL SYSTEMS 1
A non-calculus introductory course for Science students who do not intend proceeding to second-year courses in Physics.

Course co-ordinator(s): Associate Professor C M Comrie

Entrance requirements: Students will be expected to have passed senior Physical Science with at least an E symbol on the Higher Grade or at least a C symbol on the Standard Grade.

Course outline:
MECHANICS: vectors, kinematics, dynamics, work, energy, power, conservative and non-conservative forces, friction, impulse, momentum, collisions, rotation, rotational dynamics, torque, rotational inertia, rotational energy, angular momentum, static equilibrium, gravitation.
PROPERTIES OF MATTER: elasticity, elastic moduli, hydrostatics, hydrodynamics.
THERMAL PHYSICS: temperature, heat, kinetic theory of gases, thermodynamics.
VIBRATIONS AND WAVES: simple harmonic motion, damped oscillations, forced oscillations, resonance, travelling waves, phase velocity, superposition, standing waves, sound waves, sound intensity, Doppler effect.

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<td>Practicals:</td>
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DP requirements: Minimum of 30% in class record; 50% in laboratory assessment.

Examination requirements: Class record (weekly problem sets and two class tests) counts 25%; laboratory record (weekly laboratory marks and a 2-hour laboratory examination) counts 25%; one 3-hour written examination counts 50%.

PHY1032S  PHYSICS OF NATURAL SYSTEMS 2
A non-calculus introductory course for Science students who do not intend proceeding to second-year courses in Physics.

Course co-ordinator(s): Dr S M Wheaton

Entrance requirements: At least 40% in PHY1031F, or PHY1023H

Course outline:
ELECTRICITY AND MAGNETISM: electric charge, electric field, Gauss’ law, electric potential, capacitance, current, current density, emf, resistance, resistivity, networks, magnetic field, Biot-Savart law, Ampere’s law, electromagnetic induction, inductance, alternating currents.
OPTICS: Geometrical optics, polarization, electromagnetic waves, interference, diffraction.
MODERN PHYSICS: the electron, quantum physical phenomena, atomic structure, 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, Thursday or Friday, 14h00-17h00.

DP requirements: Minimum of 30% in class record; 50% in laboratory assessment.
Examination requirements: Class record (weekly problem sets and two class tests) counts 25%;
laboratory record (weekly laboratory marks and a two-hour laboratory examination) counts 25%;
one 3-hour written examination counts 50%.

Second-Year Courses

**PHY2009S  THE PHYSICS OF FLUIDS & FIELDS**

Course co-ordinator(s): Dr A T Muronga
Entrance requirements: PHY1004W or (PHY1023H and PHY1024F), and a half course in Mathematics.
Course outline:
LIQUIDS AND GASES: Interatomic forces and potentials, perfect and real gases, Boltzmann distribution, Maxwell velocity distribution, transport properties of gases, thermodynamics, entropy, free energy, latent heat and phase transitions, ideal and real fluids, fluid dynamics.
VECTORS AND FIELDS: Introductory vector calculus (div, grad, curl), flux and circulation, hydrostatics, fluid dynamics, Navier-Stokes equation, drag.

Period

Mon Tue Wed Thu Fri
Lectures: 5 5 5 5 5
Practicals: One practical or tutorial per week, Wednesday, 14h00-17h00.

DP requirements: Minimum of 30% in class record, completion of all laboratory reports and 75%
tutorial work, attendance at all class tests.
Examination requirements: Class record (tests, tutorials, projects, laboratory work) counts 50%,
one 3-hour paper written in November counts 50%.

**PHY2014F  WAVES & ELECTROMAGNETISM**

Course co-ordinator(s): Associate Professor A Buffler
Entrance requirements: PHY1004W or (PHY2009S and MAM1043H), a full first-year course in Mathematics and MAM2000W or (MAM2004H and MAM2046W) as corequisite.
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.

DP requirements: Minimum of 35% in class record; completion of all laboratory reports, 75% of
tutorial work and problem sets; attendance at all tests; all proficiency tests.
Examination requirements: Class record (tests, weekly problem sets and laboratory work) counts
50%; one 3-hour examination written in June counts 50%.
PHY2015S  CLASSICAL & QUANTUM MECHANICS

Course co-ordinator(s): Professor R D Viollier

Entrance requirements: As for PHY2014F.

Course outline:
CLASSICAL MECHANICS: Review of Newton's laws, constraints, D'Alembert principle, Lagrangian formulation of mechanics, conservation laws, applications, central forces, planetary motion, small oscillations, normal co-ordinates.
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.

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<td>DP requirements</td>
<td>Minimum of 30% in class record; completion of all laboratory reports and 75% of tutorial work, attendance at all tests.</td>
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<td>Examination requirements</td>
<td>Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour paper written in November counts 50%.</td>
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Third-Year Courses

PHY3021F  ADVANCED PHYSICS 1

Course co-ordinator(s): Professor J W A Cleymans

Entrance requirements: PHY2014F and PHY2015S, and MAM2000W or (MAM2004H and MAM2046W) must have been completed or be taken concurrently.

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, Boltmann 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.

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<td>Two sessions per week, Monday and Thursday, 14h00-17h00.</td>
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<td>DP requirements</td>
<td>Satisfactory completion of tutorial assignments and laboratory reports.</td>
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<td>Examination requirements</td>
<td>Class tests, essays, projects and laboratory reports count 50%; one 3-hour paper and one 2-hour paper count 50%.</td>
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PHY3022S  ADVANCED PHYSICS 2

Course co-ordinator(s): Associate Professor C M Comrie

Entrance requirements: PHY2014F and PHY2015S, and MAM2000W or (MAM2004H and MAM2046W) must have been completed or be taken concurrently.
Course outline:
ATOMIC PHYSICS: atomic structure and spectra, selection rules, fine structure, 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.

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Lectures: Two sessions per week, Monday and Thursday, 14h00-17h00.
Practicals: Satisfaction completion of tutorial assignments and laboratory reports.

Examination requirements: Class tests, essays, projects and laboratory reports count 50%; one 3-hour paper and one 2-hour paper count 50%; oral exam 2%.

Postgraduate Courses

PHY4000W  BSc (HONS) IN PHYSICS
Course co-ordinator(s): Professor R D Viollier
Entrance requirements: PHY3021F and PHY3022S. Candidates must satisfy the Head of Department that they have sufficient background in Mathematics (usually at least MAM2040W or MAM2000W). Admission is subject to the approval of the Head of Department and application must be made before 30th November of the preceding year.
Course outline:
The Honours course in Physics consists of a selection of advanced topics: classical mechanics, classical electrodynamics, quantum mechanics, statistical mechanics, computational physics, nuclear physics, particle physics, solid state physics, physics education and approved advanced level courses offered by the Departments of Astronomy and Mathematics and Applied Mathematics.

PHY4001W  BSc (HONS) IN THEORETICAL PHYSICS
Course co-ordinator(s): Professor R D Viollier
Entrance requirements: PHY3021F and PHY3022S. Candidates must satisfy the Head of Department that they have sufficient background in Mathematics. Admission is subject to the approval of the Head of Department and application must be made before 30th November of the preceding year.
Course outline:
The Honours course in Theoretical Physics consists of a selection of advanced topics: classical mechanics, classical electrodynamics, quantum mechanics, statistical mechanics, computational physics, nuclear physics, relativistic quantum mechanics, particle physics, relativity, gravitation and cosmology. Optional courses emphasizing particle physics are offered. Further courses offered by the Departments of Astronomy and Mathematics and Applied Mathematics may be included.

PHY4002W  BSc (HONS) IN MATHEMATICAL & THEORETICAL PHYSICS
Course co-ordinator(s): Professor R D Viollier
Entrance requirements: PHY3021F and PHY3022S or MAM3040W. Candidates must satisfy the Head of Department that they have sufficient background in Mathematics. Admission is subject to the approval of the Head of Department and application must be made before 30th November of the preceding year.
Course outline:
The Honours course in Mathematical and Theoretical Physics consists of a selection of advanced topics: classical mechanics, classical electrodynamics, quantum mechanics, statistical mechanics, relativity, gravitation, cosmology, advanced mathematical physics. Further courses offered by the Department of Astronomy and Mathematics and Applied Mathematics may be included.

AST4007W  BSc (HONS) IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme)
For course details see entry under Department of Astronomy.

AST5003F  TAUGHT COMPONENT OF THE MSc IN ASTROPHYSICS & SPACE SCIENCE (National Astrophysics and Space Science Programme)
For course details see entry under Department of Astronomy.

PHY5003W  DISSERTATION COMPONENT OF THE MSc IN ASTROPHYSICS & SPACE SCIENCE

Entrance requirements: AST5003F
Dissertation: Students will work on an approved research topic on which a dissertation must be presented.

PHY5000W  MSc IN PHYSICS
The MSc 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  MSc IN THEORETICAL PHYSICS
The MSc in Theoretical Physics is obtained by satisfactorily completing a research project on which a dissertation must be presented. Students are expected 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.

PHY6000W  PhD IN PHYSICS
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 in the previous paragraph if these have not been attended previously. Candidates are referred to the rules for this degree as set out in Book 3, General Rules.
DEPARTMENT OF STATISTICAL SCIENCES

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

Professor and Head of Department:
T T Dunne, BA (Hons) BSc (Hons) UED BEd Natal PhD Cape Town CStat

Professor of Avian Demography:
L G Underhill, MSc PhD Cape Town

Professors:
G D I Barr, BA MSc PhD Cape Town
D J Bradfield, MSc PhD Cape Town HED Unisa
R K Guo, BSc Tsinghua MSc PhD Iowa State
L M Haines, BA MA Cambridge BSc (Hons) Natal MPhil UCL PhD Unisa
T J Stewart, Pr Eng BSc (Chem Eng) Cape Town MSc (OR) PhD Unisa FRSSAf

Emeritus Professor:
C G Troskie, MSc Pret PhD Unisa

Associate Professors:
C Thiart, MSc PhD Cape Town

Emeritus Associate Professor:
J M Juritz, BSc (Hons) UNISA, MSc PhD Cape Town

Honorary Research Associate:
D A Polakow, MSc PhD Cape Town
H G Zimmerman, Dipl Math, PhD Bonn

Senior Lecturers:
F Little, MSc PhD Cape Town
J C Nyirenda BSc Newcastle Upon Tyne PhD Cambridge
L D Scott, MSc PhD Cape Town
K Stielau, BSc(Hons) Natal

Lecturers:
A Clark, MSc Cape Town
I Durbach, MBusSc Cape Town
B Erni, BSc (Hons) MSc Cape Town PhD Basel
F N Gumede, MSc Cape Town
D Katshunga, BSc(Hons) DRC MSc Cape Town
K Leask, BSc (Hons) Natal
L Zacna, MSc Poland

Chief Scientific Officers:
G Distiller, BBusSc (Hons) BCom (Hons) Cape Town
A R Joubert, BSc(Hons) PhD Cape Town

Administrative Manager:
To be appointed

Senior Administrative Officer:
M Gallon

Administrative Assistant:
S Achilles

Senior Clerk:
H Williams

Receptionist:
A Davids
RESEARCH IN STATISTICAL SCIENCES

Research areas and research units:

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, J Nyirenda, L D Scott, A Joubert).

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, C G Troskie, R K Guo, L M Haines).


BIOSTATISTICS: Medical applications of statistics (T T Dunne, F Little, L M Haines, J M Juritz, F Gumedze). 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.


MULTIVARIATE ANALYSIS: Detection of outliers and influential observations (C G Troskie, T T Dunne, C Thiart, F Gumedze); multivariate distribution theory (C G Troskie); multidimensional scaling, correspondence analysis and cluster analysis (L G Underhill); robust regression procedures (C G Troskie, C Thiart).

EDUCATIONAL APPLICATIONS: Statistical examination of data pertaining to schools, disadvantaged students and to science education (T T Dunne, K Stielau, F Gumedze, L Zacna).

MIXED 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).

SOCIAL SCIENCE STATISTICS: Research surveys; local government support; analysis of poverty and development (T T Dunne, L D Scott, C Ardington).

OPTIMAL DESIGN: The design of experiments in agriculture, biology and engineering which are in some sense optimal (L M Haines).

Undergraduate Courses

NOTES
1. Students may not obtain credit for both STA3008S and either STA2004F or STA2005S.
2. To obtain a distinction in Statistics, a student must obtain four first class passes in the second and third year half courses.
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, STA3042F, STA3043S, STA3045F and MAM2000W is strongly recommended.
5. A specialisation in Statistics for the BSc requires one of STA3041F and one of STA3043S or STA3045S.
First-Year Courses

STA1000F AND STA1000S  STATISTICS 1000

Identical first year half-courses, offered in first and second semesters. Owing to the mathematics prerequisites, first-year students must register for STA1000S in the second semester.

Course co-ordinator(s): Dr B Erni and Dr L Scott

Entrance requirements: A pass or concurrent registration in any of MAM1004F/H or MAM1005H or MAM1006H or MAM1000W or MAM1002W or MAM1003W or MAM1012F or STA1001F/S/H.

Course outline:

Lectures: First semester: five lectures per week, Monday to Friday, 1st and 4th period. Second semester: five lectures per week, Monday to Friday, 1st, 2nd, 3rd or 4th period. Students may be required to attend a particular period and venue.

Tutorials: One tutorial per week and 3 to 4 workshops during the semester, at times to be arranged. There is a Statistics Hot Seat in the Statistics Building (Ground Level of PD Hahn Annexe-North Entrance).

DP requirements: Class record of 40%.

Examination requirements: Class work (test and assignments) counts 35%; one 3-hour examination in June (STA1000F) or November (STA1000S) counts 65%. Candidates awarded a supplementary examination for STA1000F MUST write this examination in the October/November examination period of the same year.

STA1006S  STATISTICS FOR MATHEMATICAL DISCIPLINES

Course co-ordinator(s): To be advised

Entrance requirements: Matriculation mathematics (at least 50% on the higher grade). Concurrent MAM1000W registration.

Course outline:

Lectures: Five lectures per week, Monday to Friday, 1st and 4th period.

Tutorials: One tutorial per week and workshops to be arranged.

DP requirements: Attendance and completion of all tests and assignments; class record of 40%.

Examination requirements: Class record counts 35%; one 3-hour written examination in November counts 65%.

STA1007S  BIONUMERACY

This course forms part of the biological specialisations of the BEES & CMCS programmes

Course co-ordinator(s): To be advised
Entrance requirements: Matriculation Mathematics (at least 50% on the higher grade or a C-symbol on the standard grade). For foreign students a pass at A-level or a C-symbol at O-Level is required.

Course outline:
(1) Introduction to Biological Statistics. (2) Scientific Method. (3) Computing and Data Manipulation and Presentation. (4) Measures of Central Tendency. (5) Distributions and Functions. (6) Probability Theory. (7) Basic Inferential Statistics. (8) Mathematical Modelling. (9) Introduction to scientific writing. There will be three research projects 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. Each student will also be required to write a report or part of a report in the format of a scientific journal article. The course is the equivalent of STA1000S, in a biological setting.

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

DP requirements: Attendance and completion of all tests and assignments; class record of 40%.

Examination requirements: Class record counts up to 50%; one 3-hour written examination in November counts at least 50%.

Second-Year Courses

STA2004F STATISTICS 2004
Course co-ordinator(s): Associate Professor C Thiart
Entrance requirements: MAM1000W and one of the following, STA1006S or STA1006H.
Course outline:
Lectures: Monday to Friday 1st period and Tuesday 6th and 7th period.
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% and a minimum of 40% for the project.
Examination requirements: Class record counts 30%; one 3-hour examination in June counts 70%.

STA2005S STATISTICS 2005
Course co-ordinator(s): To be advised
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%.

**Examination requirements:** Class record counts 30%; one 3-hour examination in October/November counts 70%.

### STA2020F BUSINESS STATISTICS

*Note: This course is restricted to students registered for the IT programme (SB006).*

**Course co-ordinator(s):** Dr J Nyirenda

**Entrance requirements:** (MAM1000W or MAM1004F/H or MAM1005H or MAM1006H or MAM1002W or MAM1012 or MAM1003) AND (STA1000F/S or STA1006F/S/H).

**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:** 1st, 3rd or 5th period; Monday to Friday

**Tutorials:** Tutorials/Workshops by arrangement.

**DP requirements:** At least 50% for class record and satisfactory completion of the project.

**Examination requirements:** Class record counts 40%; one 3-hour examination in June/November counts 60%.

### Third-Year Courses

#### STA3036S OPERATIONAL RESEARCH TECHNIQUES

**Course co-ordinator(s):** To be advised

**Entrance requirements:** STA2020F or (STA2004F and STA2005S); (STA3030F recommended)

**Course outline:**
OR techniques in Management with a strong orientation towards computer-based solution techniques and case studies. The OR process: constructive modelling in terms of alternatives, objectives and uncertainties. LP problem formulation as an illustration of alternatives and objectives: Emphasis on formulation, structure and computer solution; decision making under uncertainty; risk aversion and mean-variance models; case studies in economics and finance - the portfolio problem. Simulation as "what-if" exploration of alternatives and uncertainties. Forecasting using time-series and/or scenario (regression) based methods as an illustration of both the strengths and limitations of statistical models. Case studies of the efficacy of forecasting applied to different classes of economic/financial time series.

**Lectures:** To be advised

**Tutorials:** To be advised

**Practicals:** To be advised

**DP requirements:** At least 35% for class record and satisfactory completion of all assignments and projects.

**Examination requirements:** Class record counts 30%; one 3-hour written examination in November counts 70%.

#### STA3041F STATISTICS 3041

**Course co-ordinator(s):** Professor L M Haines

**Entrance requirements:** STA2004F and STA2005S, MAM2000W recommended (linear algebra and advanced calculus modules).

**Course outline:**
(a) *Markov Processes:* Discrete Markov chains; application to experience rating; Poisson and renewal processes; continuous time Markov chains; Theory of Markov processes; Ruin theory;
(b) *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: Monday and Wednesday, 6th and 7th period.
DP requirements: Class record of 35% and submission of all projects.
Examination requirements: Class record counts 30%; one 3-hour examination in June counts 70%.

STA3043S STATISTICS 3043
Course co-ordinator(s): Professor T J Stewart
Course outline:
(a) 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.
(b) 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.
Examination requirements: Class record counts 30%; one 3-hour examination in November counts 70%.

STA3045F MARKOV PROCESSES & ADVANCED TIME SERIES
Course co-ordinator(s): Professor R K Guo
Entrance requirements: STA1006S/H, 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).
Lectures: Five lectures per week. Refer department.
Tutorials: One tutorial per week. Refer department.
DP requirements: Class record of 40% and submission of all projects.
Examination requirements: Class record counts 40%; one 3-hour examination in June counts 60%.

Postgraduate Courses

STA4003W and STA4007W BSc (HONS) IN ACTUARIAL SCIENCE AND BSc (HONS) IN STATISTICAL SCIENCES

Note: These two programmes follow essentially the same rules except for some differences in the "core requirements" outlined below. In the case of STA4003W, these core requirements include
BUSES027Z (Investment and Asset Management) and BUS4028F (Financial Economics) offered by the Actuarial Science Division of the School of Management Studies, although students do not separately register for these courses.

**Course co-ordinator(s):** Professor T J Stewart

**Entrance requirements:** The minimum requirements are STA2004F, STA2005S, STA3041F (or STA3042F for admission to STA4007W), STA3043S, MAM2000W. In addition, admission to STA4003W requires acceptance into BUS4027Z and BUS4028F by the Actuarial Science Division of the School of Management Studies.

The above are minimum requirements, and in general a good second class pass at least would be necessary to obtain a place on the programme. Each applicant is considered individually, taking into consideration their total academic record.

**Course outline:**
Course requirements are based on an internal departmental credit system, in which a 24-lecture module at 4th year level is granted 2 credits. Students are required to complete the following.

<table>
<thead>
<tr>
<th>Core courses</th>
<th>12 credits</th>
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<tbody>
<tr>
<td>Elective courses</td>
<td>8 credits</td>
</tr>
<tr>
<td>Individual Project</td>
<td>4 credits</td>
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</table>

In the case of STA4007W, the core courses include statistical computing, matrix methods, theory of statistics, operations research and professional communication. For STA4003W, the core courses include statistical computing, matrix methods, professional communication, BUS4027Z and BUS4028F. Available electives vary from year to year, but typically include a variety of applied and theoretical topics in statistics, econometrics and operations research.

**Examination requirements:** Each coursework module comprises a combination of tests, assignments and a final examination. The relative weighting placed on the year work varies for different modules between 30% and 50%. The final grade for the course as a whole is a weighted average (weighted by numbers of credits) of final marks for each coursework module and the individual project. In addition, the student is required to obtain a mark of at least 50% in all core courses and for the individual project.

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**STA4044S**  STOCHASTIC CALCULUS FOR FINANCIAL APPLICATIONS

**Course co-ordinator(s):** Professor R K Guo

**Entrance requirements:** STA3045F

**Course outline:**
Stochastic calculus, Lévy processes and stochastic optimal control theory and their financial applications.

**Lectures:** To be advised

**Tutorials:** To be advised

**DP requirements:** Class record of 50% and submission of all projects.

**Examination requirements:** Class record counts 50%; one 2-hour examination counts 50%.

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**STA5000W**  MSc IN MATHEMATICAL STATISTICS

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.

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**STA5001W**  MSc IN OPERATIONAL RESEARCH

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  MSc IN STATISTICAL SCIENCES**
(by coursework & dissertation)

For this taught MSc programme, candidates are required to complete coursework STA5003W given at a Master's level at the end of which they will sit and pass formal examinations. They are also required to submit a mini-dissertation (STA5004W), which is normally considered as a half dissertation (one year of study), for which a pass is the requirement for the MSc degree. General rules for completion of the masters by coursework and dissertation may be found at the beginning of the handbook.

**Entrance Requirements:** A relevant Honours degree.

Deadlines for Applications for the following year: International Students, 30th September and local students, 31st October.

**STA5010W and STA5011W  MSc IN OPERATIONAL RESEARCH IN DEVELOPMENT**
(by coursework & dissertation)

**Course Objectives:** 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.

**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.

**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, 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 project on a suitable topic, the results of which are to be written up as a dissertation. In some cases, the project might be undertaken on a local problem at the student’s home base.

**Examination requirements:** In order to qualify for the MSc 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**

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.
DEPARTMENT OF ZOOLOGY

The Department is housed in the John Day Zoology Building, 20 University Avenue
Telephone (021) 650-3603/4 Fax (021) 650-3301
The Percy Fitzpatrick Institute of African Ornithology may be reached on telephone (021) 650-3291.
  The Departmental abbreviation for Zoology is ZOO. Courses jointly offered with the Botany department are designated BIO.
The Animal Demography Unit may be reached on telephone (021) 650-2423.

Associate Professor and Head of Department:
J H Hoffmann, MSc PhD Rhodes

South African Research Chair in Animal Evolution and Systematics:
D S Jacobs, BSc (Hons) Cape Town PhD Hawaii

Professors of Zoology:
A Chinsamy-Turan, BSc (Hons) PhD Wits
T M Crowe, MSc Chicago PhD Cape Town
G Gäde, MS PhD Munster
C L Griffiths, BSc (Hons) Soton PhD Cape Town

Pola Pazwolsky Chair of Conservation Biology:
G Cumming, BSc (Hons) Rhodes DPhil Oxon

Emeritus Professors:
G M Branch, BSc (Hons) PhD Cape Town FRSSAf
J G Field, BSc (Hons) PhD Cape Town FRSSAf

Emeritus Associate Professors:
B R Davies, BSc (Hons) Newcastle PhD CNAA MSAIE & ES
J U M Jarvis, MSc Cape Town PhD East Africa FRSSAf

Associate Professors:
J A Day, BSc (Hons) PhD Cape Town MSAIE & ES
P A R Hockey, BSc (Hons) Edinburgh PhD Cape Town
P G Ryan, MSc PhD Cape Town

Honorary Research Associates:
P J Barham, MSc PhD Physics Bristol
V C Moran, MSc PhD Rhodes FRES FLS FRSSAf

Senior Lecturers:
G N Bronner, MSc PhD Natal
M J 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

Lecturers:
H Marco, BSc (Hons) PhD Cape Town
C Reed, MSc PhD UFS

Postdoctoral Fellows:
L Bruinzeel, MSc PhD Groningen
C Eising, MSc PhD Groningen
A Ridley, BSc(Hons) Lincoln PhD Cantab

Principal Technical Officer:
A Plos, BSc Cape Town

Chief Technical Officers:
G Du Plessis
P Müller

Scientific Officer:
L V Phigeland, BSc Cape Town

Administrative Officer:
M Ledeboer
Senior Secretary:
C Smith

Administrative Assistants:
C April
L F Mansfield

Laboratory Assistants:
J Booysen
G Faulmann

MARINE BIOLOGY RESEARCH CENTRE
Director:
C L Griffiths, BSc (Hons) Soton PhD Cape Town

Associates:
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
M I Lucas, BSc (Hons) PhD Wales
C L Moloney, BSc (Hons) PhD Cape Town

Research Associates:
L Atkinson, MSc Cape Town
C Attwood, BSc (Hons) PhD Cape Town
J Augustyn, BSc (Hons) PhD Cape Town
D Durholtz, BSc (Hons) PhD Cape Town
J Harris, BSc (Hons) PhD Cape Town
K Hutchings, BSc (Hons) PhD Cape Town
M Lombard, BSc (Hons) PhD Cape Town
L Shannon, BSc (Hons) PhD Cape Town
C N Steffani, MSc Hamburg PhD Cape Town
C van der Lingen, BSc (Hons) Rhodes PhD Cape Town

Scientific Officers:
G E Smith BSc

FRESHWATER RESEARCH UNIT
Director:
J A Day, BSc (Hons) PhD Cape Town MSAIE & ES

Chief Research Officers:
J M King, BSc (Hons) PhD Cape Town MSAIE & ES
H Malan, MSc UPE PhD Cape Town

Scientific Officers:
M A Amis, BSc Moi, MSc Cape Town
J Ewert-Smith, BSc (Hons) MSc Cape Town
S Koni
S Marr, BSc Chem Eng UND MSc Chem Eng Cape Town
B Paxton, BSc (Hons) Cape Town
G Ractliffe, BSc (Hons) Cape Town

WEED BIOLOGICAL CONTROL UNIT
Chief Research Officer:
J H Hoffmann, MSc PhD Rhodes

Scientific Officers:
F A C Impson, BSc (Hons) Rhodes
C A Kleinjan, MSc Cape Town
V C Moran, MSc PhD Rhodes FRES FLS FRSSAf
THE PERCY FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY

Director:
To be appointed

Pola Pazwolsky Chair of Conservation Biology:
G Cumming, BSc (Hons) Rhodes DPhil Oxon

Professor:
T M Crowe, MSc Chicago PhD Cape Town

Associate Professor:
P A R Hockey, BSc (Hons) Edinburgh PhD Cape Town
P G Ryan, MSc PhD Cape Town

Honorary Professors:
D Cumming, PhD Rhodes
S Milton, PhD Cape Town

Research Associates:
P Barnard, MSc Wits PhD Upsala
A Kemp, PhD Rhodes
A Knight, PhD N.M.M.U
R Simmons, MSc Acadia PhD Wits

Research Officers:
A Jenkins, BSc(Hons) Natal PhD Cape Town
P Lloyd, MSc Rhodes PhD Cape Town
J A Turpie, BSc (Hons) PhD Cape Town

Principal Technical Officer:
C J Tobler

Librarian:
M M Sandwith, BA Unisa HDipLib Info Sci Natal

Administrative Assistant:
H Buchanan, BA H Dip Lib Cape Town

Senior Secretary:
C Jacobs

ANIMAL DEMOGRAPHY UNIT
(located on floor 2 of the P D Hahn Annexe)

Director:
L G Underhill, MSc PhD Cape Town

Honorary Associate Professor:
R J M Crawford, MSc PhD Cape Town

Senior Scientific Officer:
R A Navarro, MSc Austral de Chile

Research Assistants:
M Brooks, National Diploma in Conservation
M Burger, BTech
M de Villiers, PhD Pretoria
D M Harebottle, MSc Natal
S Kuyper, BA Natal HDLS Unisa
S Mecenaro, PhD Cape Town
H D Oschadleus, PhD Cape Town
L Tsipa
M Wheeler, BTech
M T E Wren-Sargent, BA HDE Natal PG Dip LIS Cape Town
D J Young, MSc Cape Town
RESEARCH IN ZOOLOGY

The Department of Zoology specialises in ecology and conservation biology. In the marine field, research concentrates on the ecology of rocky shores (C L Griffiths), the upwelling zone off the Cape west coast (M I Lucas) and the management of living marine resources (C L Moloney). The Marine Biological Research Institute (Director C L Griffiths) co-ordinates and stimulates marine biological research at the University of Cape Town. Studies on the biology and management of inland waters (J A Day, J M King, H L Malan and C Reed) are co-ordinated within the Freshwater Research Unit (Director J A Day), with emphasis on the functioning of rivers and wetlands in the face of human interference.

The ethology, physiology and ecology of terrestrial vertebrates, particularly small mammals, are studied by D S Jacobs, G Bronner and J O'Riain; G Gade and H Marco specialise in arthropod physiology, particularly endocrinology; M D Picker focuses on insect ecology and systematics; and J H Hoffmann and V C Moran on the biological control of insect pests. A Chinsamy-Turan elucidates the biology of extinct vertebrates by analysing their bone structure.

The Department includes the Percy FitzPatrick Institute of African Ornithology, which is involved in a wide range of research topics on avian evolutionary and behavioural ecology, and conservation biology (T M Crowe, G Cumming, P A R Hockey, P G Ryan). The Percy Fitzpatrick Institute has been recognised as a Centre of Excellence by the National Department of Science and Technology. The Animal Demography Unit is a research group within the department that manages the South African Bird Ringing Unit and a series of monitoring projects. Applications of statistics to the population dynamics of seabirds, shorebirds, waterbirds and terrestrial birds is done by L G Underhill, B Erni, H D Oschadleus, J D Young and D M Harebottle.

Undergraduate Courses

Note: Supplementary examinations are not normally granted to students for senior courses in Zoology.

First-Year Courses

BIO1000F  CELL BIOLOGY
See course details under Department of Botany.

ERT1003H  FOUNDATIONS OF BIOLOGY, EARTH & ENVIRONMENTAL SCIENCES
A course for students on the General Entry for Programmes in Science (GEPS) providing a general introduction to the study of the earth and its living and non-living systems.
See course details under Department of Archaeology.

BIO1004S  BIOLOGICAL DIVERSITY
This course is available to all undergraduates.
Course co-ordinator(s): To be advised
Entrance requirements: BIO1000F/H or a pass in Biology at matriculation level or by permission of the Head of the Zoology Department.
Course outline:

Period

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<tr>
<td>Lectures:</td>
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</tbody>
</table>
Practicals: One practical per week, Monday, Tuesday, Wednesday or Friday, 14h00-17h00. Practical will examine animal and plant diversity.

Fieldwork: A compulsory 1-day excursion will be held over a weekend.

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

Examination requirements: Class record counts 40%; one 2-hour theory paper written in November counts 35%; one 1.5-hour practical examination written in November counts 25%.

Second-Year Courses

BIO2003S ECOPHYSIology: HOW PLANTS & ANIMALS WORK
Course co-ordinator(s): Professor G Gäde
Entrance requirements: BIO1000F/H, BIO1004S, 40% in CEM1000W or completion of CEM1009H.
Course outline:
The course provides an understanding of basic physiological processes in plants and animals from cellular to organismal level. It draws on the structural and functional similarities and dissimilarities between plants and animals in respect of topics such as nutrition, gas exchange, transport of water and nutrients (plants), osmoregulation and water relations (animals) and chemical communication, presented in an ecological and evolutionary framework.

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<th>Period</th>
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<tr>
<td>Lectures:</td>
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<tr>
<td>Tutorials:</td>
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<td>Practical:</td>
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DP requirements: Attendance at 2/3 of practicals; submission of classwork by due dates; 40% for class record.

Examination requirements: Class record counts 50%; one 2-hour written examination in November counts 30%; one 2-hour written practical in November counts 20%.

BIO2004F PRINCIPLES OF ECOLOGY
Course co-ordinator(s): Professor C L Griffiths
Entrance requirements: BIO1000F/H, BIO1004S.
Course outline:
Topics include the ecology of individuals, populations and communities, plant-animal interactions and the ecology of marine, freshwater and terrestrial biomes. In addition to formal lectures, practicals and tutorials, a compulsory 5-day field camp is held during the Easter vacation.

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<thead>
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<th>Period</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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<tbody>
<tr>
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<td>Tutorials:</td>
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<tr>
<td>Practical:</td>
<td></td>
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</tr>
</tbody>
</table>

DP requirements: Minimum of 40% for class record; attendance at field camp; submission of classwork assignments by due date.

Examination requirements: Class record counts 50%; one 2-hour theory paper written in June counts 40% (a subminimum of 35% is required on the theory paper); one 2-hour practical examination in term time counts 10%.

BIO2008F PRINCIPLES OF EVOLUTION
See course details under Department of Botany.
BIO2009S  INVERTEBRATES
Course co-ordinator(s): Dr M D Picker
Entrance requirements: BIO1000F and BIO1004S.
Course outline:
Invertebrates, overwhelmingly the most diverse animal group, have successfully exploited both terrestrial and aquatic habitats. Lectures contrast invertebrate adaptations for feeding, respiration, excretion, sensory systems, reproduction and locomotion across the two major habitats, and include a review of the phylogenetic interrelationships of all invertebrates in either terrestrial (largely insects) or marine invertebrates. Students will decide which stream they intend to follow, and will attend practical and a field camp that will cover either insect diversity and ecology OR marine invertebrate diversity and ecology.

Period

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<thead>
<tr>
<th></th>
<th>Mon</th>
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</tr>
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<tbody>
<tr>
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<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Tutorials:</td>
<td>One per week, Friday, 4th period.</td>
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<tr>
<td>Practicals:</td>
<td>One practical per week, Monday, 14h00-17h00.</td>
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<tr>
<td>DP requirements:</td>
<td>Attendance at all practicals and field camp; completion of all assignments; a subminimum of 35% for year work and exams.</td>
<td></td>
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<tr>
<td>Examination requirements:</td>
<td>Tests counts 30%; practicals and project counts 20%; one 2-hour written examination in November counts 50%.</td>
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</tbody>
</table>

Third-Year Courses

BIO3001F  VERTEBRATE ZOOLOGY
Course co-ordinator(s): Dr G N Bronner
Entrance requirements: BIO1000F, BIO1004S and CEM1000W (or equivalent); STA1007S (or STA1000F/S) strongly recommended; otherwise by arrangement with the course convenor.
Course outline:
The course consists of a series of lectures and practical work on vertebrate functional morphology, physiology and evolution. A compulsory 4-day field camp is held during the mid-term vacation.

Period

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<td>4</td>
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<tr>
<td>Practicals:</td>
<td>Two practicals per week: Friday, and Monday or Tuesday, 14h00-17h00.</td>
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<tr>
<td>DP requirements:</td>
<td>Attendance at 2/3 of practicals and at field camp; submission of classwork by due dates.</td>
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<tr>
<td>Examination requirements:</td>
<td>Class record counts 50%; one 3-hour theory paper and one 4-hour practical examination written in June each count 25% (a subminimum of 40% is required for each).</td>
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</tbody>
</table>

BIO3002S  MARINE ECOLOGY
Course co-ordinator(s): Dr M I Lucas
Entrance requirements: CEM1000W (or equivalent) and BIO2004F, BIO2005S, STA1007S (or STA1000F/S) recommended; otherwise by arrangement with the course convenor.
Course outline:
The course includes an introduction to: the South African marine environment, biological oceanography, plankton ecology, benthic ecology, mariculture, fisheries biology (with special attention to major South African fisheries), sandy beach ecology, estuarine ecology and rocky shore ecology. Special topics are covered in seminars. In addition to formal lectures, tutorials and set practicals, students are required to undertake field work and a research project. There is a
compulsory 4-day field camp during registration week.

<table>
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<tr>
<th>Period</th>
<th>Mon</th>
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<tr>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Practicals:</td>
<td>One practical per week, Wednesday, 14h00-17h00.</td>
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<tr>
<td>DP requirements:</td>
<td>Submission of project and essay by due date; attendance at field camp.</td>
<td></td>
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</tr>
<tr>
<td>Examination requirements:</td>
<td>Class record counts 50%; one 3-hour theory paper written in November counts 50% (a sub-minimum of 40% is required).</td>
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</tr>
</tbody>
</table>

BIO3003S  INLAND WATER ECOSYSTEMS

Course co-ordinator(s): Dr C Reed

Entrance requirements: BIO1004S, CEM1000W or equivalent and BIO2004F; ZOO2001S or BIO2005S and STA1007S (or STA1000F/S) recommended; otherwise by arrangement with the course convenor (may be taken in third academic year of study only).

Course outline:
The course addresses the ecology, conservation and management of inland water ecosystems, including rivers, wetlands, lakes, reservoirs and estuaries. Topics include ecosystem processes, ecology of populations and communities, the ecological impacts of human disturbance on fresh waters, and management and conservation issues. A field trip during the last week of the midyear vacation is compulsory. The field camp limits intake to 36 students.

<table>
<thead>
<tr>
<th>Period</th>
<th>Mon</th>
<th>Tue</th>
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<tr>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>Practicals:</td>
<td>Two practicals per week, one on Monday, 14h00-17h00, the other by arrangement.</td>
<td></td>
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<tr>
<td>DP requirements:</td>
<td>Attendance at field camp; submission of all course assignments by due date.</td>
<td></td>
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<tr>
<td>Examination requirements:</td>
<td>Class record counts 50%; one 3-hour theory examination paper counts 35%; one 2-hour written practical examination in term time counts 10%; an oral in November counts 5%.</td>
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</tbody>
</table>

BIO3005S  MOLECULAR ECOLOGY

See course details under Department of Botany.

BIO3010F  SYSTEMATICS & MACRO EVOLUTION

See course details under Department of Botany.

Postgraduate Courses

**NOTE:** In addition to submitting an application to the University, prospective applicants to all Zoology postgraduate courses MUST contact the Zoology Department. Failure to do so might result in their applications not being received by the department in time for consideration.

A requirement for the completion of the MSc and PhD degree is that students give a departmental seminar. On graduating they are also expected to give a short presentation at the Graduation Symposium on the day of their graduation.

ZOO4000W  BSc (HONS) IN ZOOLOGY

**NOTE:** Entrance is limited to 18 students per year.

Course co-ordinator(s): Dr M J O'Riain and Associate Professor J A Day

Entrance requirements: A BSc degree specialising in Zoology.

Course outline:
A training in research methodology including two original research projects. The honours course is
designed to enrich the students' appreciation of theory through advanced coursework, essays, seminars, discussion groups and fieldwork. There will be a compulsory field camp in late January/early February focussing on field methods. A compulsory core module includes biostatistics, the history and philosophy of science, and communication techniques. A senior undergraduate semester course may be substituted for a project.

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**ZOO4001W  BSc (HONS) IN ZOOLOGY (MARINE BIOLOGY)**

*NOTE: Entrance is limited to 12 students per year.*

**Course co-ordinator(s):** Dr M J O'Riain and Associate Professor J A Day

**Entrance requirements:** A BSc degree specialising in Zoology with emphasis on marine biology. ZOO3002F may be completed concurrently.

The programme is similar to that for BSc (Hons) in Zoology except that projects will deal mainly with marine biological or closely related topics.

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**ZOO4002W  BSc (HONS) IN ZOOLOGY (AVIAN BIOLOGY)**

*NOTE: Entrance is limited to 12 students per year.*

**Course co-ordinator(s):** Dr M J O'Riain and Associate Professor J A Day

**Entrance requirements:** A BSc degree specialising in Zoology with an emphasis on avian biology.

The programme is similar to that for BSc (Hons) in Zoology except that projects will deal mainly with birds.

---

**ZOO4004W  BSc (HONS) IN ZOOLOGY (FRESHWATER BIOLOGY)**

*NOTE: Entrance is limited to 12 students per year.*

**Course co-ordinator(s):** Dr M J O'Riain and Associate Professor J A Day

**Entrance requirements:** A BSc degree specialising in Zoology with an emphasis on freshwater biology. ZOO3003S may be completed concurrently.

The programme is similar to that for BSc (Hons) in Zoology except that emphasis in projects will be on freshwater topics.

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**ZOO5000W  MSc IN ZOOLOGY**

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

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**ZOO5003H and ZOO5004W  MSc IN CONSERVATION BIOLOGY**

(by coursework and dissertation)

**Course co-ordinator(s):** Professor T M Crowe, Academic co-ordinator: Associate Professor P G Ryan

**Course outline:**

A one-year MBA-like 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 utilization perspective, it focuses on biological and socio-economic criteria necessary to select species and areas for utilization and the development of appropriate management and monitoring strategies. This programme is intended for students concerned with both the theory and practice of conservation and consists of two components. Component 1 (ZOO5003H) is conducted in a classroom setting in the form of modules covering a range of fields of conservation biology: characterizing biodiversity, modelling, demography of wild populations, population viability analysis, genetics, monitoring and time-series analysis, community-level interactions, invasive aliens, disturbance ecology, ecological socio-economics, landscape ecology (using geographic information systems - GIS), and decision analysis using applied management models. 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 (ZOO5004W) which must be submitted as a dissertation. A pass in both components is required for the degree. It should be completed by the February following first registration. Those students already in possession of an MSc 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 Director, Percy FitzPatrick Institute.

**ZOO5005H and ZOO5006W**  
MSc IN APPLIED MARINE SCIENCE  
(by coursework and dissertation)  
**Course co-ordinator(s):** Dr C L Moloney  
**Course outline:**  
The objective of this MSc 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 (ZOO5005H) runs for approximately 7-8 months, and consists of a series of modules, each module running for 6-7 weeks. Students are engaged full-time with activities relating to the modules. Topics include coastal and shelf oceanography, marine ecology, quantitative methods, biostatistics, marine policy and law, resource economics, project management, health of the oceans, ocean circulation, climate change, living marine resource management, meteorology and oceans, coastal zone management, and mariculture. 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 (ZOO5006W) must be submitted as a dissertation. The expected duration of the research component is 5-6 months. A pass in both components is required for the degree.  
**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.  
**Examination requirements:** 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%.

**ZOO5009W**  
MSc IN CONSERVATION BIOLOGY  
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.

**ZOO6000W**  
PhD IN ZOOLOGY  
This 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.

**ZOO6002W**  
PhD IN CONSERVATION BIOLOGY  
This is a degree by dissertation 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.
INTER-FACULTY UNIT

Electron Microscope Unit

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

**Chief Scientific Officer:**
B Price, BSc (Hons) PhD *Natal*

**Principal Technical Officer (Part-time):**
J Duncan

**Chief Technical Officers:**
M A Jaffer, BSc (Hons) *Cape Town*
M Waldron, BSc (Hons) *Swansea* MSc *Cape Town*

**Photographic Assistant:**
S Karriem

The Electron Microscope Unit is housed in the R W James Building at 9 University Avenue and provides scanning and transmission electron microscopy facilities for staff and research students in all faculties. The Unit has a Leica S440 scanning electron microscope equipped with an extensive range of accessories including an X-ray analyser, cathodoluminescence spectrometer and cryo preparative facility. The Unit also has a LEO 912 EFTEM with in-column energy filter and 2k x 2k CCD camera to support tomographic applications in structural biology. Other microscopes in the unit include the JEOL 200CX and JEOL 1200 EXII cryo TEM transmission electron microscopes and the Cambridge S200 scanning electron microscope, equipped with electron back-scattered diffraction pattern analysis. Associated preparative, darkroom, light microscopy and library facilities are also provided. Enquiries regarding the use of these facilities are welcome.

Courses in aspects of electron microscopy are offered to any University member who wishes to make use of the Unit's facilities for the purpose of research. Details of these courses, which are held throughout the year, may be obtained from the Unit. The Unit is also able to provide information and advice on a wide range of microscopy related topics. More detailed information is available at [http://www.uct.ac.za/depts/emu](http://www.uct.ac.za/depts/emu).
## SCHEDULE OF COURSES, ENTRANCE REQUIREMENTS, LECTURE AND PRACTICAL TIMES

### LECTURE PERIODS

The academic day is divided into lecture periods as follows:

<table>
<thead>
<tr>
<th>Period</th>
<th>LECTURE TIMES</th>
<th>PRACTICAL/TUTORIAL TIMES</th>
<th>ENTRANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>08h00 to 08h45</td>
<td>Meridian</td>
<td>13h00 to 13h45</td>
</tr>
<tr>
<td>2</td>
<td>09h00 to 09h45</td>
<td>Period 6</td>
<td>14h00 to 14h45</td>
</tr>
<tr>
<td>3</td>
<td>10h00 to 10h45</td>
<td>Period 7</td>
<td>15h00 to 15h45</td>
</tr>
<tr>
<td>4</td>
<td>11h00 to 11h45</td>
<td>Period 8</td>
<td>16h00 to 16h45</td>
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<tr>
<td>5</td>
<td>12h00 to 12h45</td>
<td>Period 9</td>
<td>17h00 to 17h45</td>
</tr>
</tbody>
</table>

**NOTE:** Students registered for the SCIB03 degree must refer to the rules for the curriculum (Rule FB12) to ascertain which courses are classified under Lists 1, 2 and 3.

### COURSE LIST

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>LECTURE TIMES</th>
<th>PRACTICAL/ TUTORIAL TIMES</th>
<th>ENTRANCE REQUIREMENTS</th>
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</thead>
<tbody>
<tr>
<td>AGE1002S</td>
<td>AFRICA &amp; WORLD ARCHAEOLOGY</td>
<td>5 M to T</td>
<td>See departmental entry</td>
<td>None</td>
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<tr>
<td>AGE2011S</td>
<td>HUMAN EVOLUTION</td>
<td>2 M to Th</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>AGE2012F</td>
<td>SOUTHERN AFRICAN HUNTERS &amp; HERDERS</td>
<td>2 M to Th</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>AGE3006H</td>
<td>DIRECTED READING &amp; RESEARCH</td>
<td>By arrangement</td>
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<td>See departmental entry</td>
</tr>
<tr>
<td>AGE3011F</td>
<td>ROOTS OF BLACK IDENTITY</td>
<td>4 M to Th</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>AGE3012S</td>
<td>GLOBAL INTERACTION &amp; THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY</td>
<td>4 M to Th</td>
<td>One two hour practical per week, at times to be arranged</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>AGE3013H</td>
<td>ARCHAEOLOGY IN PRACTICE</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>APG1016S</td>
<td>GEOMATICS 1</td>
<td>4 M to F</td>
<td>W 6th to 8th</td>
<td>APG1015F or CSC1015F or equivalent</td>
</tr>
<tr>
<td>APG2014S</td>
<td>GEOMATICS II</td>
<td>3 M to F</td>
<td>M 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>APG2015F</td>
<td>GEOGRAPHIC INFORMATION SYSTEMS I</td>
<td>3 M to F</td>
<td>M 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>APG2018X</td>
<td>GEOGRAPHIC INFORMATION SYSTEMS CAMP</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>APG2026F</td>
<td>ELEMENTARY SURVEYING</td>
<td>5 M to F</td>
<td>M 1st to 4th</td>
<td>See departmental entry</td>
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<tr>
<td>APG3011F</td>
<td>GEOGRAPHIC INFORMATION SYSTEMS II</td>
<td>4 M to F</td>
<td>Tu 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>APG3012S</td>
<td>GEOMATICS III</td>
<td>5 M to F</td>
<td>M 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>APG3016C</td>
<td>SURVEYING II</td>
<td>3 M to F</td>
<td>W 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>APG3020X</td>
<td>SPATIAL DATA ANALYSIS PROJECT</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>APG4004A</td>
<td>REMOTE SENSING</td>
<td>1 M to F</td>
<td>Th 6th to 8th</td>
<td>See departmental entry</td>
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<tr>
<td>AST1000F</td>
<td>INTRODUCTION TO ASTRONOMY</td>
<td>5 M to F</td>
<td>See departmental entry</td>
<td>None</td>
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<tr>
<td>AST2002S</td>
<td>ASTROPHYSICS</td>
<td>2 M to F</td>
<td>One tutorial per week, Wednesday,</td>
<td>See departmental entry</td>
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<td>Credits</td>
<td>Days</td>
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<tr>
<td>AST3002F</td>
<td>STELLAR ASTROPHYSICS</td>
<td>5</td>
<td>M to F</td>
<td>14h00-16h30</td>
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<tr>
<td>AST3003S</td>
<td>GALACTIC &amp; EXTRAGALACTIC ASTROPHYSICS</td>
<td>5</td>
<td>M to F</td>
<td>See departmental entry</td>
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<tr>
<td>BIO1000F</td>
<td>CELL BIOLOGY</td>
<td>5</td>
<td>M to F</td>
<td>See departmental entry</td>
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<td>BIO1004S</td>
<td>BIOLOGICAL DIVERSITY</td>
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<td>M to F</td>
<td>See departmental entry</td>
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<tr>
<td>BIO2003S</td>
<td>ECOPHYSIOLOGY: HOW PLANTS &amp; ANIMALS WORK</td>
<td>3</td>
<td>M to Th</td>
<td>See departmental entry</td>
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<tr>
<td>BIO2004F</td>
<td>PRINCIPLES OF ECOLOGY</td>
<td>4</td>
<td>M to Th</td>
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<tr>
<td>BIO2006S</td>
<td>MARINE &amp; TERRESTRIAL PLANT DIVERSITY</td>
<td>2</td>
<td>M to F</td>
<td>See departmental entry</td>
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<tr>
<td>BIO2008F</td>
<td>PRINCIPLES OF EVOLUTION</td>
<td>2</td>
<td>M to F</td>
<td>See departmental entry</td>
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<tr>
<td>BIO2009S</td>
<td>INVERTEBRATES</td>
<td>4</td>
<td>M to Th</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>BIO3001F</td>
<td>VERTEBRATE ZOOLOGY</td>
<td>4</td>
<td>M to F</td>
<td>Two practicals per week, F and M or Tu, 14h00 to 17h00</td>
</tr>
<tr>
<td>BIO3002S</td>
<td>MARINE ECOLOGY</td>
<td>3</td>
<td>M to F</td>
<td>One practical per week, W, 14h00-17h00</td>
</tr>
<tr>
<td>BIO3003S</td>
<td>INLAND WATER ECOSYSTEMS</td>
<td>2</td>
<td>M to F</td>
<td>See departmental entry</td>
</tr>
<tr>
<td>BIO3005S</td>
<td>MOLECULAR ECOLOGY</td>
<td>2</td>
<td>M to F</td>
<td>See departmental entry</td>
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<tr>
<td>BIO3006F</td>
<td>ECOSYSTEM ECOLOGY</td>
<td>3</td>
<td>M to F</td>
<td>By arrangement</td>
</tr>
<tr>
<td>BIO3007S</td>
<td>ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE</td>
<td>4</td>
<td>M to F</td>
<td>Two practicals per week, W and F, 14h00-17h00</td>
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<td>BIO3010F</td>
<td>SYSTEMATICS &amp; MACRO EVOLUTION</td>
<td>2</td>
<td>M to F</td>
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<td>CEM1000W</td>
<td>CHEMISTRY 1000</td>
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<td>CEM1009H</td>
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<td>CEM1010F</td>
<td>CHEMISTRY 1010</td>
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<td>CEM2007F</td>
<td>PHYSICAL CHEMISTRY &amp; SPECTROSCOPY</td>
<td>3</td>
<td>M to F</td>
<td>See departmental entry</td>
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<td>CEM2008S</td>
<td>ORGANIC &amp; INORGANIC CHEMISTRY</td>
<td>3</td>
<td>M to F</td>
<td>See departmental entry</td>
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<td>CEM2013S</td>
<td>CHEMISTRY IN HEALTH &amp; DISEASE</td>
<td>5</td>
<td>M to F</td>
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<td>CEM3005W</td>
<td>CHEMISTRY 3005</td>
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<td>CEM3011F</td>
<td>MEDICINAL CHEMISTRY</td>
<td>5</td>
<td>M to F</td>
<td>One practical per week, Tuesday,</td>
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<th>Course Code</th>
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<th>Schedule</th>
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<td>CEM4000W</td>
<td>BSc (HONS) IN CHEMISTRY</td>
<td>150</td>
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<td>CSC1010H</td>
<td>COMPUTER SCIENCE 1010</td>
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<td>M to Th One practical per week, Thursday, 14h00-17h00</td>
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<td>CSC1011H</td>
<td>COMPUTER SCIENCE 1011</td>
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<td>M to Th One practical per week, Monday, 14h00-17h00</td>
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<td>CSC1010H, MAM1005H</td>
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<td>CSC1015F</td>
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<td>CSC1016S</td>
<td>COMPUTER SCIENCE 1016</td>
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<td>M to F See departmental entry</td>
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<tr>
<td>CSC1018F</td>
<td>COMPUTER SCIENCE 1018</td>
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<td>M and F One practical per week</td>
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<td>CSC2001F</td>
<td>COMPUTER SCIENCE 2001</td>
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<td>M to F One 4-hour practical per week, Monday to Friday, 14h00-18h00</td>
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<tr>
<td>CSC2002S</td>
<td>COMPUTER SCIENCE 2002</td>
<td>2</td>
<td>M to F One 4-hour practical per week, Monday to Friday, 14h00-18h00</td>
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<td>See departmental entry</td>
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<tr>
<td>CSC2003S</td>
<td>COMPUTER GAMES</td>
<td>3</td>
<td>M to F One 4-hour practical per week, Monday to Friday, 14h00-18h00</td>
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<tr>
<td>CSC3002F</td>
<td>COMPUTER SCIENCE 3002</td>
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<td>M to F Two 4-hour practicals per week, Monday to Friday, 14h00-18h00</td>
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<td>CSC3003S</td>
<td>COMPUTER SCIENCE 3003</td>
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<td>M to F Two 4-hour practicals per week, Monday to Friday, 14h00-18h00</td>
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<tr>
<td>CSC3015D</td>
<td>THEORY OF ALGORITHMS (1/4 course)</td>
<td>2</td>
<td>M to F Unscheduled work in Laboratories</td>
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<td>CSC2001F &amp; CSC2002S</td>
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<td>CSC3020H</td>
<td>THREE DIMENSIONAL &amp; DISTRIBUTED GAMES DESIGN</td>
<td>3</td>
<td>M to F 4 hours per week, by arrangement</td>
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<td>EGS1002S</td>
<td>HUMAN GEOGRAPHY</td>
<td>2</td>
<td>M to F See departmental entry</td>
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<td>Matric Geography on the Higher Grade, or ERT1000F</td>
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<td>EGS2010F</td>
<td>ENVIRONMENTAL PROBLEMS</td>
<td>5</td>
<td>M to F One practical per week, Thursday or Friday, 14h00-17h00</td>
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<td>ERT1000F (or ERT1002S) and EGS1002S</td>
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<td>EGS2011S</td>
<td>CITIES OF THE SOUTH</td>
<td>4</td>
<td>M to Th See departmental entry</td>
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<td>EGS2012S</td>
<td>PHYSICAL ENVIRONMENTAL PROCESSES</td>
<td>5</td>
<td>M to F One practical per week, Friday, 14h00-17h00</td>
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<td>ERT1000F (or ERT1002S)</td>
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<tr>
<td>EGS3012S</td>
<td>SYNOPTIC CLIMATOLOGY</td>
<td>1</td>
<td>M to F One practical per week, Tuesday or</td>
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<td>EGS3013F</td>
<td>ENVIRONMENTAL ANALYSIS</td>
<td>5 Tu to F</td>
<td>Wednesday, 14h00-17h00</td>
<td>Two practicals per week, Wednesday and Friday, 14h00-17h00</td>
<td>EGS2010F and either EGS2012S or EGS2011S</td>
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<td>EGS3014S</td>
<td>ENVIRONMENTAL CHANGE</td>
<td>5 M to F</td>
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<td>One practical per week, Wednesday, 14h00-17h00</td>
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<td>EGS3015S</td>
<td>URBAN GEOGRAPHY</td>
<td>Meridian M to Th</td>
<td>See departmental entry</td>
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<td>EGS3016F</td>
<td>POPULATION DYNAMICS, MEASUREMENT &amp; PROCESSES I</td>
<td>4 Tu to F</td>
<td>Friday, 6th and 7th period</td>
<td>See departmental entry</td>
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<tr>
<td>EGS3017S</td>
<td>POPULATION DYNAMICS, MEASUREMENT &amp; PROCESSES II</td>
<td>4 Tu to F</td>
<td>Friday, 6th and 7th period</td>
<td>EGS3016F</td>
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<tr>
<td>EGS3018F</td>
<td>INTRODUCTION TO POPULATION STUDIES</td>
<td>3 M to Th</td>
<td>Friday, 3rd period</td>
<td>EGS2011S or SOC2019F</td>
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<tr>
<td>EGS3019S</td>
<td>POPULATION &amp; DEVELOPMENT</td>
<td>3 M to Th</td>
<td>Friday, 3rd period</td>
<td>EGS3018F and EGS2011S or SOC2019F</td>
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<tr>
<td>ERT1000F</td>
<td>INTRODUCTION TO EARTH &amp; ENVIRONMENTAL SCIENCES 1000</td>
<td>2 M to F</td>
<td>See departmental entry</td>
<td>See EGS2011S or SOC2019F</td>
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<td>ERT1003H</td>
<td>FOUNDATIONS OF BIOLOGY, EARTH &amp; ENVIRONMENTAL SCIENCES 1000</td>
<td>2 M to F</td>
<td>Friday, 14h00-17h00</td>
<td>A minimum of 45% in ERT1000F or ERT1002S</td>
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<td>GEO1006S</td>
<td>INTRODUCTION TO MINERALS, ROCKS &amp; STRUCTURE</td>
<td>5 M to F</td>
<td>Thursday, 14h00-17h00</td>
<td>See EGS2011S or SOC2019F</td>
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<td>GEO1007S</td>
<td>EARTH STEWARDSHIP</td>
<td>5 M to F</td>
<td>By arrangements on the website</td>
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<td>GEO2001F</td>
<td>MINERALOGY &amp; CRYSTALLOGraphy</td>
<td>2 M to F</td>
<td>Wednesday, 14h00-17h00</td>
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<td>GEO2004S</td>
<td>PHYSICAL GEOLOGY</td>
<td>2 M to F</td>
<td>Wednesday, 14h00-17h00</td>
<td>GEO2001F</td>
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<tr>
<td>GEO2005X</td>
<td>FIELD GEOLOGY &amp; GEOLOGICAL MAPPING (second-year half course)</td>
<td>None</td>
<td>See departmental entry</td>
<td>GEO1006S, GEO2004S (co-requisite)</td>
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<td>GEO3001S</td>
<td>STRATIGRAPHY &amp; ECONOMIC GEOLOGY</td>
<td>2 M to F</td>
<td>Tuesday and Thursday, 14h00-17h00</td>
<td>GEO2004S, DP in GEO3005F</td>
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<tr>
<td>GEO3005F</td>
<td>PETROLOGY &amp; STRUCTURAL GEOLOGY</td>
<td>2 M to F</td>
<td>Tuesday and Thursday, 14h00-17h00</td>
<td>GEO2001F, GEO2004S, first qualifying course in Chemistry</td>
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<td>HUB2019F</td>
<td>INTRODUCTION TO HUMAN BIOLOGY</td>
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<td>M to F</td>
<td>See departmental entry</td>
<td>CEM1000W (or equivalent), BIO1000F</td>
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<td>HUB2021S</td>
<td>HUMAN BIOLOGY : MAINTENANCE &amp; INTEGRATION</td>
<td>1</td>
<td>M to F</td>
<td>See departmental entry</td>
<td>HUB2019F, CEM1000W or equivalent</td>
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<td>HUB3006F</td>
<td>GENERAL &amp; APPLIED PHYSIOLOGY</td>
<td>1</td>
<td>M to F</td>
<td>See departmental entry</td>
<td>HUB2021S, CEM1000W (or equivalent)</td>
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<td>HUB3007S</td>
<td>BIOPHYSICS &amp; NEUROPHYSIOLOGY</td>
<td>1</td>
<td>M to F</td>
<td>See departmental entry</td>
<td>HUB2021S, CEM1000W (or equivalent)</td>
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<td>HUB3010F</td>
<td>FUNCTIONAL ANATOMY &amp; HISTOLOGY</td>
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<td>Four lectures per week</td>
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<td>HUB3011S</td>
<td>COMPARATIVE ANATOMY &amp; BIOLOGICAL ANTHROPOLOGY</td>
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<td>Four lectures per week</td>
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<td>MAM1000W</td>
<td>MATHEMATICS I</td>
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<td>One 2-hour tutorial per week</td>
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<td>MAM1004F</td>
<td>MATHEMATICS 1004</td>
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<td>M to F</td>
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<td>MAM1004H</td>
<td>MATHEMATICS 1004</td>
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<td>Three lectures per week, days to be arranged, in Meridian</td>
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<td>MAM1005H</td>
<td>MATHEMATICS 1005</td>
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<td>M to F</td>
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<td>MATHEMATICS 1006</td>
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<td>MAM1043H</td>
<td>MODELLING &amp; APPLIED COMPUTING</td>
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<td>See departmental entry</td>
<td>One practical every second week, Friday, 6th and 7th periods</td>
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<td>MAM1044H</td>
<td>DYNAMICS</td>
<td></td>
<td>See departmental entry</td>
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<td>MAM2000W</td>
<td>MATHEMATICS II</td>
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<td>See departmental entry</td>
<td>MAM1000W or equivalent</td>
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<td>MAM2043S</td>
<td>INTRODUCTION TO BIOLOGICAL MODELLING</td>
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<td>M to F</td>
<td>See departmental entry</td>
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<td>APPLIED MATHEMATICS II</td>
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<td>M to F</td>
<td>One tutorial per week, Thursday, 14h00-16h00</td>
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<td>APPLIED MATHEMATICS 2047</td>
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<td>MAM1043H, MAM1044H and MAM1000W</td>
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<td>One tutorial per week, Thursday, 14h00-16h00</td>
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<td>MAM2052F</td>
<td>QUANTITATIVE SKILLS FOR SCIENTISTS</td>
<td>4</td>
<td>M to F</td>
<td>Friday 3rd or Thursday 5th period</td>
<td>MAM1004F or MAM1004H or MAM1005H or MAM1000W</td>
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<td>MATHEMATICS 3001</td>
<td>5 M to F</td>
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<td>MAM3002H and MAM3003S</td>
<td>MATHEMATICS 3002 &amp; MATHEMATICS 3003</td>
<td>5 M to Th</td>
<td>See departmental entry</td>
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<td>MAM3040W</td>
<td>APPLIED MATHEMATICS III</td>
<td>3 M to F</td>
<td>One tutorial per week, Thursday, 6th and 7th periods</td>
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<tr>
<td>MAM3041H</td>
<td>APPLIED MATHEMATICS III (half course)</td>
<td>Depending on modules chosen, as for MAM3040W</td>
<td>One tutorial per week, Thursday, 6th and 7th periods</td>
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<td>MAM3042H</td>
<td>FURTHER BIOLOGICAL MODELLING</td>
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<td>One every two to three weeks, to be arranged</td>
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<td>Depending on modules chosen, as for MAM3040W</td>
<td>One tutorial per week, Thursday, 6th and 7th period</td>
<td>MAM3041H</td>
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<td>MOLECULAR COMPONENTS OF CELLS</td>
<td>4 M to F</td>
<td>See departmental entry</td>
<td>CEM1000W</td>
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<td>METABOLISM</td>
<td>4 M to F</td>
<td>See departmental entry</td>
<td>MCB2014F</td>
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<tr>
<td>MCB2016F</td>
<td>INTRODUCTION TO MICROBIOLOGY</td>
<td>5 M to F</td>
<td>See departmental entry</td>
<td>CEM1000W, BIO1000F</td>
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<td>MCB2017S</td>
<td>MICROBIAL BIOTECHNOLOGY</td>
<td>5 M to F</td>
<td>See departmental entry</td>
<td>MCB2016F</td>
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<td>MCB2018F</td>
<td>INTRODUCTION TO GENETICS</td>
<td>3 M to F</td>
<td>See departmental entry</td>
<td>BIO1000F, BIO1004S, CEM1000W</td>
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<td>MCB2019S</td>
<td>EUKARYOTIC GENE REGULATION &amp; CELL SIGNALLING</td>
<td>3 M to F</td>
<td>See departmental entry</td>
<td>MCB2014F, MCB2018F</td>
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<td>MCB3019F</td>
<td>RECOMBINANT DNA, GENOMICS &amp; PROTEOMICS</td>
<td>4 M to F</td>
<td>See departmental entry</td>
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<td>MCB3020S</td>
<td>PROTEIN STRUCTURE &amp; FUNCTION</td>
<td>4 M to F</td>
<td>See departmental entry</td>
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<td>MCB3021F</td>
<td>MOLECULAR MICROBIAL GENETICS</td>
<td>5 M to F</td>
<td>Tu 14h00-17h00</td>
<td>See departmental entry</td>
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<tr>
<td>MCB3022S</td>
<td>ADVANCED BIOTECHNOLOGY</td>
<td>2 M to F</td>
<td>W 14h00-17h00</td>
<td>See departmental entry</td>
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<td>MCB3023S</td>
<td>MOLECULAR EVOLUTIONARY GENETICS &amp; DEVELOPMENT</td>
<td>3 M to F</td>
<td>See departmental entry</td>
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<td>MCB3024S</td>
<td>DEFENCE &amp; DISEASE</td>
<td>5 M to F</td>
<td>See departmental entry</td>
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<td>PHY1004W</td>
<td>INTRODUCTORY PHYSICS</td>
<td>3 M to F</td>
<td>One practical or tutorial per week, Tuesday 14h00 to 17h00</td>
<td>See departmental entry</td>
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<td>PHY1023H</td>
<td>FOUNDATIONS &amp; PRINCIPLES OF PHYSICS</td>
<td>3 M to F</td>
<td>One practical or tutorial per week, Tuesday, 14h00-17h00</td>
<td>See departmental entry</td>
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<td>Course Code</td>
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<td>Contact Hours</td>
<td>Co-requisites</td>
<td>Notes</td>
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<td>PHY1024F</td>
<td>PHYSICS OF RADIATION &amp; MATTER</td>
<td>3</td>
<td>M to F</td>
<td>One practical or tutorial per week, W, 14h00 to 17h00</td>
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<td>PHY1031F</td>
<td>PHYSICS OF NATURAL SYSTEMS 1</td>
<td>3</td>
<td>M to F</td>
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<td>PHY1032S</td>
<td>PHYSICS OF NATURAL SYSTEMS 2</td>
<td>3</td>
<td>M to F</td>
<td>See departmental entry</td>
<td>At least 40% in PHY1031F or PHY1023H</td>
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<td>PHY2009S</td>
<td>THE PHYSICS OF FLUIDS &amp; FIELDS</td>
<td>5</td>
<td>M to F</td>
<td>W 14h00-17h00</td>
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<td>PHY2014F</td>
<td>WAVES &amp; ELECTROMAGNETISM</td>
<td>4</td>
<td>M to F</td>
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<td>PHY2015S</td>
<td>CLASSICAL &amp; QUANTUM MECHANICS</td>
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<td>PHY3021F</td>
<td>ADVANCED PHYSICS 1</td>
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<td>Two sessions per week, M and Th, 14h00-17h00</td>
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<td>PHY3022S</td>
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<td>SAN1015F</td>
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<td>SEA2002S</td>
<td>COASTAL OCEANOGRAPHY</td>
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<td>One tutorial or practical per week, Tu, 14h00-17h00</td>
<td>SEA2003F (or SEA2000F)</td>
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<td>SEA2003F</td>
<td>INTRODUCTORY PHYSICAL OCEANOGRAPHY &amp; MARINE DISASTERS</td>
<td>1</td>
<td>M to F</td>
<td>One tutorial or practical per week, Tuesday, 14h00-17h00</td>
<td>PHY1031F or PHY1032S or EGS1002S or ERT1000F (ERT1002H/S)</td>
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<td>SEA3002F</td>
<td>OCEAN CIRCULATION</td>
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<td>STA1000F AND STA1000S</td>
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<td>STA1006S</td>
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<td>STA3043S</td>
<td>STATISTICS 3043</td>
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<td>STA3045F</td>
<td>MARKOV PROCESSES &amp; ADVANCED TIME SERIES</td>
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<td>One tutorial per week, refer department</td>
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</tr>
</tbody>
</table>
INDEX

Actuarial Science, BSc(Hons) in ................................................................. 135
Actuarial Science specialisation field in Mathematical, Physical and Statistical Science Degree Programme ................................................................. 15
Admission to BSc degree, Minimum requirements for ........................................ 6
Admission to the BSc (Hons) degree ............................................................. 24
Admission to the MSc degree ..................................................................... 25
Admission, Transfer from other faculties ...................................................... 11
Advanced level school examinations, Exemption on grounds of ...................... 11
Applied Marine Science, MSc in .............................................................. 120
Archaeology ............................................................................................... 30
Astronomy .................................................................................................. 36
Astrophysics, BSc(Hons) in ....................................................................... 38
Atmospheric Science, BSc (Hons) in .......................................................... 70
Avian Biology, BSc (Hons) in .................................................................... 145
Botany ........................................................................................................ 40
BSc (Hons), Rules for the degree of ........................................................... 24
BSc (Hons), Subjects for the degree of ....................................................... 24
BSc, Rules for the degree of ...................................................................... 8
Chemical Crystallography, MSc in ............................................................ 53
Chemistry ................................................................................................... 47
Class medals .............................................................................................. 13
Computer Science ..................................................................................... 54
Conservation Biology, MSc in ................................................................. 145
Convenors for Degree Programmes ............................................................ 3
Course codes, Explanatory note on ............................................................. 14
Curriculum for the BSc degree programmes, SB006, SB012, SB013 and SB014 ... 15
Curriculum for the General Entry for Programmes in Science, SB011 ............ 23
Dean's Merit List ....................................................................................... 13
Degree Programmes offered in the Faculty of Science ................................. 15
Degrees offered in the Faculty ................................................................... 7
Distinction, Award of ................................................................................ 11
Distinguished Teachers in the Faculty ....................................................... 5
DSc, Rules for the degree of ....................................................................... 28
Electron Microscope Unit .......................................................................... 147
Environmental and Geographical Science .................................................. 62
Environmental Evaluation Unit ................................................................... 62
Environmental Management, MPhil in ...................................................... 72
Examinations, Supplementary .................................................................... 9
Faculty Student Council (SSC) .................................................................. 4
Fellows in the Faculty ................................................................................ 4
Geochimistry, BSc (Hons) in ................................................................... 74
Geology ..................................................................................................... 79
Geomatics Division (Faculty of Engineering and the Built Environment) .......... 81
Human Biology .......................................................................................... 86
Industrial Mathematics, BSc (Hons) in ....................................................... 107
Marine Biology, BSc (Hons) in ................................................................. 145
Mathematical Statistics, MSc in ............................................................... 136
Mathematics and Applied Mathematics ..................................................... 91
Mathematics of Computer Science, BSc (Hons) in ..................................... 107
Mathematics of Finance, MSc in ............................................................... 108
Molecular and Cell Biology ........................................................................ 110
MSc, Dissertation for the degree of ................................................................. 26
MSc, Rules for the degree of ................................................................. 25
MSc, Subjects for the degree of ................................................................. 26
Ocean and Atmosphere Science, MSc in ................................................................. 120
Oceanography ................................................................. 118
Operational Research in Development, MSc in ................................................................. 137
Operational Research, MSc in ................................................................. 136
PhD, Rules for the degree of ................................................................. 27
Physical Oceanography, BSc(Hons), MSc or PhD in ................................................................. 120
Physics ................................................................. 122
Postgraduate Centre, The................................................................. 4
Prizes ................................................................. 5
Programme Convenors in the Faculty ................................................................. 3
Readmission to the Faculty, Refusal of ................................................................. 10
Rules for the BSc degree ................................................................. 8
Rules for the BSc (Hons) degree ................................................................. 24
Rules for the DSc degree ................................................................. 28
Rules for the MSc degree ................................................................. 25
Rules for the PhD degree ................................................................. 27
Scholarships ................................................................. 6
Statistical Sciences, BSc(Hons) in ................................................................. 135
Statistical Sciences, MSc in ................................................................. 137
Statistics ................................................................. 130
Student Advisers in the Faculty ................................................................. 3
Student Council, Faculty, (SSC) ................................................................. 4
Supplementary examinations ................................................................. 9
Theoretical Physics, BSc (Hons) or MSc in ................................................................. 129
Transfer from other faculties ................................................................. 11
UCT Book Award ................................................................. 5
Zoology ................................................................. 138