

# 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

### 2007

**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:**

<b><u>Telephones:</u></b>	Dean's Office	(021) 650 2711
	Faculty Office	(021) 650 2712/3023
	Accounts and Fees	(021) 650 4076/2134
	Admissions	(021) 650 2128

<b><u>Internet:</u></b>	UCT's Home Page	<a href="http://www.uct.ac.za">http://www.uct.ac.za</a>
	Faculty Website	<a href="http://www.science.uct.ac.za">http://www.science.uct.ac.za</a>
	Faculty Office	<a href="mailto:scifac@science.uct.ac.za">scifac@science.uct.ac.za</a>
	International Academic Programmes Office	<a href="mailto:iapo@world.uct.ac.za">iapo@world.uct.ac.za</a>

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**

- |                    |  |
|--------------------|--|
| <b>Book 1:</b>     | Information for applicants for undergraduate degrees and diplomas  |
| <b>Book 2:</b>     | Authorities and information of record  |
| <b>Book 3:</b>     | General rules and policies   |
| <b>Book 4:</b>     | Academic calendar and meetings   |
| <b>Book 5:</b>     | Student support and services   |
| <b>Books 6-11:</b> | Handbooks of the Faculties of Commerce, Engineering and the Built Environment, Health Sciences, Humanities, Law, Science |
| <b>Book 12:</b>    | Student fees   |
| <b>Book 13:</b>    | Financial assistance for undergraduate students  |
| <b>Book 14:</b>    | 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

<b>General Information.....</b>	<b>2</b>
Officers in the Faculty .....	2
Convenors for Degree Programmes in the Faculty of Science .....	2
Student Advisers in the Faculty .....	3
Faculty Student Council.....	3
Postgraduate Centre, The .....	3
Fellows in the Faculty.....	4
Distinguished Teachers in the Faculty .....	4
UCT Book Award.....	5
Prizes .....	5
Scholarships.....	6
Minimum requirements for admission to undergraduate programmes .....	6
Degrees Offered in the Faculty of Science.....	6
<b>Rules for degrees / Degree Programmes .....</b>	<b>8</b>
Rules for the degree of Bachelor of Science .....	8
Explanatory Notes on Course Codes.....	13
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
<b>Departments in the Faculty.....</b>	<b>30</b>
Department of Archaeology.....	30
Department of Astronomy .....	36
Department of Botany.....	40
Department of Chemistry.....	48
Department of Computer Science.....	57
Department of Environmental and Geographical Science.....	66
Department of Geological Sciences.....	78
Division of Geomatics (Faculty of Engineering and the Built Environment).....	85
Department of Human Biology (Faculty of Health Sciences).....	90
Department of Mathematics and Applied Mathematics .....	95
Department of Molecular and Cell Biology .....	113
Department of Oceanography .....	124
Department of Physics.....	128
Department of Statistical Sciences.....	137
Department of Zoology.....	148
<b>Inter-faculty Unit.....</b>	<b>158</b>
Electron Microscope Unit.....	158
<b>Schedule of courses.....</b>	<b>159</b>
<b>Index.....</b>	<b>168</b>

---

## TELEPHONE NUMBERS OF DEPARTMENTS IN THE FACULTY OF SCIENCE

Archaeology	650 2353
Astronomy	650 5830
Botany	650 2447
Chemistry	650 2446
Computer Science	650 2663
Environmental and Geographical Science	650 2874
Geological Sciences	650 2931
Human Biology (Faculty of Health Sciences)	406 6235
Mathematics and Applied Mathematics	650 3191
Molecular and Cell Biology	650 3270
Oceanography	650 3277
Physics	650 3326
Statistical Sciences	650 3219
Zoology	650 3603

---

## GENERAL INFORMATION

### Officers in the Faculty

**Dean of the Faculty of Science:**

Professor K A Driver, BSc (Hons)  
*Witwatersrand MSc Stanford PhD  
Witwatersrand*

Rm A200 P D Hahn Building  
Dean@science.uct.ac.za

**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*

Rm A323 PD Hahn Building  
gammondw@science.uct.ac.za  
Rm 409 Geological Sciences Building  
aleroex@geology.uct.ac.za

**Secretary to the Dean:**

E Taladia

etaladia@science.uct.ac.za

*Academic Administration:*

**Faculty Manager (Academic):**

K T Wienand, MSc *Cape Town*

**Rm A200 P D Hahn Building**

wienand@science.uct.ac.za

**Administrative Officer (Undergraduate):**

T Mohamed, BSc BCom (Hons) *UWC*

scitm@science.uct.ac.za

**Administrative Officer (Postgraduate):**

P Phillips, BA *Cape Town*

phillips@science.uct.ac.za

**Administrative Assistant:**

Z Salie

scizs@science.uct.ac.za

**Senior Secretaries/Receptionists:**

S Adams

sadams@science.uct.ac.za

Z Hartley

hartleyz@science.uct.ac.za

A Rooks, BA PGCE *Cape Town*

amy.rooks@uct.ac.za

*Communications & Marketing:*

**Faculty Manager (Communications,**

**Development & Marketing)**

---

---

**Schools Liaison & Recruitment Officer**

S Masoet, BCom (Hons) *UWC*

smasoet@science.uct.ac.za

*Finance and Operations Administration:*

**Faculty Manager (Finance):**

H Crowther, HNC(Chem) *Leeds Polytechnic*

crowther@science.uct.ac.za

**Assistant Faculty Manager (Finance):**

V Stemmet, BCom (Hons) *UWC*

stemmet@science.uct.ac.za

**Faculty Finance Officers:**

D Fielding

fielding@science.uct.ac.za

R Hendricks

rovena@science.uct.ac.za

L A Strauss, BCom (Acc) *UWC*

lstrauss@science.uct.ac.za

*Human Resource Management:*

**Human Resource Advisor:**

L Toerien, BA *Cape Town* IPM Dipl

ltoerien@science.uct.ac.za

**Human Resource Officer:**

Z Matthews, BAdmin *UWC*

zmathews@science.uct.ac.za

### Convenors for Degree Programmes in the Faculty of Science

Programme in Information Technology

Associate Professor S Berman

Rm 317 Computer Science Building  
sonia@cs.uct.ac.za

**Programme in Biology, Earth and Environmental Sciences**

Professor J J Bolton

Rm 2.14 HW Pearson Building (Botany)  
bolton@botzoo.uct.ac.za

**Programme in Chemical, Molecular & Cellular Sciences**

Associate Professor G G Lindsey

Rm 401A Molecular Biology Building  
lindsey@science.uct.ac.za

**Programme in Mathematical, Physical and Statistical Sciences**

Dr J Conradie

Rm 325 Mathematics Building  
jurie@maths.uct.ac.za

**General Entry for Programmes in Science (GEPS)**

Associate Professor B Davidowitz

Rm A117 P D Hahn Building (Chemistry)  
bette@science.uct.ac.za

## Student Advisers in the Faculty

**Information Technology:**

Mr D Cook

Rm 304 Computer Science Building  
dc@cs.uct.ac.za

Dr M Kuttel

Rm 307 Computer Science Building  
mkuttel@cs.uct.ac.za

**Biology, Earth and Environmental Sciences**

Dr K Winter

Rm 4.08 Environmental & Geographical  
Sciences Building  
winter@enviro.uct.ac.za

Dr G A Verboom

Rm 3.15 H W Pearson Building (Botany)  
verboom@botzoo.uct.ac.za

Dr J O'Riain

Rm 1.37 John Day Zoology Building  
joriain@botzoo.uct.ac.za

**Chemical, Molecular and Cellular Sciences**

---

Dr L Roden

Rm 435 Molecular Biology Building  
lroden@science.uct.ac.za

Associate Professor V Coyne

Rm 200 Molecular Biology Building  
vernon@science.uct.ac.za

**Mathematical, Physical and Statistical Sciences**

Associate Professor A Buffler

Rm 503 R W James Building (Physics)  
abuffler@science.uct.ac.za

Ms K Bennie

Rm 206.2 Mathematics Buildings  
kbennie@maths.uct.ac.za

Dr J Nyirenda

Rm 334 P D Hahn Building  
nyirenda@stats.uct.ac.za

## Faculty Student Council

The Science Students' Council is elected annually by the students in the Faculty of Science. The Science Students' Council forms an important part of the Governance and Committee structures in the Faculty of Science (see booklet "Faculty of Science, Governance and Committees"). The SSC may be contacted via email: [uct\\_ssc@science.uct.ac.za](mailto:uct_ssc@science.uct.ac.za). The Chairperson of the Science Students Council is Mr N Zalumis.

## 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

## 4 GENERAL INFORMATION

(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 O A M Lewis
Professor W J Bond	Professor G N Louw
Professor G M Branch	Professor J R E Lutjeharms
Professor A C Brown	Dr N A H Millard
Professor G C L Brümmer	Professor V C Moran
Professor D M Butterworth	Professor J R Moss
Professor M R Cairá	Professor L R Nassimbeni
Professor R D Cherry	Professor J E Parkington
Professor A Chinsamy-Turan	Professor E G Prout
Professor J W A Cleymans	Professor D E Rawlings
Professor M J de Wit	Professor B D Reddy
Professor G F R Ellis	Associate Professor F T Robb
Professor A P Fairall	Professor A L Rodgers
Professor J G Field	Dr K H Schütte
Associate Professor C L Griffiths	Professor W R Siegfried
Professor J J Gurney	Professor A M Stephen
Professor M J Hall	Professor J A Thomson
Professor K A Hardie	Professor L G Underhill
Professor J U M Jarvis	Professor C von Holt
Professor H Klump	Professor R D Viollier
Professor D W Kurtz	Professor B Warner
Professor A P le Roex	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)	1998: Professor J A Thomson (Microbiology)
1984: Professor J H Webb (Mathematics)	1998: Associate Professor I V Barashenkov (Mathematics)
1986: Associate Professor B R Davies (Zoology)	1998: Professor J U M Jarvis (Zoology)
1990: Associate Professor H S T Driver (Physics)	1999: Dr T Egan (Chemistry)
1998: Mr A N Rynhoud (Mathematics)	2000: Associate Professor D L Reid (Geological Sciences)
1992: Dr J J Conradie (Mathematics)	2001: Dr V Abratt (Molecular & Cell Biology)
1992: Professor J E Parkington (Archaeology)	2002: Professor J W Lutjeharms (Ocean & Atmosphere Science)
1994: Professor J R Moss (Chemistry)	2002: Dr S Oldfield (Environmental & Geographical Science)
1996: Professor M J Hall (Archaeology)	2002: Dr A Buffler (CHED/Physics)



1996: Dr M D Picker (Zoology)  
 1997: Dr N Morrison (Mathematics)

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 Borchers Prize

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

### Frank Schweitzer Memorial Prize

Awarded to one or more outstanding senior students in Archaeology, at the discretion of the Head of Department.

### Gordon Percy Memorial Award

Awarded to the best student in Chemistry Honours.

### 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.

## 6 GENERAL INFORMATION

### 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 Joint Matriculation Board was dissolved in September 1992. Its functions have been transferred to the South African Certification Council (SAFCERT) in respect inter alia of the issue of senior (school-leaving) certificates and to the Committee of University Principals Matriculation Board in respect of the issue of certificates of complete exemption and conditional exemption.

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. The Matriculation Board's website address is <http://hesa-enrol.ac.za/mb>

All references in the rules for undergraduate degrees and diplomas to admission requirements, matriculation and matriculation exemption are to be read in the context of these changes.

Certificates of matriculation or exemption from matriculation issued by the Joint Matriculation Board remain valid for the purpose of applying for admission to Bachelor's degree study.

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 Philosophy (MPhil) degree
- iv) Master of Science (MSc) 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:
- the equivalent of four half-courses in each semester in the first academic year of study;
  - 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:
- 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);
  - 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;
  - waivers to students who satisfy (a) or (b) above will depend on an assessment, by a Student Adviser or Programme Convenor (SB013), 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

## 10 RULES FOR DEGREES / DEGREE PROGRAMMES

### **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:
- 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;
  - three and a half courses or the equivalent, including all first-year courses required for a specialisation by the end of the second year;
  - five and a half courses or equivalent, including one and a half senior courses, by the end of the third year;
  - 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:
- one and a half courses or the equivalent, including one course specific to a specialisation, by the end of the first year;
  - three full-year courses or the equivalent, including two and a half courses specific to a specialisation, by the end of the second year;
  - five full-year courses or the equivalent, of which at least one shall be a senior course, by the end of the third year;
  - 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 appropriate, as applicable *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 2007)

- (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
Atmosphere Science:	Two of EGS2012S, SEA2003F (or SEA2000F), SEA2002S and two of EGS3012S, EGS3013F, SEA3002F
Biochemistry:	MCB2000F, MCB2001S, MCB3000C, MCB3001B, MCB3015A, MCB3016D
Biodiversity & Evolutionary Biology:	Two of BIO2006F, BIO2005S, BIO2002S; BIO3000S and one of BOT3009F, ZOO3000F, ZOO3004F
Bioinformatics:	Either CSC2001F or CSC2002S; either MCB2000F or MCB2001S; either CSC3002F or CSC3003S; and two of

## 12 RULES FOR DEGREES / DEGREE PROGRAMMES

	MCB3007A, MCB3001B, MCB3000C, MCB3017D
Biotechnology:	MCB2009C, CHE2039D, MCB2007F or MCB3007A, MCB3003B, MCB3010S
Botany:	Four senior half-courses coded BOT or BIO which are required for a specialisation in Botany
Business Computing:	Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H
Chemistry:	CEM2007F, CEM2008S and CEM3005W
Computer Engineering:	Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H
Computer Games Design:	Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H
Computer Science:	Two of CSC2001F, CSC2002S, CSC2003S; and two of CSC3002F, CSC3003S, CSC3020H
Demographics & Statistics:	EGS3016F, EGS3017S, EGS3018F and EGS3019S
Ecology:	Two of BIO2000F, BOT2007S, ZOO2000F; BOT3009F and one of ZOO3002F, ZOO3003S, ZOO3004F
Environmental and Geographical Science:	EGS2010F, EGS2011S or EGS2012S; Two of EGS3013F, EGS3012S, EGS3014S, EGS3015S
Genetics & Development:	MCB2003F, MCB2013S, MCB3013C, MCB3014B, MCB3018D, BIO3009A
Geoinformatics:	APG1016S, APG2015F, APG3011F, APG3012S and APG4004A
Geology:	GEO2001F, GEO2004S, GEO3005F and GEO3001S
Marine Biology:	Two of BIO2004F, SEA2003F, BIO2005S; BIO3002S plus one of SEA3002F, BIO3001F, BIO3003S, BIO3006F
Mathematics:	MAM2000W and MAM3000W
Microbiology:	MCB2005F, MCB2006S, MCB3007A, MCB3008B, MCB3011S
Ocean and Atmosphere Science:	SEA2003F (or SEA2000F), SEA2002S, SEA3002F and EGS3012S
Physics:	PHY2014F, PHY2015S, PHY3021F, PHY3022S
Physiology:	HUB2019F, HUB2013S, HUB3006F and HUB3007S
Statistics:	STA2004F, STA2005S; two of 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 2007)**

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:

## 14 RULES FOR DEGREES / DEGREE PROGRAMMES

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" ie: 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).

<i>CEM1000W</i>	<i>Chemistry 1000</i>
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
<i>ZOO3002F</i>	<i>Marine Ecology</i>
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 and Evolutionary Biology; Botany; Ecology; Environmental & Geographical Science; Geology; Ocean and Atmosphere Science; Zoology

#### **BEES Specialisations for students entering first-year in 2005 or later:**

Archaeology; Atmospheric Science; Botany; Ecology; Environmental & Geographical Science; Biodiversity and Evolutionary Biology; Geology; Marine Biology; Ocean and Atmosphere Science; Zoology; Geoinformatics (Geoinformatics must be accompanied by a Science specialisation.)

### **Programme in Chemical, Molecular and Cellular Sciences (CMCS SB013)**

Biochemistry; Biotechnology; Chemistry; Genetics and Development; 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**

*Note: Students wishing to obtain BCS (British Computer Society) accreditation for the BSc (IT) degree followed by Computer Science Honours will be required to take CSC3020H as one of their 3000-level elective courses.*

#### *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 APG2014S, APG3012S, APG4004A and APG3016C. MAM2004H/2000W with module 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

2000-level courses: CSC2001F, CSC2002S, MCB2000F, MCB2001S

3000-level courses: CSC3002F, CSC3003S, MCB3007A, MCB3001B, MCB3000C, MCB3017D

*Note: MAM2004H, STA2004F and STA3046C are strongly recommended.*

*Specialisation in BUSINESS COMPUTING*

1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent), ACC1006F, either ACC1011S or ACC1012S, ECO1010F, ECO1011S

2000-level courses: CSC2001F, CSC2002S, INF2009F, INF2011S, either BUS1010F/S or BUS1005F

3000-level courses: CSC3002F, CSC3003S

*NOTE: A total of nine and a half courses is required for Business Computing*

*Specialisation in COMPUTER ENGINEERING*

1000-level courses: CSC1015F or CSC1018F, CSC1016S, MAM1000W (or equivalent), (PHY1031F + PHY1032S) or equivalent

2000-level courses: CSC2001F, CSC2002S, EEE2032F, EEE2026S, and either BUS1010F/S or BUS1005F

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).

*Specialisation in COMPUTER GAMES DESIGN*

1000-level courses: CSC1015F or CSC1018F, CSC1016F, MAM1000W (or equivalent), MAM1043H

2000-level courses: CSC2001F, CSC2002S, CSC2003S

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

2000-level courses: CSC2001F, CSC2002S, MAM2001H, and either BUS1010F/S or BUS1005F

3000-level courses: CSC3002F, CSC3003S

## 18 RULES FOR DEGREES / DEGREE PROGRAMMES

*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**

#### **Specialisations for students first registered before 2005**

##### *Specialisation in ARCHAEOLOGY*

1000-level courses: ERT1000F (ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W

2000-level courses: AGE2011S, AGE2012F

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)

2000-level courses: EGS2012S, SEA2003F, SEA2002S, MAM2052F

3000-level courses: EGS3012S, EGS3013F (or EGS3014S if no EGS2010F), SEA3002F

##### *Specialisation in BIODIVERSITY AND EVOLUTIONARY BIOLOGY*

1000-level courses: BIO1000F, BIO1004S, CEM1000W (or equivalent), MAM1004F + STA1000S/STA1007S (or equivalent) or MAM1000W

2000-level courses: BIO2006F, and BIO2005S or BIO2002S

3000-level courses: BIO3000S and one of BOT3009F (or BOT3005F), ZOO3000F, ZOO3004F

##### *Specialisation field in BOTANY*

1000-level courses: BIO1000F, BIO1004S, CEM1000W (or equivalent), MAM1004F + STA1000S/STA1007S (or equivalent) or MAM1000W

2000-level courses: BIO2006F, BIO2007S

3000-level courses: two of BOT3009F (or BOT3005F), BOT3010F, BIO3000S

##### *Specialisation in ECOLOGY*

1000-level courses: BIO1000F, BIO1004S, CEM1000W (or equivalent), ERT1000F (or ERT1002H/S), MAM1004F + STA1000S/STA1007S (or equivalent) or MAM1000W

2000-level courses: BIO2000F, BIO2007S, BIO2004F

3000-level courses: BOT3009F (or BOT3005F), and one of ZOO3002F, ZOO3003S, ZOO3004F

##### *Specialisation in ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE*

1000-level courses: ERT1000F (or ERT1002S), EGS1002S, MAM1004F + STA1000S (or equivalent) or MAM1000W

2000-level courses: EGS2010F, 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)

2000-level courses: GEO2001F, GEO2004S, MAM2052F, GEO2005X\*

3000-level courses: GEO3001S, GEO3005F

\* field work course to be taken over second and third years of study

##### *Specialisation in OCEAN AND ATMOSPHERE SCIENCE*

1000-level courses: ERT1000F (or ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W, PHY1031F or PHY1032S (or equivalent)

2000-level courses: SEA2003F, SEA2002S

3000-level courses: SEA3002F, EGS3012S

*Specialisation in ZOOLOGY*

1000-level courses: BIO1000F, BIO1004S, CEM1000W (or equivalent), MAM1004F + STA1000S/STA1007S (or equivalent) or MAM1000W

2000-level courses: BIO2004F and BIO2005S or BIO2002S

3000-level courses: ZOO3000F or ZOO3004F or BIO3000S and one other 3000-level ZOO or BIO course

**Specialisations for those entering first-year in 2005 or later:**

*Specialisation in ARCHAEOLOGY*

1000-level courses: ERT1000F (ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W

2000-level courses: AGE2011S, AGE2012F

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), first-year semester elective

2000-level courses: EGS2012S, SEA2003F, SEA2002S, MAM2052F, full course elective

3000-level courses: EGS3012, EGS3013F (or EGS3014S if no EGS2010F), SEA3002F, second- or third-year semester electives

*Specialisation in BIODIVERSITY AND EVOLUTIONARY BIOLOGY*

1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W

2000-level courses: BIO2006F, BIO2007S and BIO2002S or BIO2005S

3000-level courses: BIO3009A, BIO3008B, MCB3013C, BIO3005D, MCB3012Z

*Specialisation in BOTANY*

1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W

2000-level courses: BIO2003F, BIO2006F, BIO2007S

3000-level courses: Two of BIO3009A + BIO3008B, BIO3005F, BIO3006F, BIO3007S

*Specialisation in ECOLOGY*

1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), CEM1000W

2000-level courses: BIO2003F, BIO2004F, plus one of BIO2006F, BIO2002S or BIO2005S

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, BIO3009A + BIO3008B, BIO3007S

*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)

2000-level courses: GEO2001F, GEO2004S, MAM2052F, GEO2005X\*

## 20 RULES FOR DEGREES / DEGREE PROGRAMMES

3000-level courses: GEO3005F, GEO3001S

\* field work course to be taken over second and third years of study

### *Specialisation in MARINE BIOLOGY*

1000-level courses: BIO1000F/H, BIO1004S, MAM1004F + STA1007S (or equivalent), ERT1000F, CEM1000W

2000-level courses: BIO2004F, SEA2003F, BIO2005S

3000-level courses: BIO3002S plus SEA3002F or BIO3001F or BIO3003S or BIO3006F

### *Specialisation in OCEAN & ATMOSPHERE SCIENCE*

1000-level courses: ERT1000F (ERT1002S), MAM1004F + STA1000S (or equivalent) or MAM1000W, PHY1031F (or equivalent)

2000-level courses: SEA2003F, SEA2002S

3000-level courses: SEA3002F, EGS3012S

### *Specialisation in ZOOLOGY*

1000-level courses: BIO1000F/H, BIO1004S MAM1004F + STA1007S (or equivalent), CEM1000W

2000-level courses: BIO2003F, BIO2004F plus BIO2005S or BIO2002S

3000-level courses: BIO3001F and BIO3009A + BIO3008B or BIO3003S or BIO3004F

### *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. Any other courses towards a Science specialisation plus at least one full-course equivalent selected from APG2026F, APG3012S, APG2014S, APG4004A, APG3016C.

*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.*

## **Programme in Chemical, Molecular and Cellular Sciences**

### *Specialisation in BIOCHEMISTRY*

1000-level courses: CEM1000W, MAM1000W or MAM1004F + STA1000S or STA1007S, BIO1000F, first-year Physics course highly recommended

2000-level courses: MCB2000F, MCB2001S

3000-level courses: MCB3015A + MCB3001B + MCB3000C + MCB3016D or MCB3017D, MCB3012Z

### *Specialisation in BIOTECHNOLOGY*

1000-level courses: CEM1000W, MAM1000W or MAM1005H + STA1000S or STA1007S, BIO1000F

2000-level courses: MCB2007F, MCB2009C, CHE2039D, MCB2000F, MCB2001S, MCB2005F, MCB2006S or CEM2013S

3000-level courses: MCB3007A, MCB3003B, MCB3010S, 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 AND DEVELOPMENT*

1000-level courses: CEM1000W, MAM1000W or MAM1004F or MAM1005H, STA1000S or STA1007S, BIO1000F, BIO1004S

2000-level courses: MCB2000F, MCB2001S, MCB2003F, MCB2013S

3000-level courses: BIO3009A, MCB3013C, MCB3014B, MCB3018D, MCB3012Z

*Specialisation in HUMAN BIOSCIENCE*

1000-level courses: BIO1000F, BIO1004S, CEM1000W, MAM1004S, STA1000S or STA1007S, PSY1001W

2000-level courses: HUB2019F, HUB2013S, two of PSY2008F, PSY2009F, PSY2003S or PSY2005S. Any 2nd year Science full course or equivalent approved by the Programme Convenor

3000-level courses: HUB3006F, HUB3007S, PSY3007F, two of PSY3004S, PSY3005S, PSY3008F

*Specialisation in MICROBIOLOGY*

1000-level courses: CEM1000W, MAM1000W or MAM1004F + STA1000S, BIO1000F

2000-level courses: MCB2005F, MCB2006S, MCB2000F, MCB2001S

3000-level courses: MCB3007A, MCB3008B, MCB3011S, MCB3012Z

*Specialisation in PHYSIOLOGY*

1000-level courses: MAM1000W or MAM1004F + STA1000F or STA1007S, BIO1000F, BIO1004S, CEM1000W (PHY1031F, PHY1032S strongly recommended)

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*

**Programme in Mathematical, Physical and Statistical Sciences**

*Specialisation in ACTUARIAL SCIENCE*

1000-level courses\*: MAM1000W, ECO1010F, ECO1011S, ACC1006F, ACC1011S, STA1006S, BUS1003S

2000-level courses: MAM2000W, STA2004F, STA2005S, BUS2016H, BUS2019S\*\*

3000-level courses: BUS3018F, BUS3024S, STA3041F, STA3043S, STA3045F

\* Notes: 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.

*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

## 22 RULES FOR DEGREES / DEGREE PROGRAMMES

2000-level courses: AST2002S, MAM2000W or (MAM2004H + MAM2046W), PHY2014F, PHY2015S

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

2000-level courses: MAM2000W, STA2004F, STA2005S and **either** SOC2019F **or** EGS2011S

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

2000-level courses: PHY2014F, PHY2015S, MAM2000W or (MAM2046W + MAM2004H),

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 and Chemistry, as well as optional components in either Computer Science, or in the Life or Earth Sciences. 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:  
Year one: CEM1009H, MAM1005H, PHY1023H and one of CSC1010H or BIO1000H or ERT1000F/ERT1002S.

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
- 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
  - 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
  - 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.*
- 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 and Theoretical Physics |
| Archaeology and Environmental Science        | Mathematics                          |
| Astrophysics & Space Science                 | Mathematics of Computer Science      |
| Atmospheric Science                          | Molecular & Cell Biology             |
| Botany                                       | Ocean & Atmosphere Science           |
| Botany (Biodiversity & Evolutionary Biology) | Physical Oceanography                |
| Botany (Plant Ecology)                       | Physics                              |
| Chemistry                                    | Quaternary Science                   |
| Computer Science                             | Statistics                           |
| Disaster Risk Science                        | Theoretical Physics                  |
| Environmental and Geographical Science       | Zoology                              |
| Geochemistry                                 | Zoology (Avian Biology)              |
| Geology                                      | Zoology (Freshwater Biology)         |
| Industrial Mathematics                       | Zoology (Marine Biology)             |

### 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 in inter-faculty units where a Master of Science degree is not appropriate.

### 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.

#### *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 must, after consultation with the prospective supervisor or supervisors, 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:

## 26 RULES FOR DEGREES / DEGREE PROGRAMMES

Analytical Chemistry	Geochemistry
Applied Marine Science	Geology
Applied Mathematics	Mathematical Statistics
Archaeology	Mathematics
Astronomy	Mathematics of Finance
Astrophysics & Space Science	Molecular and Cell Biology
Botany	Ocean and Atmosphere Science
Chemical Crystallography	Operational Research
Chemistry	Operational Research in Development
Computer Science	Physical Oceanography
Conservation Biology	Physics
Disaster Risk Science (MPhil)	Quaternary Science
Environmental and Geographical Science	Statistics
Environmental Geochemistry	Structural Biology
Environmental Management (MPhil)	Systematics and Biodiversity Science
Information Technology	Theoretical Physics
	Zoology

### Award of the degree

- FM4.1 The degree of MSc may be conferred
- after acceptance by Faculty of a dissertation constituting a detailed report on a research project(s) performed under the guidance of an approved supervisor (MSc by dissertation only), or
  - after a programme of advanced formal training and supervised research, for which a dissertation would be a partial requirement (MSc by coursework and dissertation); provided that in both cases an oral examination may be required.
- 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 projects undertaken.

#### *Guidelines for candidates*

After registration the candidate is expected to consult regularly with the supervisor(s). At the end of each academic year 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.

### The dissertation (research masters)

- 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
- 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 Dean in writing of his or her intention to submit the dissertation for examination by no later than 20 January 2007 for graduation in June 2007 or by 20 June 2007 for graduation in December 2007, and
  - (b) submit a minimum of three copies in temporary binding to the Dean by 15 February 2007 for graduation in June 2007 or by 15 August 2007 for graduation in December 2007. A further two unbound copies 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 department, 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.

#### **The dissertation (by coursework and dissertation)**

Candidates to consult with the Head of Department on number of copies required and necessary procedures to follow when submitting the dissertation. See submission dates under section FM6.3 above.

### **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 20 January or 20 June respectively; the final dates for receipt of theses by the Doctoral Degrees Board Office are 15

## 28 RULES FOR DEGREES / DEGREE PROGRAMMES

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

FM9 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,*



- and*
- (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:**

J C Sealy, MSc PhD *Cape Town*

**Emeritus Professor:**

N J van Der Merwe, MA PhD *Yale*

**Professor:**

J E Parkington, MA PhD *Cantab*

**Emeritus Associate Professor:**

A B Smith, PhD *Berkeley*

**Principal Scientific Officer:**

J L Lanham, BA (Hons) *Cape Town*

**Scientific Officer:**

---

**Senior Lecturers:**

S L Hall, MA *Witwatersrand* DPhil *Stell*

R R Ackermann, MA *Arizona* PhD *Washington*

**Lecturers:**

D R Braun, MA PhD *Rutgers*

**Laboratory Assistants:**

M Herbert

D H Jacobs

**Administrative Assistant:**

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 AND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5

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

**DP requirements:** Attendance and participation in tutorials, submission of written work.

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

#### SAN1014F INTRODUCTION TO SOCIAL ANTHROPOLOGY AND ARCHAEOLOGY

*NOTE: This semester course may not be taken by students who have obtained credit for AGE1003F. AGE1003F course code has changed to SAN1014F.*

**Course co-ordinator(s):** Professor J E Parkington and Professor A D Spiegel

**Entrance requirements:** None

**Course outline:**

Introduction to concept and themes in anthropology and archaeology, including the study of "culture", kinship, issues of race and gender, understanding the ways in which societies impart meaning to material culture, and cultural relativism. Debates around key issues that are seen differently by archaeologists and social anthropologists serve to introduce some aspects of academic discourse - the ways in which new knowledge is developed.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 1 1 1 1

**Tutorials:** Thursday, 1st period or at times 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 3-hour examination in June counts 50%.

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

See course details under the Department of Geological Sciences.

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

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2

**Practicals:** One two 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 AND HERDERS

**Course co-ordinator(s):** Professor J E Parkington

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2

**Practicals:** One two 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 AND 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 L Hall

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

**Course outline:**

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

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4

**Practicals:** One two 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 AND THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY**

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

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

**Course outline:**

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

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4

**Practicals:** One two 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 November counts 50%.

**AGE3013H ARCHAEOLOGY IN PRACTICE**

*NOTE: This course is a three and a half week residential field-school during the July vacation.*

## 34 DEPARTMENT OF ARCHAEOLOGY

**Course co-ordinator(s):** Dr S L Hall

**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):** Professor J C Sealy

**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 AND ENVIRONMENTAL SCIENCE

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

**Entrance requirements:** A BSc degree with majors in both Archaeology and Environmental and 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.

---

### ERT4001W and ERT5000W BSc (HONS)/MSc IN QUATERNARY SCIENCE

See course details under Department of Environmental and Geographical Science.

---

**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*

### 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 and large-scale structures, including those partially obscured by the foreground Milky Way (Professors Kraan-Korteweg 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:

Our place in the Universe. Early beliefs and historical development of astronomical knowledge. Telescopes and instrumentation. The Earth-Sun-Moon system. Planets of the Solar System. Stars. Our galaxy and others. Relativity and cosmology. Life in the Universe.

#### Period

Mon Tue Wed Thu Fri

**Lectures:** 5 5 5 5 5

**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.

**DP requirements:** Satisfactory completion of exercise sets, regular attendance at lectures, and at least 25% in tests.



**Examination requirements:** Class record (including three tests) counts 50%. One two-hour paper, written in June, counts 50%.

## Second-Year Courses

---

### AST2002S ASTROPHYSICS

**Course co-ordinator(s):** Dr P A Woudt

**Entrance requirements:** PHY1021F and PHY1022S (PHY1004W) or PHY1031F and PHY1032S (PHY1000W), MAM1000W.

**Course outline:**

Radiation Laws, Black Body radiation, Planck function. Wien's Law, Stefan-Boltzmann Law. Hydrogen spectroscopy, stellar spectroscopy. Relativistic Doppler effect. Stellar distances, magnitudes, radii and masses. HR diagram. Hydrostatic equilibrium, stellar and planetary structure. Nuclear energy, p-p cycle, CNO cycle, 3-Å. The sun. Stellar evolution. White dwarfs, neutron stars, black holes. Our galaxy, 21-cm radiation, radio mapping, interstellar matter. Galaxies, dark matter. Hubble Law, expansion of the Universe, primordial nucleosynthesis, 2.726 K background radiation, the Big Bang model. Radio, infra-red, ultra-violet, x-ray and gamma-ray-astronomy.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

**Tutorials:** One tutorial per week, Wednesday, 14h00-16h30

**DP requirements:** Satisfactory attendance at lectures and tutorials

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

## 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

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

**DP requirements:** Satisfactory attendance at lectures

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

---

### AST3003S GALACTIC AND 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:**

## 38 DEPARTMENT OF ASTRONOMY

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

### Period

Mon Tue Wed Thu Fri

**Lectures:** 5 5 5 5 5

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

**DP requirements:** Satisfactory attendance at lectures

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

## Postgraduate Courses

---

**PHY4003W** BSc (HONS) IN ASTROPHYSICS AND 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 (MAM4009Z)\*, classical electrodynamics (PHY4004Z), general relativity (MAM4010Z), general astrophysics (AST4003Z and AST4004Z), galaxies (AST4006Z), computational physics (PHY4005Z), astrophysical fluid dynamics (MAM4011Z) and computational methods (AST4005Z), as well as an observational techniques component which includes optical and infrared astronomy (AST4002Z) and radio astronomy (MAM4012Z). 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.

---

**PHY5002F** TAUGHT COMPONENT OF THE MSc IN ASTROPHYSICS AND 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 (AST5001Z), extragalactic astronomy (AST5002Z), space technology (EEE5024Z), hot topics in cosmology (MAM5005Z), advanced general relativity (MAM5006Z), high energy astrophysics (MAM5007Z), observational cosmology (MAM5008Z), geomagnetism and aeronomy (MAM5009Z), plasma physics (PHY5004Z) and magnetohydrodynamics (PHY5005Z).

---

**AST5001W** THESIS COMPONENT OF THE MSc IN ASTROPHYSICS AND SPACE SCIENCE**Entrance requirements:** PHY5002F**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 and Director of the National Botanical Institute:**

B J Huntley, BSc *Natal* MSc *Pret*

**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*

**Associate Professor:**

M D Cramer, MSc *Witwatersrand* PhD *Cape Town*

**Senior Lecturers:**

E C February, BA (Hons) PhD *Cape Town*

A M Muasya, MPhil *Moi* PhD *Redding*

G A Verboom, BSc (Hons) PhD *Cape Town*

**Lecturer:**

S B M Chiphango, MSc *Malawi* PhD *Cape Town*

T G Mandiwana-Neudani, BSc (Hons) *Venda* MSc *Cape Town*

**Honorary Research Associates:**

R J Anderson, BSc (Hons) *Witwatersrand* PhD *Cape Town*

E J Moll, BSc (Hons) PhD *Natal*

G Reeves, PhD *Imperial*

G Scott, BSc (Hons) PhD *Cape Town*

W D Stock, BSc (Hons) PhD *Cape Town*

**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 Assistant:**

S Smuts

**Senior Secretary:**

N Thungela

**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*

**Curator/Chief Technical Officer:**

T H Trinder-Smith, MSc *Cape Town*

**Honorary Research Associates:**

P V Bruyns, MA DPhil *Oxon RSM MSc Cape Town*

S Hammer

G Williamson, BDS MSc *Witwatersrand*

**Technical Officer (part-time):**

C Klak, BSc (Hons) PhD *Cape Town*

**Librarian:**

C P Kotze, BA *Unisa* PTD III *Dept Ed PG Dip LIS Cape Town*

**Departmental Assistant:**

C J Christians

### INSTITUTE FOR PLANT CONSERVATION

**Director:**

M T Hoffman, BSc (Hons) PhD *Cape Town*

**Deputy Director:**

L Gillson, BA *Oxon* MSc *Imperial* DPhil *Oxon*

**Honorary Research Associate:**

A E Ellis, BSc (Hons) *Cape Town* PhD *UC Irvine*

**Administrative Assistant:**

M Sauls

### SEAWEED RESEARCH UNIT

#### MARINE & COASTAL MANAGEMENT (DEPARTMENT OF ENVIRONMENT AFFAIRS)

**Head:**

R J Anderson, BSc (Hons) *Witwatersrand* PhD *Cape Town*

**Oceanographic Researcher:**

M D Rothman, BSc (Hons) *UWC* MSc *Cape Town*

**Principal Oceanographic Research Assistants:**

C J T Boothroyd

F A Kemp

### RESEARCH IN BOTANY

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 Hedderson 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 Hedderson 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 Institute for Plant Conservation 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

## 42 DEPARTMENT OF BOTANY

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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Tutorials:** One tutorial per week, by arrangement.

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

**DP requirements:** Attendance at 70% of the practicals.

**Examination requirements:** Class record counts 45% (three class tests of 9% each and a practical book mark of 18%). One practical paper counts 15% and one 2-hour examination paper written in June counts 40%.

---

#### BIO1000H CELL BIOLOGY

*NOTE: This course forms part of the General Entry Programme in Science (GEPS).*

**Course co-ordinator(s):** Dr S B M Chimphango and Mr J Jordaan

**Entrance requirements:** As for BIO1000F

**Course outline:**

As for BIO1000F

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Tutorials:** One tutorial per week, by arrangement.

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

**DP requirements:** Attendance at 70% of the practicals.

**Examination requirements:** As for BIO1000F, except the examination paper is written in November.

---

#### BIO1004S BIOLOGICAL DIVERSITY

For course details see entry under Department of Zoology.

### Second-Year Courses

---

#### BIO2003F ECOPHYSIOLOGY: HOW PLANTS AND ANIMALS WORK

For course details see entry under the Department of Zoology.

---

#### BIO2006F MARINE AND TERRESTRIAL PLANT DIVERSITY

*NOTE: Replaces BOT206F: MARINE AND TERRESTRIAL PLANT DIVERSITY from 2006.*

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

**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 evolution of the major groups of seaweeds and phytoplankton is considered in relation to the evolution of similar form 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**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 June each count 25%.

**BIO2007S EVOLUTIONARY ECOLOGY**

*NOTE: Replaces BOT207S: EVOLUTIONARY ECOLOGY OF PLANTS from 2006.*

**Course co-ordinator(s):** Professor W J Bond

**Entrance requirements:** BIO1000F/H, BIO1004S, attendance of a first-year course in Chemistry is recommended.

**Course outline:**

This course introduces ecological and evolutionary topics that mostly operate at the population level in both plants and animals. 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 are included where appropriate.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**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 November each count 25%.

**Third-Year Courses**

**BIO3006F ECOSYSTEM ECOLOGY**

*NOTE: Replaces BOT3009F: ECOSYSTEM ECOLOGY from 2007.*

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

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

**Entrance requirements:** BIO1000F/H and any two of BIO2006F (BOT2006F), BIO2007S (BOT2007S), BIO2000S (BIO2000F), BIO2004F (ZOO2000F), BIO2005S (ZOO2001S),

#### 44 DEPARTMENT OF BOTANY

BIO2002S (ZOO2002S), EGS2010F or EGS2012S

**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) but including marine examples (from kelp beds to coral reefs). 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.

**Lectures:** By arrangement.

**Tutorials:** By arrangement.

**Practicals:** By arrangement.

**Examination requirements:** Project, essays and tests count 50%, one 2-hour theory examination and one 2-hour practical examination written in March/April each count 25%.

---

#### **BIO3007S ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE**

*NOTE: Replaces BOT3010S: ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE from 2007.*

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

**Entrance requirements:** CEM1000W and any two of BIO2000S (BIO2000F), BIO2007S (BOT2007S), BIO2004F (ZOO2000F), EGS3012S or EGS3014F

**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 significance of different photosynthetic pathways, photosynthesis and global productivity, environmental constraints on photosynthesis and respiration as a result of global change (temperature and atmospheric CO<sub>2</sub> 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

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

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

**Examination requirements:** Essays, tests and projects count for 60%, two 2-hour examinations in November count for 20% each.

---

#### **BIO3009A SYSTEMATICS AND EVOLUTIONARY DEVELOPMENT**

*NOTE: This course is offered in the first semester, first quarter. BIO3009A and BIO3008B replaces BIO3000S.*

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

**Entrance requirements:** MCB2001S or MCB2013S or any second-year BIO course; BIO2007S, MCB2003F and MCB2013S recommended



**Course outline:**

The reconstruction of evolutionary relationships underpins much of modern biology. This course examines data sources and methods pertaining to the inference of phylogenetic (evolutionary) relationships. The utility of these methods is explored in two specific contexts, the Tree of Life and universal DNA barcoding, and the study of the developmental processes underlying variation in organismal form and function.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	3	3	3	3	3
------------------	---	---	---	---	---

**Tutorials:** One per week, time to be arranged

**Practicals:** Tuesdays and Thursdays, 14h00 to 17h00

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

**Examination requirements:** Class mark counts 50% (tests count 30%, practicals and tutorials count 20%); one 2-hour written examination in June counts 50%.

**BIO3008B MACROEVOLUTION AND SPECIATION**

*NOTE: This course is offered in the first semester, second quarter.*

**Course co-ordinator(s):** Professor T A Hedderson

**Entrance requirements:** BIO3009A; BIO2006F or BIO2002S or BIO2005S recommended

**Course outline:**

Species are the fundamental units of biodiversity. This course explores the theory underlying the recognition of these entities and the methodologies employed to define and classify them. The processes that give rise to new species and the forces that generate species diversity (e.g. adaptation and key innovations) are considered. We also focus of the use of molecular data in dating and tracing macroevolutionary pattern.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	3	3	3	3	3
------------------	---	---	---	---	---

**Tutorials:** One per week, time to be arranged

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

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

**Examination requirements:** Class mark counts 50% (tests count 30%, practicals and tutorials count 20%); one 2-hour written examination in June counts 50%

**BIO3005D MOLECULAR ECOLOGY**

*NOTE: This course is offered in the second semester, fourth quarter.*

**Course co-ordinator(s):** Professor T A Hedderson

**Entrance requirements:** BIO3009A, MCB3013C

**Course outline:**

The emerging field of Molecular Ecology involves the use of molecular data to address evolutionary and ecological questions. This course aims to demonstrate how such information is revolutionizing evolutionary biology. We develop the theoretical background and examine how biological and historical factors such as migration rates, paternity, population connectivity, population history and historical demography affect patterns of molecular variation. Throughout, there is a strong emphasis on demonstrating the application of molecular techniques across a range of evolutionary and ecological disciplines such as Conservation Biology, Behavioural Ecology, Biogeography, Forensic Science and Biodiversity.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	3	3	3	3	3
------------------	---	---	---	---	---

**Tutorials:** One per week, time to be arranged

**Practicals:** Tuesdays and Thursdays 14h00 to 17h00

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

**Examination requirements:** Class mark counts 50% (tests count 30%, practicals and tutorials count 20%); one 2-hour written examination in November counts 50%

## Postgraduate Courses

---

### **BOT4000W** BSc (HONS) IN BOTANY

**Course co-ordinator(s):** Dr E C February

**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):** Dr E C February

**Entrance requirements:** A BSc degree with a specialisation in Botany or Ecology (students with an undergraduate degree from UCT must have completed BIO2000F/S and BOT3009F 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 AND EVOLUTIONARY BIOLOGY)

**Course co-ordinator(s):** Dr E C February

**Entrance requirements:** A BSc degree with a specialisation in Botany or Biodiversity and Evolutionary Biology (students with an undergraduate degree from UCT must have completed BIO3000S) 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.

---

**BIO5001W and BIO5002W** MSc IN SYSTEMATICS AND BIODIVERSITY SCIENCE

(by coursework and dissertation)

**Course co-ordinator(s):** Professor T A Hedderson and Dr G A Verboom

This one year course trains students in the description, documentation and analysis of biological diversity, from molecular methods to whole-organism approaches. This includes the methods and approaches used in taxonomy, systematics and natural history collection curation. The course includes formal training in the conceptual basis of taxonomy (species concepts), the rules of nomenclature, basic molecular methods, and multivariate and cladistic methods of analysing the patterns of variation. There are also components on biogeographic analysis and conservation biology, and introductory courses in Geographical Information Systems. Training in the methods used in one of the major groups of life (botany, entomology, ornithology, herpetology, etc) is in the form of a six-month project. The course work component will be examined in July, followed by a dissertation in February in the following year.

---

**SEA5002W** MSc IN APPLIED MARINE SCIENCE

See course details under Department of Oceanography.

---

**ZOO5003W and ZOO5004W** MSc IN CONSERVATION BIOLOGY

See course details under Department of Zoology.

---

**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*

### **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

### **Professor of Physical Chemistry:**

---

### **Professors:**

M R Cairra, MSc PhD *Cape Town* Dr Hon Causa Univ Med Pharm 'Iuliu Hatieganu' *Romania*

K Chibale, BScEd *Zambia* PhD *Cantab*

T Egan, BSc (Hons) PhD *Witwatersrand* 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 Professor:**

S A Bourne, BSc (Hons) PhD *Cape Town* CChem MRSC MSACI

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

K J Naidoo, MSc *Cape Town* PhD *Michigan*

N Ravenscroft, BSc (Hons) PhD *Cape Town* MSACI

### **Senior Lecturer:**

---

### **Lecturer:**

---

### **Contract Lecturers:**

G Smith, BSc *Natal* BSc (Hons) MSc PhD *UWC*

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

D J Robinson, BSc (Hons) *Sheffield* MSc *Witwatersrand* PhD *Unisa* MBA *Cape Town*

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*

---

### **Senior Scientific Officers:**

A Gamiendien, BSc (Hons) *HDE UWC*

E Murray, BSc Med (Hons) *Stell* PhD *Cape Town*

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

M Edwards

**Departmental Assistants:**

S Y Dyule-Nozewu

N M Gushman

A Hendricks

W Hendricks

M Mentor

G Mlungu

R Muller

K M Sigam

C Stanley

S Swigelaar

## 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 Cairn, 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).

*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>

## 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(or S) are half courses taken by students who are admitted to the General Entry Programme 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 CEM1011H 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):** Associate Professor N Ravenscroft

**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 Programme 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(or S) 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.

#### Period

Mon	Tue	Wed	Thu	Fri
-----	-----	-----	-----	-----

<b>Lectures:</b>		4	4	4
------------------	--	---	---	---

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

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

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

### CEM1010F CHEMISTRY 1010

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. There are no supplementary examinations for this course.

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

**Entrance requirements:** CEM1009H

#### Course outline:

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

#### Period

Mon	Tue	Wed	Thu	Fri
-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

**Tutorials:** One tutorial per week, by arrangement.

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

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

---

**CEM1010S CHEMISTRY 1010**

This half course is a tutorial-based reinforcement of CEM1010F available to students who have obtained a DP certificate for CEM1010F in the same year. There are no lectures, practicals or supplementary examinations for this course. Credit will not be given for both CEM1010F and CEM1010S. The half courses CEM1009H and CEM1010S together are equivalent to the first-year full course CEM1000W. Please note that this course will only run if a sufficient number of students register for it.

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

**Entrance requirements:** DP certificate for CEM1010F in the same year.

**Course outline:**

As for CEM1010F

**Tutorials:** Three hours per week, Thursday, 14h00-17h00.

**Examination requirements:** Class record (comprising tests and tutorials) 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.

**Second-Year Courses**

CEM2007F and CEM2008S are required courses for students proceeding to a specialisation field in Chemistry. CEM2009F, CEM2012F/S and CEM2013S are elective courses which may also be taken by non-chemistry majors.

---

**CEM2007F PHYSICAL CHEMISTRY AND SPECTROSCOPY**

**Course co-ordinator(s):** Associate 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Tutorials:** One tutorial per week, by arrangement

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

**Examination requirements:** Class record (comprising tests 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.

---

**CEM2008S ORGANIC AND INORGANIC CHEMISTRY**

**Course co-ordinator(s):** Professor K Chibale

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3



**Tutorials:** One tutorial per week, by arrangement.

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

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

### **CEM2009F ANALYTICAL AND ENVIRONMENTAL CHEMISTRY**

*NOTE: This course will not be offered in 2007.*

**Course co-ordinator(s):** Professor G E Jackson

**Entrance requirements:** CEM1000W (or equivalent), first-year full or semester course in Mathematics.

**Course outline:**

What is Analytical Chemistry? Sample preparation, classical methods of quantitative analysis, instrumental methods of analysis, introduction to electrochemical and chromatographic methods, analysis of real samples. Applications to environmental problems will be emphasised throughout the course.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 1 1 1 1 1

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

**Examination requirements:** 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.

### **CEM2012F/S CURRENT ISSUES IN CHEMISTRY**

*NOTE: This course will not be offered in 2007.*

This generic half course may be offered in the first or second semester. It is an occasional course (it may not be offered every year) which will offer topics of timely importance in chemistry, usually presented by visiting experts. When the course is offered it will be widely advertised. Enquiries may be directed to the Administrative Officer in the Department of Chemistry.

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

**Entrance requirements:** CEM1000W (or equivalent). Sometimes additional prerequisites may be required, depending on the topic being offered.

**Course outline:**

The topics studied will be in a specific area of current importance in chemistry. The course content will vary each time the course is offered. There may be practicals involved, but if not there will be a mix of site visits, literature assignments, essays, oral presentations and seminars to occupy the scheduled practical afternoons.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2

**Tutorials:** One tutorial per week, Friday 2nd period.

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

**Examination requirements:** Class record (comprising tests, assignments, practicals and/or projects) counts 50%; one 3-hour written paper counts 50%. It is necessary to pass the theory examination and the whole course in order to secure an overall pass.

### **CEM2013S CHEMISTRY IN HEALTH AND DISEASE**

**Course co-ordinator(s):** Associate Professor D W Gammon

**Entrance requirements:** CEM1000W (or equivalent); MCB2000F is highly recommended.

**Course outline:**

## 54 DEPARTMENT OF CHEMISTRY

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; biomaterialization - role in crystal deposition disease.

### Period

Mon Tue Wed Thu Fri

Lectures: 5 5 5 5 5

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

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

## Third-Year Courses

CEM3005W is the required course for students proceeding to a specialisation field in Chemistry. CEM3009S and CEM3011F are elective courses 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.

---

### CEM3005W CHEMISTRY 3005

**Course co-ordinator(s):** Professor M R Cairn

**Entrance requirements:** CEM2007F and CEM2008S, first-year full course in Mathematics.

**Course outline:**

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

### Period

Mon Tue Wed Thu Fri

Lectures: 3 3 3 3 3

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

**Examination requirements:** 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.

---

### CEM3009S ADVANCED ANALYTICAL CHEMISTRY

*NOTE: This course is given in conjunction with the Department of Geological Sciences, each Department contributing to the lectures and the practicals.*

**Course co-ordinator(s):** Professor J R Moss

**Entrance requirements:** CEM2009F, CEM2007F and CEM2008S are strongly recommended.

**Course outline:**

Data analysis and chemometrics, XRF analysis, X-ray powder diffraction, electron microprobe analysis, mass spectrometry and coupled techniques, ICP-AES, thermal analysis, electroanalytical methods, separation methods.

### Period

Mon Tue Wed Thu Fri

Lectures: 1 1 1 1 1

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

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

### CEM3011F MEDICINAL CHEMISTRY

**Course co-ordinator(s):** Professor R Hunter

**Entrance requirements:** CEM2007F, CEM2008S, CEM2013S (or CEM2011S) and MCB2000F.

**Course outline:**

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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

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

**Examination requirements:** 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.

## 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.

---

**CEM5004W and CEM5005W MSc IN ANALYTICAL CHEMISTRY**

(by coursework and dissertation)

*Note: This programme will not be offered in 2007.*

Candidates for this one-year MSc programme are required to attend modules of lectures on advanced instrumental analysis and modern analytical chemistry in the first semester. This will be followed by formal assessment by written examination (CEM5004W). In the second semester candidates will carry out a project on an approved topic and submit a dissertation in part fulfilment of the requirements for the degree (CEM5005W). Successful candidates can expect to graduate in June of the following year. The course attendance, however, spans only one year.

---

**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) *Witwatersrand* PhD *London*

P S Kritzinger, MSc (Eng) *Witwatersrand* 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:**

J E Gain, MSc *Rhodes* PhD *Cantab*

M Kuttel, MSc PhD *Cape Town*

P C Marais, MSc *Cape Town* DPhil *Oxon*

A Potgieter MSc PhD *Pretoria*

H Suleman, MSc *UDW* PhD *Virginia Tech*

### **Lecturers:**

D H Cook, BSc (Hons) *Cape Town*

A Mbogho, BS MS *City Univ of New York*

G Stewart BSc (Hons) *Cape Town*

### **Computer System Managers:**

S G Chetty

M R West

### **Administrative Assistants:**

E M Gill

F Parker

### **Senior Secretary:**

---

### **Departmental Assistant:**

B J Sam

## RESEARCH IN COMPUTER SCIENCE

Research in the Department is organised into three 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 under <http://www.cs.uct.ac.za/newstudents/postgrad.html>

**ADVANCED INFORMATION MANAGEMENT** (Co-ordinator: Dr H Suleman; Associate Professor S Berman, Mr D Cook, Dr M Kuttel, Professor K MacGregor, Associate Professor G Marsden, Dr A Potgieter) (<http://aim.cs.uct.ac.za>)

This laboratory deals with multiple facets of the information processing problem, exemplified by the following active research areas: databases; knowledge management systems; scientific and high performance computing; complex adaptive systems; distributed artificial intelligence; 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 (this work covers designing better interfaces for the creators of collections and improving access to end users through PDAs and cellular handsets).

**COLLABORATIVE VISUAL COMPUTING** (Co-ordinator: Professor E Blake; Dr J Gain, Dr P Marais, Associate Professor G Marsden)

Topics of research include: Collaborative Virtual Environments (focussing on authoring, user

engagement and low-cost platforms); Useability 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. TELECOMMUNICATION NETWORKS (Co-ordinator: Professor P Kritzing; Dr A Hutchison) Work in this field focuses on the specification and analysis of computer protocols and associated software as well as fixed line communication networks. There is also work in the area of computer security.

## Undergraduate Courses

### First-Year Courses

---

#### CSC1010H COMPUTER SCIENCE 1010

This course is part of the General Entry Programme 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 Programme in Science.

**Course outline:**

As for CSC1015F

#### Period

	Mon	Tue	Wed	Thu	Fri	
--	-----	-----	-----	-----	-----	--

<b>Lectures:</b>	5	5	5	5		This includes one tutorial per week.
------------------	---	---	---	---	--	--------------------------------------

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

**DP requirements:** Minimum of 50% aggregate in practical work and 40% aggregate in tests and mid-year examination.

**Examination requirements:** Tests count 15%; practical work counts 25%; one 3-hour paper written in November counts 60%. Subminima: 50% for practicals, 45% for 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 Programme 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.

#### Period

	Mon	Tue	Wed	Thu	Fri	
--	-----	-----	-----	-----	-----	--

<b>Lectures:</b>	4	4	4	4		This includes one tutorial per week
------------------	---	---	---	---	--	-------------------------------------

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

**DP requirements:** Minimum of 50% aggregate in practical work and practical test and 40% aggregate in theory tests and mid-year examination.

**Examination requirements:** Tests count 20%; practical work counts 15%; practical test counts 15%; one 3-hour paper written in November counts 50%. Subminima: 50% for practicals, 45% for theory tests and examination.

---

#### CSC1015F COMPUTER SCIENCE 1A

**Course co-ordinator(s):** Dr H Suleman

**Entrance requirements:** Mathematics Higher Grade, at least a D symbol. Corequisite: MAM1000W.

**Course outline:**

Introduction to computers, World Wide Web and Netcentric Computing. Object orientated programming, problem solving and Algorithm development with Java.

Introduction to Databases. Sorting and Searching.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5 This includes one tutorial per week.

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

**DP requirements:** Minimum of 50% aggregate in practical work and 40% aggregate in tests.

**Examination requirements:** Tests count 15%; practical work counts 25%; one 3-hour paper written in June counts 60%. Subminima: 50% for practicals, 45% for tests and examinations.

### CSC1016S COMPUTER SCIENCE 1B

**Course co-ordinator(s):** Dr H Suleman

**Entrance requirements:** CSC1015F (or supp for CSC1015F) or CSC1010H or registration for CSC1018F. Corequisite: MAM1000W.

**Course outline:**

Linear Abstract Data Structures including Lists, Stacks and queues. Binary Trees and their applications, Applets, events and graphics. Computer Architecture - the design and structure of a computer. An introduction to Assembler level programming. Number representation, Boolean Algebra and simple circuits.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5 This includes one tutorial per week.

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

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

**Examination requirements:** Tests count 20%, practical work counts 15%, practical test 15%, one 3-hour paper written in November counts 50%. Subminima: 50% for practicals and practical test, 45% for theory tests and examination.

### CSC1018F COMPUTER SCIENCE 1018

**Course co-ordinator(s):** Mr D Cook

**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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 4 4**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 2A****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 &amp; 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 &amp; Testing using UML.

**Period****Mon Tue Wed Thu Fri****Lectures:** 2 2 2 2 2 Four or five lectures per week.**Practicals:** One 4-hour practical per week, Monday to Friday, 14h00-18h00.**DP requirements:** Minimum of 45% aggregate in practical work, and minimum of 40% in theory tests.**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 2B****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 &amp; control, pipelining, memory hierarchy, peripherals and parallel processors.

SOFTWARE ENGINEERING-2: Project Management, System Engineering, Software Metrics (Concepts and Principles), Object Oriented Metrics, CASE Tools, Perspective (Evolution of SE techniques).

ETHICAL and PROFESSIONAL ISSUES in COMPUTING: Philosophical background, Professionalism, Privacy, Property rights, Accountability, Ethics and the Internet.

HUMAN COMPUTER INTERACTION: Productivity paradox, Interaction styles, Event based programming, User Centered Design, User modelling, Standards &amp; Guidelines, Evaluation techniques &amp; Ethnography.



**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	2

Four lectures per week.

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

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

**CSC2003S COMPUTER GAMES AND SIMULATION**

**Course co-ordinator(s):** Professor E Blake

**Entrance requirements:** CSC2001F, MAM1000W or equivalent.

**Course outline:**

Introduction to Game Development, Game Concepts, Game Engines, Modeling and Simulation, Discrete Simulation, Agents, Game Representations, Search Strategies, Gaming Strategies, Artificial Life and Terrain Simulation.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	3	3	3	3	3

Four lectures per week.

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

**DP requirements:** Minimum of 45% aggregate in practical work, 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 (30); Operating Systems (30).

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	2

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

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

**Examination requirements:** Tests count 16.7%; practical work counts 33.3%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals; 45% for tests and examination.

**CSC3003S COMPUTER SCIENCE 3003**

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

**Entrance requirements:** As for CSC3002F.

**Course outline:**

Information management (30); Theory of Algorithms (30).

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

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

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

**Examination requirements:** Tests count 16.7%; practical work counts 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% for practicals, 45% for tests and examination.

**CSC3020H THREE DIMENSIONAL AND DISTRIBUTED GAMES DESIGN**

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

**Entrance requirements:** CSC2001F, CSC2002S and CSC2003S.

**Course outline:**

Topics from Compilers; Distributed Computing, Web-Based Computing, Computer Graphics, Multi-user games and Mobile Gaming.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	3	3	3	3	3
------------------	---	---	---	---	---

**Practicals:** 4 hours per week, by arrangement

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

**Examination requirements:** Tests count 16.7%; practical work counts 33.3%; one 3-hour paper written in November counts 50%. Subminima: 45% for practicals, 45% for tests and examination.

**CSC3014C INFORMATION MANAGEMENT (1/4 course)**

*NOTE: This course is offered in the second semester, third quarter.*

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

**Entrance requirements:** CSC2001F & CSC2002S.

**Course outline:**

The objective of this course is to introduce students to various different approaches to store, manipulate and access structured data. Students will be exposed to the general concepts and theories underlying the information models of databases, markup languages and information retrieval systems, with an emphasis on practical applications and concrete examples. (30)

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

**Practicals:** Unscheduled work in laboratories.

**DP requirements:** 45% subminimum for theory and 45% subminimum for practical.

**Examination requirements:** Essays and tests count 16.7%; projects counts 33.3%; one 1.5-hour paper written in November counts 50%.

**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).

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

**Practicals:** Unscheduled work in laboratories.

**DP requirements:** 45% subminimum for theory and 45% subminimum for practical.

**Examination requirements:** Essays and tests count 16.7%; projects counts 33.3%; one 1.5-hour paper written in November counts 50%.

**CSC3018A COMPUTER SCIENCE 3018A (1/4 course)**

*Note: This course is offered in the first semester, first quarter, for students registered for the Bioinformatics stream only.*

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

**Entrance requirements:** CSC2001F and CSC2002S. This course is only available to students in the Bioinformatics specialisation. It is strongly recommended that students should have completed a second-year course in Mathematics, Applied Mathematics or Statistics.

**Course outline:**

Topics from Networks, Operating Systems (30).

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

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

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

**Examination requirements:** Tests count 16.7%; practical work counts 33.3%; one 3-hour paper written in June counts 50%. Subminima: 45% for practicals; 45% for tests and examinations.

**CSC3019B COMPUTER SCIENCE 3019B (1/4 course)**

*NOTE: This course is offered in the first semester, second quarter.*

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

**Entrance requirements:** CSC2001F, CSC2002S, registration for CSC3018A. This course is only available to students in the Bioinformatics specialisation. It is strongly recommended that students should have completed a second-year course in Mathematics, Applied Mathematics or Statistics.

**Course outline:**

Topics from Networks, Operating Systems (30).

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	2	2	2	2	2
------------------	---	---	---	---	---

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

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

**Examination requirements:** Tests count 16.7%, practical work counts 33.3%; one 3 hour paper written in June counts 50%. Subminima: 45% for practicals; 45% for tests and examinations.

## Courses Offered in Other Faculties

The Department of Computer Science also offers the course CSC1017F to students registered in the Faculty of Engineering and the Built Environment and CSC4003W for students registered in the Commerce Faculty. Details of these courses may be found in the Faculty of Engineering and the Built Environment Faculty handbook and 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 65% in CSC3002F, CSC3003S and CSC3005H. Certain applicants who are graduates of universities other than the University of Cape Town may be offered admission on a two-year programme. Registration for the second year of this programme is conditional upon satisfactory progress in the first year. Prospective students should consult the course co-ordinator on additional entrance requirements.

**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 65% in CSC3002F and CSC3003S. Certain applicants who are graduates of universities other than the University of Cape Town may be offered admission on a two-year programme. Registration for the second year of this programme is conditional upon satisfactory progress in the first year. Prospective students should consult the course co-ordinator on additional entrance requirements.

**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 BCS accreditation.

---

### 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, or with degrees from other faculties at UCT, 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 IN INFORMATION TECHNOLOGY

**Course co-ordinator(s):** Associate Professor G Marsden

**Entrance requirements:** Any non-IT related 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.

---

## DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE

The Department is housed in the Shell Environment & Geographical Science Building, South Lane  
Telephone (021) 650-2874 Fax (021) 650-3456

The Departmental abbreviation for Environmental & Geographical Science is EGS.

**Professor and Head of Department:**

M E Meadows, BSc (Hons) *Sussex* PhD *Cantab* FSSAG

**Professors:**

B C Hewitson, BSc *Cape Town* MSc PhD *Penn State*

S M Parnell, MA PhD *Witwatersrand*

**Associate Professors:**

M R Sowman MSc PhD *Cape Town*

M F Ramutsindela, MA *UNIN* PhD *London*

**Honorary Professor:**

J Boardman, BSc (Hons) PhD *Cantab*

J Crush, MA *Cantab* MA *Laurier* PhD *Queens*

D S G Thomas, MA PhD *Cantab*

**Emeritus Professor:**

R J Davies, MSc *Rhodes* PhD *London* FSSAG

R F Fuggle, BSc (Hons) UED *Natal* MSc *Louisiana* PhD *McGill*

**Senior Lecturers:**

N Dewar, MA *MRCP* PhD *Cape Town* Dip Ed *Oxon*

F D Eckardt, BSc (Hons) *KCL* MSc *Cranfield* DPhil *Oxon*

S E Oldfield, BA (Hons) *Syracuse* MA PhD *Minnesota*

**Lecturers:**

S E Butcher, BSc (Hons) *Stell* MSc *Cape Town*

R C Hill, BSc (Eng) *Cape Town* Pr Eng PhD *Cape Town*

K J Winter, BA (Hons) *Cape Town* MA *London* PhD *Cape Town*

**Assistant Lecturers:**

E Gbobaniyi, BSc *Obafemi Awolowo* MSc *Ife-Ife*

R Walawege, BSc (Hons) MSc *Cape Town*

**Postgraduate Co-ordinator:**

J Battersby-Lennard, MA DPhil *Oxon*

**Research Fellow:**

L Nathan BBus Sci/LLB *Cape Town* MPhil *Bradford*

**Administrative Assistant:**

S Adams

**Senior Secretary:**

A Innes

**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*

**Senior Researchers:**

J A Bodenstein, MA *Cape Town*

R Hasler, MA *Cape Town* MA *Rhodes* GRAD.C.E. *Zimbabwe* PhD *Michigan*

M Hauck, MA (Criminology) *Cape Town*

R P Wynberg BSc (Hons) MSc MPhil *Cape Town*

**Researchers:**L Munro MSc *Cape Town*S Rippon, MPhil *Cape Town*S Williams, BA (Hons) MA *UWC***Intern:**Q Williams BA (Hons) GES *UWC***Office Manager:**

S Hassiem

**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:**A Benjamin, B Soc Sci (Hons) *Cape Town*X Mdandlu, BA (Hons) *Rhodes* and *UWC*L Pottier, B Soc Sci (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](http://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.

---

#### 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.

#### Period

Mon Tue Wed Thu Fri

**Lectures:** 2 2 2 2 2

**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.

#### Period

Mon Tue Wed Thu Fri

**Lectures:** 5 5 5 5 5

**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):** Dr S Oldfield

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4

**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).

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 1 1 1 1 1

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

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

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

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

---

**EGS3015S URBAN GEOGRAPHY****Course co-ordinator(s):** Dr N Dewar**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.

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

**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).

### **EGS3016F POPULATION DYNAMICS, MEASUREMENT AND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4

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

**DP requirements:** Students must submit 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.

**Examination requirements:** Essays and tests count 40%; one 3-hour written examination in June counts 60%.

### **EGS3017S POPULATION DYNAMICS, MEASUREMENT AND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4

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

**DP requirements:** 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.

**Examination requirements:** Essays and tests count 20%; research project report counts 30%; one 3-hour written examination in November counts 50%.

### **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):** Dr R Marindo

**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.

**Period**

**Mon Tue Wed Thu Fri**

**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 40%; one 3-hour written examination in June counts 60%.

### **EGS3019S POPULATION AND DEVELOPMENT**

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

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

**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.

**Period**

**Mon Tue Wed Thu Fri**

**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. (Refer to Page 76 for a list of postgraduate modules).

**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.

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

**Course co-ordinator(s):** Dr J Battersby-Lennard

**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](http://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, except Environmental Management, 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 Studies. Upon completion of the appropriate requirements students may exit with the BSc (Hons) degree in Environmental and Geographical Science. (Refer to page 76 for a list of postgraduate modules).

**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.

---

### **EGS4008W and EGS5011W and EGS5021W BSc (HONS)/MPhil IN DISASTER RISK SCIENCE**

This programme is structured in the form of a one year Honours degree leading directly to the second year of coursework and research culminating in a Master of Philosophy degree 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. Students proceeding to the MPhil component of the programme must satisfy the coursework, examination and project requirements of the BSc (Hons) degree in Disaster Risk Science. In addition to submitting an application to the University, prospective candidates must complete an application form available from the department.

**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 course contextualises disaster risk as an outcome of the interplay between human and natural factors. Moreover, it assumes an interdisciplinary perspective on disasters, taking into consideration both biophysical elements (hazards), as well as social and economic forces that influence disaster vulnerability and resilience. In the first (Honours) year of study, students select four coursework modules from a range of core courses and options, including an introduction to disaster risk science, foundation courses in research methods, earth systems science and settlement geography, as well as a disaster risk research Honours project. It is followed by a second (MPhil) year of in-depth study in disaster risk science, students selecting four advanced course options in areas such as food/livelihood security, community-based risk reduction, actuarial science and public health. Relevant courses offered by other Faculties at appropriate academic levels may be counted as credits towards both Honours and MPhil degrees at the discretion of the course convenor in consultation with the Head of Department. A major Disaster Risk Science research report, completes the MPhil degree. (Refer to page 76 for a list of postgraduate modules).

**Examination requirements:** All modules are examinable by 3-hour written examination; practicals, essays, reaction papers, projects and other assignments count 60-70% of the mark in most instances. The research project in the first year counts 20% towards the Honours degree, while the Disaster Risk Research report constitutes 50% of the total marks for the MPhil degree.

---

**ERT4001W and ERT5000W BSc (HONS)/MSc IN QUATERNARY SCIENCE**

*ERT4001W will not be offered in 2007.*

This is a one year Honours-level BSc degree programme in Quaternary Science leading directly to a second year of dissertation-based research towards the degree of MSc. Students would have the option of graduating at the end of year 1 or proceeding to the MSc after completion of a research dissertation.

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

**Entrance requirements:** Students entering the programme must have completed an undergraduate degree with a major in Archaeology, Geography, Environmental Science, Geology, Botany, Zoology, Oceanography or other environmentally-related discipline.

**Course outline:**

The structure of this year is based on a modular system as follows: Quaternary Science core module which includes history and philosophy, fundamentals of earth systems, methods (including dating), quantitative methods, information technology and fieldwork. Four modules chosen from the following list: Dating techniques; Principles of stable light isotopes; Quaternary palaeoecology; Marine geoscience and palaeo-oceanography; Palaeoclimates and environmental reconstruction; Human evolution and palaeoecology; Vegetation and global change; Curation of Quaternary collections. Note: at the discretion of the Programme convenor, students could be allowed to take one of their four modules from any approved Honours module in the Science Faculty. Modules offered subject to availability and demand. In order to facilitate the two exit points, it is suggested that students initially register for BSc Hons (ERT4001W) and then upgrade to MSc (ERT5000W) at the end of the first year of study at the discretion of the Programme Convenor. Upgrading would be dependent upon satisfactory completion of all course modules plus the presentation of an acceptable research project proposal. Students who have already completed an Honours degree in a related discipline would be eligible to proceed directly to MSc registration upon submission of an acceptable research proposal.

**Examination requirements:** 3-hour examination in the case of all modules; practical assignments and essays count 33% of all modules. Research project counts 25% towards BSc (Hons), where appropriate. Satisfactory completion of practical assignments, essays and project proposal required in the case of students proceeding to MSc.

---

**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.

---

**EGS5008W and EGS5009W MPhil IN ENVIRONMENTAL MANAGEMENT**

(by coursework, group project report and individual papers)

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 be eligible to pursue an MA, MSc or MPhil degree at UCT, that is, they 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

## 76 DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE

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](http://www.egs.uct.ac.za).

### **Course outline:**

Prescribed coursework (EGS5008W): In the first 18 months of the programme, students complete six taught modules: Environmental Management; Environmental Law for Non-Lawyers; Social and Economic Assessment; Environmental Science Methodology and Ethics of Environmental Management; and Environmental Evaluation and Monitoring. Each module has its own method of assessment, which typically includes written examinations and coursework assignments. (Refer to page 76 for a list of postgraduate modules).

Group research project and individual papers (EGS5009W): In the last 6 months of the programme, students undertake a group research project that includes the preparation of a group report and individual papers, which are submitted for formal examination by internal and external examiners. The research project must demonstrate the application of science to practical issues in environmental planning, impact assessment and management.

---

### **EGS5010W and EGS5020W MSc IN ENVIRONMENTAL & GEOGRAPHICAL SCIENCE**

(by coursework and dissertation)

This is an advanced programme of study by coursework and research leading to the degree of Master of Science

**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. (Refer to page 76 for a list of postgraduate modules).

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

---

### **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.

### **POSTGRADUATE MODULES IN ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE**

The Department of Environmental and Geographical Science offers the following modules. The 4000-level modules are available for both Honours and Masters level students, the 5000-level courses only for Masters level students.

EGS4006Z	Introduction to Environmental Assessment and Management (not available to students within EGS)
EGS4011Z	Environmental Management
EGS4013Z	Environmental Science
EGS4016Z	Capital, Politics and Nature



EGS4018Z	GIS I: Theories and Principles of Geographical Information Systems
EGS4019Z	GIS II: Studio Work
EGS4023Z	Research Methods in Natural Science
EGS4024Z	Climate Variability and Climate Modelling
EGS4025Z	Remote Sensing
EGS4026Z	Extreme Climate and Weather Events
EGS4027Z	Quaternary Palaeoecology
EGS4029X	Research Project in EGS (BSc Stream)
EGS4030Z	Disaster Risk Science I
EGS4032Z	Social and Economic Assessment
EGS4033Z	Geography of Development and the Environment
EGS4034Z	Globalization and the Natural Environment
EGS4035Z	Rise, Fall and Reconstruction of the South African City
EGS4036Z	Drylands of Southern Africa
EGS4037Z	Understanding and Managing Conflict
EGS4038Z	Climate Change and Predictability
EGS5022Z	Directed Reading for Independent Research (Academic Writing course)
EGS5024Z	Methodology and Ethics of Environmental Management
EGS5025Z	Environmental Evaluation and Monitoring

---

## DEPARTMENT OF GEOLOGICAL SCIENCES

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

The Departmental abbreviation for Geological Sciences is GEO.

**Associate 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 *Witwatersrand*

**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 Annegarn, BSc (Hons) PhD *Witwatersrand*

H C Klinger, MSc *Stell* PhD *Tubingen*

R M Smith, MSc *Witwatersrand* PhD *Cape Town*

R Zartman, MS PhD *Caltech*

**Principal Scientific Officer:**

A Späth, MSc PhD *Cape Town*

**Principal Technical Officer:**

B A Cairns

**Chief Technical Officers:**

J Harrison

V Moisey

**Senior Scientific Officers:**

S Govender

R August, BSc (Hons) *UDW* MSc *Natal*

**Scientific Officers:**

---

F Rawoot, BSc *UWC*

**Administrative Assistant (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.

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

**First-Year Courses****ERT1000F INTRODUCTION TO EARTH AND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

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

**Fieldwork:** Students are required to attend three half day excursions in the Cape Peninsula.

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

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

*Note: Supplementary examinations will be written in November.*

---

**ERT1002S INTRODUCTION TO EARTH AND 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.

---

**GEO1006S INTRODUCTION TO MINERALS, ROCKS AND STRUCTURE**

**Course co-ordinator(s):** Associate 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 AND CRYSTALLOGRAPHY

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

**Entrance requirements:** ERT1000F (or ERT1002S) and GEO1006S, first qualifying course in Chemistry.

**Course outline:**

Crystallography, crystallographic calculations, and a brief introduction to X-ray crystallography. Crystal optics: the theory and practice of identifying minerals by means of the polarising microscope. Mineralogy: the chemical, physical and optical properties of selected groups of rock-forming minerals. Phase diagrams: interpretation of one, two and simple three component phase diagrams.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

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

**DP requirements:** Attendance at 80% of practicals, and an average of 30% in all marked class work and tests.

**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 C Rowe

**Entrance requirements:** GEO2001F

**Course outline:**

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

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

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

**DP requirements:** An average of 30% in marked class work, and attendance at 80% of practicals.

**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 AND GEOLOGICAL MAPPING** (second-year half course)**Course co-ordinator(s):** Associate 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 AND 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.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	2

**Practicals:** Two practicals per week, Tuesday and Thursday, 14h00-17h00.**DP requirements:** An average of 30% in all marked class work and class tests.**Examination requirements:** Practical and tests count 25%; one 3-hour theory examination written in November counts 45%; two 2-hour practical examinations written in November count 30%. Subminima of 40% required in practical and theory examination papers.

---

**GEO3005F PETROLOGY AND STRUCTURAL GEOLOGY****Course co-ordinator(s):** Professor A P le Roex**Entrance requirements:** GEO2001F, GEO2004S, first qualifying course in Chemistry**Course outline:**

Interpreting major and trace element and isotope variations in igneous rocks. Origin and evolution of the major magma series. Thermodynamics, kinetics and chemography of metamorphic reactions. Tectonic setting of metamorphic terrains. Principles of interpretations and classification of continental and marine sedimentary environments. Fault related folding, fold and thrust systems, kinematic principles and section balancing. Ductile deformation.

	Period				
	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	2

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

**DP requirements:** Attendance at 80% of practicals and an average of 30% in all marked class work and tests.

**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):** Associate 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 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.

---

### GEO5000W MSc IN GEOLOGY

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

---

### GEO5001F and GEO5002W MSc IN ENVIRONMENTAL GEOCHEMISTRY

(by coursework and dissertation)

**Course co-ordinator(s):** Dr A N Roychoudhury

**Entrance requirements:** At least a four year degree in Science, Agriculture, or Engineering, including a first-year course in Chemistry. Due to limitations imposed by laboratory space and equipment, a maximum of 8 students will be permitted to register in any one year. Applications will be evaluated on the basis of academic and/or publication record, record of appropriate training or

work experience, and referees' reports.

**Course outline:**

The degree comprises six months of taught coursework (GEO5001F) and a dissertation on an approved project spread over six months (GEO5002W). The degree would normally be completed over twelve months, and successful students can expect to graduate at the mid-year graduation ceremony the following year. The first six months involve lectures, practicals, essays, seminars and small projects. The teaching programme begins in mid-January and comprises modules (short courses of one to three weeks duration) covering the following topics: General Introduction to Analytical Methods; Geodata analysis; Water Chemistry; Surficial (sediment-forming) Processes; Soils; Atmospheric Geochemistry; Geochemistry and Human and Animal Health; Legislative Aspects and Environmental Impact Assessment; Management; Geohydrology. Examination of all coursework will take place during mid-July. Attendance of a 10-day field trip to individual mining and industrial centres in August is a compulsory requirement. Project work and dissertation preparation is carried out from August to December. Dissertation projects are selected from topics covered in the modules and require approval by the Head of Department. A more detailed outline of the course and application forms can be obtained from the Department.

**Examination requirements:** In GEO5001F marked class work and seminars count 37%; two three-hour theory examination papers written in July each count 20%; one one-week examination assignment written in July counts 23%. Both GEO5001F and GEO5002W (dissertation) must be passed for the degree to be awarded. A subminimum of 40% is required for GEO5001F examination.

---

**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.



---

## DEPARTMENT OF ARCHITECTURE, PLANNING AND GEOMATICS - DIVISION OF GEOMATICS

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.

**Professor:**

H R  ther, 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 Davids

**Laboratory Attendant:**

S Smith

## Undergraduate Courses

### First-Year Courses

---

#### APG1016S GEOMATICS 1

**Course co-ordinator(s):** Professor H R  ther

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Practicals:** One practical per week, Wednesday 6th to 8th period.

**Assessment:** Tests 20%, Practical Assignments 25%, 3-hour Examination 55% (sub minimum 40%).

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

### Second-Year Courses

---

#### APG2014S GEOMATICS II

**Course co-ordinator(s):** Associate Professor C Merry

## 86 DEPARTMENT OF ARCHITECTURE, PLANNING AND GEOMATICS - DIVISION OF GEOMATICS

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Practicals:** One practical per week, Monday 6th to 8th period.

**Assessment:** Tests 15%; practical assignments 25%; 3-hour examination 60% (sub minimum 40%).

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

### APG2026F ELEMENTARY SURVEYING

**Course co-ordinator(s):** Ms J Whittal

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Practicals:** One practical per week, Tuesday 6th to 8th period.

**Assessment:** Tests 25%, Practical Assignments 25%, 3-hour examination 50% (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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Practicals:** One practical per week, Monday 6th to 8th period.

**Assessment:** Tests 20%, Practical Assignments 25%, 3-hour examination 55% (sub minimum 40%)

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

---

**APG2018X GEOGRAPHIC INFORMATION SYSTEMS CAMP**

**Course co-ordinator(s):** Professor H R  ther

**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

---

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Practicals:** One practical per week, Tuesday 6th to 8th period.

**Assessment:** Tests 20%, Practical Assignments 25%, 3-hour examination 55% (sub minimum 40%)

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

## 88 DEPARTMENT OF ARCHITECTURE, PLANNING AND GEOMATICS - DIVISION OF GEOMATICS

---

### APG3012S GEOMATICS III

**Course co-ordinator(s):** Dr G Sithole

**Entrance requirements:** APG1015F or CSC1017F or CSC1015F or CSC1018F, and APG1016S

**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, coplanarity, 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Practicals:** One practical per week, Monday 6th to 8th period.

**Assessment:** Tests 15%, Practical Assignments 25%, Examination 3 hours 60% (sub minimum 40%)

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

---

### APG3016C SURVEYING II

**Course co-ordinator(s):** Ms J Whittal

**Entrance requirements:** APG1016F and APG2015F or equivalent; 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3 third quarter only

**Practicals:** One practical per week, Wednesday 6th to 8th period.

**Assessment:** Tests 20%, Practical Assignments/Seminars 20%, Examination 1.5 hours 60% (sub minimum 40%)

**DP requirements:** Completion of practical assignments to the satisfaction of the course convenor; 35% test mark (or average if more than one test).

---

### 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):** Professor H R ther

**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, Wednesday 6th to 8th period.

**Assessment:** Tests 20%, Practical Assignments 20%, Examination 1.5-hours 60% (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 *Witwatersrand* 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*

V A Russell, BSc (Hons) MSc *Cape Town* PhD *Stell*

M P Schwellnus, MBChB *Witwatersrand* 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*

A G Morris, BSc (WLU) PhD *Witwatersrand*

### 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 MEd (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) *Witwatersrand*

### 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*

O J Tsotetsi, BSc (Hons) *North* MSc PhD *Wits*

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: Replaces HUB2014F: HUMAN PHYSIOLOGY: MAINTENANCE OF HOMEOSTASIS from 2006*

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

#### Period

Mon Tue Wed Thu Fri

**Lectures:** 1 1 1 1 1 Fridays may be used for tutorials, guest lectures and tests.

**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 counts 20%; assignments counts 10%; practicals counts 20%; examinations (theory and practical) counts 50%. An oral examination may be required in the case of selected students.

---

#### HUB2013S HUMAN PHYSIOLOGY: PHYSIOLOGY OF ORGAN SYSTEMS

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

**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.

## 92 DEPARTMENT OF HUMAN BIOLOGY

### Period

Mon Tue Wed Thu Fri

**Lectures:** 1 1 1 1 1 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 counts 20% examinations (theory and practical) 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:** HUB2013S, CEM1000W (or equivalent)

**Course outline:**

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

### Period

Mon Tue Wed Thu Fri

**Lectures:** 1 1 1 1 1

**Practicals:** One practical per week, 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) counts 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:** HUB2013S, 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.

### Period

Mon Tue Wed Thu Fri

**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 HUB2013S, HUB3006F, HUB3007S, HUB3002S and RAY2001W towards the senior courses required for the degree.*

### **HUB3010F FUNCTIONAL ANATOMY AND HISTOLOGY**

**Course co-ordinator(s):** Associate 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%.

### **HUB3011S COMPARATIVE ANATOMY & BIOLOGICAL ANTHROPOLOGY**

**Course co-ordinator(s):** Associate 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:** 50% for course work and 50% examination (theory and practical).

## **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.

---

## DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

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

### **Associate Professor and Head of Department:**

C R A Gilmour, MSc PhD *Cape Town*

### **Professor of Applied Mathematics:**

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*

J H Webb, BSc (Hons) *Cape Town* PhD *Cantab*

### **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 Brümmmer, MSc *Stell* Docts Math *Amsterdam* PhD *Cape Town*

K A Hardie, MSc *Natal* 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)*

T G Myers, BSc (Hons) *Leicester* PhD *Leeds*

A B Yanovski, MSc *Sofia* PhD *Dubna*

### **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*

P W Ouweland, MSc 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*

K Bennie, BA(Hons) *Natal* MPhil *Cape Town*

V Frith, MSc HDE *Cape Town* (CHED)

J Murugan, MSc PhD *Cape Town*

K T P Rafel, BSc (Hons) *Witwatersrand* MSc *Cape Town*

## 96 DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

N R C Robertson, MSc PhD *Cape Town*

C S Swart, MSc *Natal* MSc PhD *London*

D L Wilcox, MSc PhD *Cape Town*

### **Research Officers:**

A D G Brandao, BSc *Witwatersrand* MSc PhD *Cape Town*

C Cunningham, PhD *Imperial College, London*

S J Holloway, MSc PhD *Cape Town*

### **Principal Technical Officer:**

J M Rolfe, BSc (Eng) *Cape Town*

### **Administrative Manager:**

H S Leslie, BA (Hons) *UPE*

### **Administrative Assistants:**

B B Cloete

D L Loureiro

P T Middelkoop, BSocSc *Cape Town*

L U Pieters

C D Sher

### **Administrative & Research Assistant:**

M Cooke

### **Senior Secretaries:**

S Hellaby, BA HED *Cape Town*

M L Yon

### **Departmental Assistants:**

N Minnie

J M Steenveld

## **RESEARCH IN MATHEMATICS AND APPLIED MATHEMATICS**

Research activities in the Department cover the spectrum of mathematics, and there are groups which are active in areas as diverse as Topology, Analysis, Logic and 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, P W Ouwehand, D L Wilcox)

Cryptography (C S Swart)

Dynamical Systems (A B Yanovski)

General Relativity and Cosmology (B A Bassett, C A Clarkson, P K S Dunsby, G F R Ellis, C W Hellaby, J Murugan)

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)

Logic, Universal Algebra (P W Ouwehand)

Low Dimensional Geometry and Topology (D T Gay)

Marine Population Dynamics (A Brandao, D S Butterworth, C Cunningham, S J Holloway, E E Plagányi)

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)

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)

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)

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:*

MAM1043H, MAM1044H, MAM2046W, MAM3040W

with courses in Mathematics, Oceanography, Statistics and Computer Science.

*Mathematical Physics:*

MAM1043H, MAM1044H, MAM2046W, MAM3040W

with courses in Physics, Astronomy and Mathematics.

*Biomathematics and Life Sciences:*

MAM1043H, MAM1044H, 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 AND 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,

## 98 DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

introduction to dynamical systems, modelling and simulation of discrete and continuous processes.

**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:**

Developing simple mathematical models useful to biologists. Models of growth, competition, predation and sustainable harvesting. Implementing models using the computer. Elementary statistics.

#### Period

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	5	5	5	5	5
------------------	---	---	---	---	---

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

**DP requirements:** Minimum of 30% in class tests.

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

---

### 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)

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

**2OD ORDINARY DIFFERENTIAL EQUATIONS**

First order linear and nonlinear equations; existence and uniqueness of solutions. Linear equations of the n-th order and systems of n linear first order equations. Nonhomogeneous linear equations and systems; variation of parameters; qualitative theory of nonlinear equations; phase plane analysis; externally and parametrically driven oscillators; resonances; application to the theory of nonlinear vibrations. Calculus of variations.

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

Boundary-value problems, Green's functions, eigenvalue problems. Variational calculus, applications to Lagrangean and Hamiltonian mechanics. Diffusion, Laplace's and wave equation. Solution by separation of variables.

**2MM INTRODUCTION TO MATHEMATICAL MODELLING** (coded as MAM2044F for Engineering students)

Formulation, construction and interpretation of mathematical models for problems in the natural and life sciences. Modelling with first and second order differential equations. Introduction to population modelling, heat transfer and fluid flow. Analytical, qualitative and numerical methods and solutions. Basic use of the Laplace transform.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

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

**DP requirements:** A class record of 30% or more is required in each module of the course.

**Examination requirements:** For each module the year mark counts 30% and one no longer than 2-hour examination paper counts 70%.

**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.

#### Period

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	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 3MP will be offered in the first semester, and modules 3FD, 3GR and 3ND 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 method of characteristics; the effect of dissipation; the Cole-Hopf transform for the Burgers equation; travelling fronts for the KPP equation. The effect of dispersion: KdV and nonlinear Schroedinger equation. Elliptic integrals and elliptic functions; dark and bright solitons; kinks and breathers for the sine-Gordon equation. Multisoliton solutions: the Hirota method and Baecklund transformations.

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

Fixed points, bifurcations, phase portraits. Conservative and reversible systems. Index theory, Poincaré-Bendixson theorem, Liénard systems, relaxation oscillators. Hopf bifurcations, quasiperiodicity and Poincaré maps. Applications to oscillating chemical reactions and Josephson



junctions. Chaos on a strange attractor, Lorentz map, logistic map, Hénon map, Lyapunov exponents. Fractals.

3AN ADVANCED NUMERICAL METHODS (coded as MAM3050S for Engineering Students).

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

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

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

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

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

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

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

**DP requirements:** A class record of 30% or more is required in each module of the course.

**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 3MP are written in June and modules 3FD, 3GR and 3ND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3 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 2007, 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 and equilibria. Rates of change. Limits, derivatives. Maxima and minima. Concavity. Asymptotes and curve sketching. Newton's Method. Taylor Polynomials. Antiderivatives and integrals. Mathematical modelling. Separable and linear differential equations.

**Period**

Mon	Tue	Wed	Thu	Fri
-----	-----	-----	-----	-----

<b>Lectures:</b>	1	1	1	1	1
------------------	---	---	---	---	---

**Tutorials:** One per week, Monday or Wednesday afternoon, 14h00-16h00.**DP requirements:** Minimum of 30% in class tests, and at least 80% attendance at tutorials.**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 Programme 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

## 104 DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

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 in the Department of Mathematics and Applied Mathematics. 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.

#### Period

Mon Tue Wed Thu Fri

**Lectures:** 1 1 1 1 1

**Tutorials:** Friday, 1st period. **Workshops:** Monday, 6th and 7th period.

**DP requirements:** Minimum of 35% for class record and very satisfactory attendance at all lectures, workshops and tutorials.

**Examination requirements:** Year mark counts up to 40%; one no longer than 3-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, MAM2004H and MAM2002S MATHEMATICS 2001, 2004 AND 2002

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 PHY2005H and PHY2006H, 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:** 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:** As for MAM2000W except that the examination consists of two 2-hour papers.

#### Modules for Second-Year Courses

		Semester	Prerequisites
2AC	Advanced Calculus	1	-
2DE	Differential Equations	2	Modules 2AC and 2LA
2DS	Discrete Structures	1	-
2FM	Fourier Methods	2	-
2HI	History of Mathematical Ideas	2	-
2IA	Introductory Algebra	2	Module 2LA
2LA	Linear Algebra	1	-
2RA	Real Analysis	2	-

#### Syllabuses

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

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

2FM FOURIER METHODS: Signals and systems. Fourier series. Analysis of periodic Fourier series. Discrete frequency spectra. Fourier transforms, convolution, continuous spectra. Applications. Discrete and Fast Fourier Transforms.

2HI HISTORY OF MATHEMATICAL IDEAS: (Not offered in 2007) Early Mathematics - Euclid and the crisis over irrational numbers. Hindu and Arab Mathematics. The Century of Genius - Descartes, Newton and Leibniz and the origins of the calculus. Pascal - projective geometry and probability. Berkeley's attack on the calculus. Bernoulli, Euler, Gauss, Lobachewski. Fourier and the notion of function. Nineteenth century Mathematics; elliptic functions. Development of rigorous analysis - Cauchy, Bolzano, Weierstrass. Number theory; Dirichlet, Riemann, Kummer, Hilbert. Frege develops logic. Dedekind axiomatizes the integers and invents cuts. Cantor discovers transfinite numbers. Renewed crisis in the foundations of Mathematics.

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

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

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

2DS DISCRETE STRUCTURES: Introduction to informal logic; use of truth tables, quantifiers. Methods of proof (contradiction, induction). Informal set theory, relations, equivalences, partitions, partial orders, functions, cardinality. Introduction to graph theory.

## 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5 with options in 4th period.

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

**DP requirements:** A class record of 30% or more 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-semester modules in October/November.

---

**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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 5 5 5 5 5 with options in 4th period.**Tutorials:** Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.**DP requirements:** A class record of 30% or more.

**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-semester modules in October/November.

---

**MAM3002H and MAM3003S MATHEMATICS 3002 AND 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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 5 5 5 5 with options in 4th period.**Tutorials:** Friday, 14h00-17h00, with tutorials for some modules at other times to be arranged.**DP requirements:** A class record of 30%.

**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**

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

**Allowed combinations**

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

**Recommended modules for Mathematics Honours courses**

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

- (a) BROAD COVERAGE OF MATHEMATICS: Intended for prospective researchers and mathematicians.
- (b) TEACHING: Intended for prospective high school mathematics teachers.
- (c) MATHEMATICS OF COMPUTER SCIENCE: A co-operative venture with the Department of Computer Science. Each Department offers one half of the degree.
- (d) INDUSTRIAL MATHEMATICS: Designed to prepare a mathematician to enter industry, this programme is run jointly through the Department of Mathematics & Applied Mathematics and the Department of Statistical Sciences.
- (e) FINANCIAL MATHEMATICS: 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 2007 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 A selection of topics from:

Rings: introductory ideal theory, maximal ideals, isomorphism theorems. Euclidean rings, principal ideal and unique factorization domains. Fields of Fractions for a domain.

Fields: the characteristic, extensions of fields, finite fields and their multiplicative groups, algebraic numbers and algebraically closed fields.

Groups: the correspondence theorem, isomorphism theorems, Sylow's theorems for finite groups, finitely generated abelian groups.

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
MAM3050S	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 2007. 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:** 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, Complex Function Theory, Computability and Complexity, Measure Theory, Applied Logic, Number Theory, Differential Geometry, Differential Topology, Algebraic Geometry, Formal Methods of Artificial Intelligence, Formal Methods of Computer Science, Denotational Semantics, Theory of Algorithms, Dynamical Systems and Chaos, Lie Algebras, Quantum Computing.

**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:** 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 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 Physics, Project, Seminar, Numerical Solution of Partial Differential Equations, Optimisation, Environmental Modelling, General Relativity and Cosmology, Mechanics and Analysis, 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 AND 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.

---

**PHY4003W BSc (HONS) IN ASTROPHYSICS AND 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 (MAM4009Z)\*, classical electrodynamics (PHY4004Z), general relativity (MAM4010Z), general astrophysics (AST4003Z and AST4004Z), galaxies (AST4006Z), computational physics (PHY4005Z), astrophysical fluid dynamics (MAM4011Z) and computational methods (AST4005Z), as well as an observational techniques component which includes optical and infrared astronomy (AST4002Z) and radio astronomy (MAM4012Z). 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 Physics department.

### **PHY5002F TAUGHT COMPONENT OF THE MSc IN ASTROPHYSICS AND 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 (AST5001Z), extragalactic astronomy (AST5002Z), space technology (EEE5024Z), hot topics in cosmology (MAM5005Z), advanced general relativity (MAM5006Z), high energy astrophysics (MAM5007Z), observational cosmology (MAM5008Z), geomagnetism and aeronomy (MAM5009Z), plasma physics (PHY5004Z) and magnetohydrodynamics (PHY5005Z).

### **MAM5005W THESIS COMPONENT OF THE MSc IN ASTROPHYSICS AND SPACE SCIENCE**

**Entrance requirements:** PHY5002F

**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

## 112 DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

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 (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):** To be advised

**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:

Financial Instruments and Risk Management, Mathematics of Derivative Securities, Theory of Statistics, Numerical Modelling I & II, Theory of Arbitrage I & II, Financial Econometrics I & II, Modern Portfolio Theory, South African Financial Markets and Instruments.

The coursework component may vary from year to year.

DISSERTATION 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.

---

## DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

The Department is housed in the Molecular Biology Building, 22 University Avenue  
Telephone (021) 650-3270 Fax (021) 689-7573

The Departmental abbreviation for Molecular and Cell Biology is MCB.

### **Professor and Head of Department:**

---

### **Professor of Biochemistry:**

J M Farrant, BSc (Hons) PhD *Natal*

J P Hapgood, BSc (Hons) PhD *Cape Town*

### **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*

V E Coyne, BSc Rhodes BSc (Hons) PhD *Cape Town*

N Illing, MSc *Cape Town* DPhil *Oxon*

G G Lindsey, BSc (Hons) PhD *Sussex*

S G Mundree, BPaed (Sci) BSc (Hons) UDW PhD *Auburn* MBA *Cape Town*

S J Reid, BSc (Hons) PhD *Rhodes*

### **Senior Lecturers:**

K J Denby, BSc (Hons) *Bristol* DPhil *Oxon*

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

### **Senior Scientific Officers:**

A Lilelo, BSc (Hons) *UWC*

T Millard, BSc *Pretoria*

S Grové

### **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

### Secretary:

C Sandwith

### Librarian:

J L Eidelman, BA PGDipLib *Cape Town*

### Departmental Assistants:

W Adonis

K Diedericks

C Hendrickse

D A Human

M Josias

M Keating

P Louw

J Solomons

## 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 (Associate Professor Illing and Dr Roden): projects include 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

---

#### MCB2000F INTRODUCTION TO BIOCHEMISTRY

*NOTE: Entrance is limited to 160 students.*

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

**Entrance requirements:** First-year course in Chemistry.

**Course outline:**

Water, pH, protein structure and function, DNA/RNA structure, flow of genetic information, methodology of exploring genes, thermodynamics, enzymes: catalytic and regulatory strategies.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Tutorials:** One tutorial per week.

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

**DP requirements:** Average mark of 40% in written class tests and an average mark of 50% in practicals, tutorials and model building sessions.

**Examination requirements:** Essays, class tests and practicals count 50%; one paper written in June counts 50%, with a minimum mark of 40%. Oral examinations may be held at the discretion of the Department.

**MCB2001S MOLECULAR BIOLOGY AND PHYSIOLOGICAL BIOCHEMISTRY**

**Course co-ordinator(s):** Dr J D E A Rodrigues

**Entrance requirements:** MCB2000F.

**Course outline:**

Membrane structure and dynamics, membrane channels and pumps, signal transduction, antibodies: biology and application, metabolic energy: carbohydrates, glycolysis, citric acid cycle, oxidative phosphorylation.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Tutorials:** One tutorial per week.

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

**DP requirements:** Average mark of 40% in written class tests and an average mark of 50% in practicals, tutorials and model building sessions. (Practical theory is tested with the class tests).

**Examination requirements:** Essays, class tests and practicals count 50%; one paper written in November counts 50%, with a minimum mark of 40%. Oral examinations may be held at the discretion of the Department.

**MCB2005F INTRODUCTORY MICROBIOLOGY I**

*NOTE: Entrance is limited to 100 students.*

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

**Entrance requirements:** CEM1000W (or equivalent), BIO1000F/S.

**Course outline:**

Prokaryote cell structure and function; diversity of microorganisms and taxonomy; bacterial growth and control; microbial ecology; introduction to virology.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Tutorials:** One per week.

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

**DP requirements:** Attendance at all practicals, 40% test average and 50% on all assignments.

**Examination requirements:** Practical, assignments and tests count 50%; one 3-hour paper written in June counts 50%, with a 40% sub-minimum.

**MCB2006S INTRODUCTORY MICROBIOLOGY II**

**Course co-ordinator(s):** Dr P Meyers

**Entrance requirements:** MCB2005F

**Course outline:**

Microbial diversity; microbial metabolism; microbial genetics.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	5	5	5	5	5

**Tutorials:** One per week.

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

**DP requirements:** Attendance at all practicals, 40% test average and 50% on all assignments.

**Examination requirements:** Practical, assignments and tests counts 50%; one 3-hour paper written in November counts 50%, with a 40% sub-minimum.

**MCB2007F TRADITIONAL BIOTECHNOLOGY**

**Course co-ordinator(s):** Dr P Meyers

**Entrance requirements:** BIO1000F, CEM1000W, BIO1004S; MCB2005F (co-requisite) highly recommended..

**Course outline:**

Food Biotechnology; principles of beer and wine making; agriculture; marine biotechnology; microbial strain selection, water purification.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	3	3	3	3	3

**Tutorials:** One tutorial per week.

**Practicals:** One practical per week, Wednesday, 14h00-17h00. This may take the form of a compulsory field trip.

**DP requirements:** Attendance at all practicals; 40% test average; 50% on all assignments.

**Examination requirements:** Essays, practicals and tests count 50%; one 3-hour written examination in June counts 50%, with a 40% sub-minimum.

**MCB2009C INDUSTRIAL BIOTECHNOLOGY**

*NOTE: This course is offered in the second semester, first quarter.*

**Course co-ordinator(s):** Associate Professor V E Coyne

**Entrance requirements:** MCB2005F, MCB2000F

**Course outline:**

Bioremediation; production of fine chemicals and vaccines.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	3	3	3	3	3

**Tutorials:** One tutorial per week.

**Practicals:** One practical per week, Wednesday, 14h00-17h00. This may take the form of a compulsory field trip.

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

**Examination requirements:** Essays, tests and practicals count 50%; one 3-hour written examination in November counts 50%, with a 40% sub-minimum.

**MCB2003F INTRODUCTION TO GENETICS**

*NOTE: Entrance is limited to 60 students.*

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

**Entrance requirements:** BIO1000F, BIO1004S, CEM1000W (or equivalent), STA1000F/S, MAM1004F or MAM1005H.

**Course outline:**



Principles of heredity and variation, basic genetic linkage and mapping, Tetrad analysis, chromosomal abnormalities, genome size and complexity, structure of the eukaryotic genome, prokaryotic genetics, bacteriophages and transposons, extranuclear inheritance, mitochondrial diseases, population genetics.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

**Tutorials:** One per week.

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

**DP requirements:** Average mark of 40% in class tests, average mark of 50% in practicals and tutorials.

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

### MCB2013S MOLECULAR GENETICS AND DEVELOPMENT

*NOTE: Entrance is limited to 60 students.*

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

**Entrance requirements:** BIO1000F, BIO1004S, CEM1000W, STA1000F/S or STA1007S, MAM1004F or MAM1005H, MCB2003F highly recommended.

**Course outline:**

Introduction to development: Early Development; morphogenesis; Histogenesis and differentiation; Early development and patterning of nervous system; Brain development, neural path finding; Eukaryotic gene expression; Axis specification - Drosophila; Plant development.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

**Tutorials:** One per week.

**Practicals:** One practical per week, Wednesday, 7-9th period.

**DP requirements:** Attendance and write up of all practicals and attempts at all tutorials. Class test average of 40%.

**Examination requirements:** Essays, practicals and tests count 50%; one 3-hour paper written in November counts 50%.

### CHE2039D BIOPROCESS TECHNOLOGY

*NOTE: This course is offered in the second semester, fourth quarter.*

**Course co-ordinator(s):** Professor S T L Harrison

**Entrance requirements:** MCB2000F, MCB2005F, MCB2007F, MAM1000W or MAM1005H.

**Course outline:**

Bioprocess Technology: microbial process engineering; material balancing; microbial stoichiometry and yields; microbial bioprocess for fine chemical production; bioreactor types and features; oxygen transfer and transfer rates; heat transfer and transfer rates; downstream processing (DSP) for product recovery, concentration or purification. Bioprocess Kinetics: industrial bioprocesses; kinetics of microbial growth, substrate utilization and product formation; derivation of generalised performance equation for a bioreactor; batch and continuous culture; transient behaviour of continuous bioreactor following introduction of contaminant, step change in feed rate or feed substrate concentration; determination of kinetic parameters from steady state data; introduction to maintenance and endogenous respiration; instruction on use of EXCEL for data processing and simulation.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Tutorials:** One tutorial per week.

## 118 DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

**Practicals:** One practical per week, Wednesday, 14h00-17h00. This may take the form of a compulsory field trip.

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

**Examination requirements:** Essays, tests, practicals and/or projects count 50%; one 3-hour written examination in November counts 50%.

### 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.*

---

#### BIO3009A SYSTEMATICS AND EVOLUTIONARY DEVELOPMENT

For course details see entry under Department of Botany.

---

#### MCB3000C BIOCHEMISTRY: EUKARYOTIC GENE REGULATION

*NOTE: This course is offered in the second semester, third quarter.*

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

**Entrance requirements:** MCB2001S, MAM1004F and STA1000F/S or STA1007S (or MAM1000W).

**Course outline:**

DNA structure, eukaryotic replication and repair and gene rearrangements. Eukaryotic RNA synthesis and splicing, protein synthesis, protein targeting, eukaryotic gene expression including regulation of chromatin structure, regulatory transcription factors, regulatory RNA and RNAi.

##### Period

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	4	4	4	4	4
------------------	---	---	---	---	---

**DP requirements:** 40% average in class tests.

**Examination requirements:** Essays, and tests count 40%; one 2-hour written examination in November counts 60%, with a minimum of 40%.

---

#### MCB3001B BIOCHEMISTRY: ADVANCED METABOLISM

*NOTE: This course is offered in the first semester, second quarter. Entrance is limited to 80 students.*

**Course co-ordinator(s):** Associate Professor G G Lindsey

**Entrance requirements:** MCB2001S, MAM1004F and STA1000F/S or STA1007S (or MAM1000W).

**Course outline:**

Advanced metabolism including pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, amino acid degradation and urea cycle, integration of metabolism, protein folding and design.

##### Period

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	4	4	4	4	4
------------------	---	---	---	---	---

**Practicals:** One practical per week, Thursday or Friday, 14h00-18h00.

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

**Examination requirements:** Essays, practicals and tests count 40%; one 2-hour written examination in June counts 60%, with a minimum of 40%.

---

**MCB3003B MARINE AND PLANT BIOTECHNOLOGY**

*NOTE: This course is offered in the first semester, second quarter.*

**Course co-ordinator(s):** Associate Professor V E Coyne

**Entrance requirements:** MCB2001S, MCB3007A. Students registered on the SB012 programme may register without MCB2001S.

**Course outline:**

Secondary metabolism in plants, plant transformation, development of GM crops, abalone spawning and settlement, probiotics, triploidy and marine animals, development of GM fish, disease resistance in fish, DNA vaccines.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Practicals:** One practical per week, Wednesday 14h00-17h00. This may take the form of a compulsory field trip.

**DP requirements:** Attendance at all practicals, 40% test average and 50% in all assignments.

**Examination requirements:** Essays and tests count 40%, one 2-hour written examination in June counts 60%, with a minimum of 40%.

---

**MCB3007A RECOMBINANT DNA TECHNOLOGY**

*NOTE: This course is offered in the first semester, first quarter.*

**Course co-ordinator(s):** Professor J A Thomson

**Entrance requirements:** MCB2006S and MCB2000F. Students registered on the SB012 Programme may register without MCB2006S.

**Course outline:**

Construction of gene banks, cloning vectors, polymerase chain reaction, DNA sequencing, gene expression analysis, bioinformatics, site directed mutagenesis, and repetitive DNA.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

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

**DP requirements:** Attendance at practicals, 40% test average and 50% on all assignments.

**Examination requirements:** Essays and tests count 40%, one 2-hour written examination in June counts 60%, with a minimum of 40%.

---

**MCB3008B MOLECULAR MICROBIAL GENETICS**

*NOTE: This course is offered in the first semester, second quarter.*

**Course co-ordinator(s):** Professor J A Thomson

**Entrance requirements:** MCB3007A

**Course outline:**

Plasmid genetics, lambda phage gene regulation, transposons, signal transduction, post-transcriptional regulation, nitrogen metabolism, sporulation.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

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

**DP requirements:** Attendance at practicals, 40% test average and 50% on all assignments.

**Examination requirements:** Essays and tests count 40%, one 2-hour written examination in June counts 60%, with a minimum of 40%.

---

**MCB3010S PROCESS OPTIMISATION AND PRODUCTION IN**

## 120 DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

### BIOTECHNOLOGY

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

**Entrance requirements:** MCB3007A, MCB2000F, MCB3015A

**Course outline:**

Drug discovery and design; protein engineering; enzymology; biotransformations; downstream processing; metabolic engineering.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

**Practicals:** Students will have to complete an experimentally based project.

**DP requirements:** 40% test average; satisfactory completion of research project.

**Examination requirements:** Essays, tests and projects count 40%; one 3-hour written examination in November counts 60%.

---

### MCB3011S MOLECULAR VIROLOGY AND ADVANCED MICROBIAL GENETICS

**Course co-ordinator(s):** Professor E P Rybicki

**Entrance requirements:** MCB3007A, MCB3008B

**Course outline:**

Molecular Virology including virion structure, virus replication, virus taxonomy, molecular epidemiology and pathogenesis. Microbial molecular genetics including stationary phase regulation, DNA repair and hot topics in Microbiology.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Tutorials:** One tutorial per week, by arrangement.

**Practicals:** Students will have to complete an experimentally based research project.

**DP requirements:** 40% average in class tests; satisfactory completion of research project.

**Examination requirements:** Essays and tests count 40%; one 3-hour written examination in November count 60%, with a minimum of 40%.

---

### MCB3012Z RESEARCH PROJECT IN MOLECULAR AND CELL BIOLOGY

**Course co-ordinator(s):** Dr P Meyers

**Entrance requirements:** MCB3015A + MCB3001B or MCB3007A + MCB3003B or BIO3009A + MCB3014B or MCB3007A + MCB3008B as pre-requisites.

**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:** By arrangement

**DP requirements:** None

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

---

### MCB3013C MOLECULAR EVOLUTIONARY GENETICS

*NOTE: This course is offered in the second semester, first quarter.*

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

**Entrance requirements:** MCB2003F or MCB2013S or any second-year BIO course.

**Course outline:**

Molecular data, Population genetics, Behavioural genetics, neutral theory of evolution Practical component: Students will have to complete an experimentally based research project (MCB3012Z).

**Period****Mon Tue Wed Thu Fri****Lectures:** 3 3 3 3 3**DP requirements:** Class test average of 40%.**Examination requirements:** Essays, practicals and tests count 40%; one 2-hour written examination in June counts 60%, with a minimum of 40%.**MCB3014B ADVANCED MOLECULAR DEVELOPMENT I***NOTE: This course is offered in the first semester, second quarter.***Course co-ordinator(s):** Associate Professor N Illing**Entrance requirements:** BIO3009A, MCB2003F and MCB2013S highly recommended.**Course outline:**

Applying the principles of mouse genetics and tools of molecular biology to development. The following developmental paradigms will be used to explain key concepts; eye development; limb development; neural development.

**Period****Mon Tue Wed Thu Fri****Lectures:** 4 4 4 4 4**Practicals:** Wednesday, 7th to 9th period.**DP requirements:** Class test average of 40%.**Examination requirements:** Essays, practicals and tests count 40%; one 2-hour written examination in November counts 60%, with a minimum of 40%.**MCB3015A PROTEIN AND STRUCTURAL BIOCHEMISTRY***NOTE: This course will be offered in the first semester, first quarter. Entrance is limited to 60 students.***Course co-ordinator(s):** Professor W Brandt**Entrance requirements:** MCB2001S, MAM1004F and STA1000F/S or STA1007S (or MAM1000W).**Course outline:**

Protein and nucleic acid structural biochemistry, structural bioinformatics, proteomics.

**Period****Mon Tue Wed Thu Fri****Lectures:** 4 4 4 4 4**DP requirements:** Average mark of 40% in class tests.**Examination requirements:** Essays, practicals and tests count 40%; one 2-hour written examination counts 60%.**MCB3016D PLANT BIOCHEMISTRY AND PHYSIOLOGY OF STRESS***NOTE: This course will be offered in the second semester, fourth quarter.***Course co-ordinator(s):** Associate Professor G G Lindsey**Entrance requirements:** MCB2001S, MAM1004F and STA1000F/S or STA1007S (or MAM1000W).**Course outline:**

Plant Biochemistry and Physiology, Desiccation and stress tolerance in plants and yeast.

**Period****Mon Tue Wed Thu Fri****Lectures:** 4 4 4 4 4**DP requirements:** Average mark of 40% in class tests.**Examination requirements:** Essays and tests count 40%; one 2-hour written examination in

## 122 DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

November counts 60%.

---

### MCB3017D TOPICS IN BIOINFORMATICS

*NOTE: This course will be offered in the second semester, fourth quarter.*

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

**Entrance requirements:** MCB2001S, MCB3007A, MAM1004F and STA1000F/S or STA1007S (or MAM1000W).

**Course outline:**

Genomes-sequencing, assembly, analysis and annotation; comparative genomics; gene prediction and promoter analysis; profiles and probabilistic models for protein families; topics in molecular evolution; gene expression bioinformatics and analysis of microarray data; ontologies in molecular biology (including GO); sbSNP and HapMap.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**DP requirements:** Average mark of 40% in class tests.

**Examination requirements:** Essays and tests count 40%; one 2-hour written examination in November counts 60%.

---

### MCB3018D ADVANCED MOLECULAR DEVELOPMENT II

*NOTE: This course will be offered in the second semester, fourth quarter.*

**Course co-ordinator(s):** Dr L Roden

**Entrance requirements:** MCB3014B

**Course outline:**

Application of principles of molecular development to the following subjects: Cell cycle regulation; circadian rhythms; light signaling in plants.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 2 2 2 2 2

**DP requirements:** Average mark of 40% in class tests.

**Examination requirements:** Essays and tests count 40%; one 2-hour written examination in November counts 60%.

## Postgraduate Courses

---

### MCB4002W BSc (HONS) IN MOLECULAR AND CELL BIOLOGY

**Course co-ordinator(s):** Associate Professor V E Coyne

**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:** One 4-hour techniques examination written in May counts 15%; essays count 20%; oral presentations count 15%; one 4-hour examination written in November counts 10%; projects count 40%.

---

### MCB5005W MSc IN MOLECULAR AND 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.

---

**MCB5003W and MCB5004W MSc IN STRUCTURAL BIOLOGY**

(by coursework and dissertation)

**Course co-ordinator(s):** Associate Professor T Sewell

**Entrance requirements:** An Honours degree or equivalent qualification in any appropriate area, subject to a minimum grade of 60%. There will be recognition of prior learning in accordance with University policy. Only 10 students per year will be accepted and this will be determined by the programme committee. Details of the core and elective components and other aspects of the course can be obtained from the programme co-ordinator.

**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. The theoretical component will be run in the first year and the research component in the second. The curriculum for the theoretical component will include the following, running in parallel, and will count for 120 credit points:

A *lecture series* of core and elective components focussing on the theory of the underlying technologies, and on biological applications. The lectures will be given in alternate blocks of approximately 10 weeks each, alternately at UWC at UCT (100 credits)

A *self-study* programme utilizing computer-based education imported from Birkbeck College, University of London as well as locally written material. Students' progress will be closely monitored and supervised on an individual and group basis. Self-study will be supplemented with weekly face-to-face tutorials to ensure that the students are up to date and on track. In addition students will be assigned tasks for individual self study on which they will be required to make either written or verbal reports (20 credits).

A non-examined *workshop* and *seminar series* focussing on biological applications, current research and practice in structural biology. These will be conducted by a range of local and international researchers, giving students an opportunity to discuss possible future research directions. Details of this series may change and will also include interactions between the students and ad hoc visitors.

In the second year a research-based laboratory project will be undertaken and a dissertation will be produced by the end of that year. This component of the course will count for 120 credit points.

---

**MCB6002W PhD IN MOLECULAR AND 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) *Witwatersrand* MSc PhD *Cape Town*

**Professor of Ocean Climatology:**

J R E Lutjeharms, MSc DSc *Cape Town* PhD *Washington* FRSSAf

**Emeritus Professor of Physical Oceanography:**

G B Brundrit, BSc (Hons) PhD *Manchester*

**Honorary Professor in Oceanography:**

L V Shannon, MSc PhD *Cape Town* FRSSAf

**Professor:**

C J C Reason, BSc (Hons) *Cape Town* MPhil *City* MSc PhD *British Columbia*

**Senior Lecturer:**

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

**Lecturer:**

I J Ansonge, BSc *Plymouth* MSc PhD *Cape Town*

**Departmental Librarian:**

E Sithole, BSocSci P Dip LIF *Cape Town*

**Principal Technical Officer:**

P B Hanekom, BSc *Cape Town*

**Senior Scientific Officer:**

C Whittle, MSc *Cape Town*

**Diving Supervisor:**

---

**Honorary Research Associates:**

D A Byrne, PhD *Lamont*

C M Duncombe Rae, BSc *Rhodes* BSc(Hons) PhD *Cape Town* (University of Maine)

K P Findlay, BSc (Hons) *Cape Town* MSc PhD *Pret* (Southern Whales)

J L Largier-Brown, PhD *Cape Town* (UCLA Davis)

P M S Monteiro, MSc PhD *Cape Town* (CSIR)

G Nelson, BSc (Hons) *Witwatersrand* MSc *St Andrews*

S Speich, PhD *Paris* (University of Brest)

S Weeks, MSc PhD *Cape Town* (University of Queensland)

**Administrative Assistant:**

R Harris

## JOINT FRENCH-SOUTH AFRICAN MARINE RESEARCH GROUP (IRD/UCT/MCM)

**Research Officers:**

J-L Melice PhD *Louvain*

P Penven, PhD *Brest*

## OCEAN CLIMATOLOGY RESEARCH GROUP

**Head:**

J R E Lutjeharms, MSc DSc *Cape Town* PhD *Washington* FRSSAf

**Research Officer:**

M Rouault, MSc PhD *Aix-Marseille*

**Scientific Officers:**

---

## COASTAL OCEAN RESEARCH GROUP (BCLME)

**Head:**

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



**Scientific Officers:**S Bernard, BSc(Hons) *Southampton* MSc PhD *Cape Town*P Florenchie, PhD *Grenoble***RESEARCH IN OCEANOGRAPHY**

Physical Oceanography: Ocean modelling, coastal oceanography, air-sea interaction, shelf dynamics, marine climatology, climate variability, marine and coastal meteorology, extreme events, Benguela current studies, remote sensing (Professors G B Brundrit, J R E Lutjeharms, L V Shannon, F A Shillington, C J Reason and Drs H N Waldron and I J Ansonge).

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

A basic introduction to Oceanography. The extent of the oceans, the physical, chemical and biological properties of sea water and typical distributions of water properties in the oceans. Water, salt and heat budgets, sea surface fluxes and ocean climatology. Principal forcing and responses of the sea, tides and waves. Currents and water masses in the oceans of the world. South African regional oceanography. Tutorials and practicals in oceanographic instrumentation and methods of analysis.

**Period****Mon Tue Wed Thu Fri****Lectures:** 1 1 1 1 1**Practicals:** One tutorial or practical per week, Tuesday, 14h00-17h00.**DP requirements:** Attendance at tutorials and practicals and a class mark of at least 40%.**Examination requirements:** Tutorials/practicals and tests count 40%; one 3-hour paper written in June counts 60%.**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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 1 1 1 1 1**Practicals:** One tutorial or practical per week, Tuesday, 14h00-17h00.**DP requirements:** Attendance at tutorials and practicals and a class mark of at least 40%.**Examination requirements:** Tutorials/practicals and tests count 40%; one 3-hour paper written in

November counts 60%.

### 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 1 1 1 1 1

**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

---

#### SEA4000W BSc (HONS) IN PHYSICAL OCEANOGRAPHY

**Course co-ordinator(s):** Dr H N Waldron

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

**Course outline:**

Scope: Honours students intending careers in ocean science and registering for SEA4000W 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 course modules selected from SEA4000W.

Content: Lecture-tutorials (70%), seminars (20%) and practical work (10%) in advanced physical oceanography, meteorology and marine climatology, including participation in a research cruise and a coastal field trip. First semester modules: physical properties of the ocean and atmosphere, large scale ocean and atmosphere circulation systems, geophysical fluid dynamics applied to the 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.

---

#### SEA4001W BSc (HONS) IN OCEAN & ATMOSPHERE SCIENCE

**Course co-ordinator(s):** Professor C Reason/Dr H N Waldron

**Entrance requirements:** BSc in Ocean & Atmosphere Science/Atmospheric Science/Physics/Applied Mathematics.

**Course outline:**

The program follows the same pattern as SEA4000W; students are expected to do suitable Atmospheric Science modules in consultation with the convenor, including participation in research

cruises and field trips.

**Lectures:** Three lectures per week, refer to department.

**Tutorials:** One tutorial per week, refer to department.

**Practicals:** One practical per week, refer to department.

**DP requirements:** Satisfactory attendance and completion of required modules.

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

### **SEA5000W** MSc IN OCEAN AND 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.

### **SEA5002W 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.

**Associate Professor and Head of Department:**

C M Comrie, MSc *Natal* PhD *Cantab*

**Professors of Physics:**

D G Aschman, BSc (Hons) *Cape Town* DPhil *Oxon*

R D Viollier, dipl phys *Basel* Dr phil nat *Basel* FRSSAf

**Professors of Theoretical Physics:**

J W A Cleymans, MSc D en Sc *Louvain* FRSSAf

C A Dominguez, MSc PhD *Buenos Aires* FRSSAf

**Emeritus Professor:**

F D Brooks, DSc *Rhodes*

S M Perez, BSc (Hons) *Witwatersrand* 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)

R W Fearick, BSc (Hons) PhD *Witwatersrand*

M Härting, Dipl Phys *Regensburg* Dr. Ing BW *München*

**Emeritus Associate Professors:**

J W F Juritz, MSc *Cape Town*

P E Spargo, BSc (Eng) MSc *Witwatersrand* Cert Ed *Cantab* FRSSAf

G N v d H Robertson, BSc (Hons) *Cape Town* DPhil *Oxon*

**Senior Lecturers:**

A T M Muronga, MSc *Cape Town* PhD *Minnesota*

Z Z Vilakazi, MA PhD *Witwatersrand*

**Lecturers:**

M R Nchodu, MSc PhD *Cape Town*

S M Wyngaardt, MSc PhD *Stell*

**Part-time Lecturer:**

C R Spargo, BSc (Hons) *London* Cert Ed *Cantab*

**Senior Research Associates:**

G B Tupper, MSc *Berkeley* PhD *Oklahoma*

**Principal Technical Officer:**

D Boulton

**Chief Technical Officers:**

K J Ontong

L N van Heerden, BSc *Stell*

**Senior Technical Officers:**

G K Fowle

**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 (Professors C A Dominguez and R D Viollier, Drs S M Wyngaardt and 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 (Associate Professors M S Allie and A Buffler)

## 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

## 130 DEPARTMENT OF PHYSICS

law, induction, electromagnetic radiation, waves and particles, semiconductor devices.

### Period

Mon Tue Wed Thu Fri

**Lectures:** 3 3 3 3 3

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

**DP requirements:** Minimum of 30% in class record and 50% in laboratory assessment.

**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 AND 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 A Buffler

**Entrance requirements:** This course is taken by students on the General Entry Programme 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.

### Period

Mon Tue Wed Thu Fri

**Lectures:** 3 3 3 3 3

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

**DP requirements:** Minimum of 30% in class record and 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%.

---

### PHY1024F PHYSICS OF RADIATION AND 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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 3 3 3 3 3

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

**DP requirements:** Minimum of 30% in class record and 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):** To be advised

**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.

**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 and 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%.

**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):** Professor C A Dominguez

**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 and 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 AND FIELDS

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

**Entrance requirements:** PHY1004W or PHY1023H and PHY1024F. 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% of 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 AND ELECTROMAGNETISM

**Course co-ordinator(s):** Associate Professor A Bufferl

**Entrance requirements:** PHY1004W or PHY2009S, a full first-year course in Mathematics, MAM1043H or a half course in Computer Science, and MAM2000W or (MAM2004H and MAM2046W) as corequisite.

**Course outline:**

WAVES: Harmonic oscillations, damped and forced oscillations, resonance, Fourier analysis, harmonic chains, waves, dispersion, polarization, 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 AND QUANTUM MECHANICS

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

**Entrance requirements:** PHY1004W or PHY2009S, a full first-year course in Mathematics.



**Course outline:**

CLASSICAL AND QUANTUM 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. The basic assumptions of quantum mechanics. Solutions of Schrödinger's equation. Properties of wave functions and operators. One-dimensional applications. Angular momentum in quantum mechanics. Three-dimensional applications. The hydrogen atom. Approximate methods.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	4	4	4	4	4
------------------	---	---	---	---	---

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

**DP requirements:** Minimum of 30% in class record; completion of all laboratory reports and 75% of tutorial work, attendance at all tests.

**Examination requirements:** Class record (tests, weekly problem sets and laboratory work) counts 50%; one 3-hour paper written in November counts 50%.

### 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; conservation laws; electromagnetic waves; the Fresnel relations; absorption and dispersion; wave guides; gauge transformations; dipole radiation; power radiation by a point charge; special relativity; four vectors; relativistic kinematics, relativistic electrodynamics.

THERMAL PHYSICS: Ensembles and entropy; Boltzmann distribution and Helmholtz free energy; thermal radiation; chemical potential and Gibbs distribution; Fermi-Dirac and Bose-Einstein statistics, with applications to classical and quantum systems.

COMPUTATIONAL PHYSICS: Introduction to computing; numerical methods; motion in classical mechanics; problems in quantum mechanics; Monte Carlo techniques.

**Period**

	Mon	Tue	Wed	Thu	Fri
--	-----	-----	-----	-----	-----

<b>Lectures:</b>	4	4	4	4	4
------------------	---	---	---	---	---

**Practicals:** Two sessions per week, Monday and Thursday, 14h00-17h00.

**DP requirements:** Satisfactory 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%.

---

#### PHY3022S ADVANCED PHYSICS 2

**Course co-ordinator(s):** Professor D G Aschman

**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.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Practicals:** Two sessions per week, Monday and Thursday, 14h00-17h00.

**DP requirements:** Satisfactory 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 AND 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.

---

### **PHY4003W** BSc (HONS) IN ASTROPHYSICS AND 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 (MAM4009Z)\*, classical electrodynamics (PHY4004Z), general relativity (MAM4010Z), general astrophysics (AST4003Z and AST4004Z), galaxies (AST4006Z), computational physics (PHY4005Z), astrophysical fluid dynamics (MAM4011Z) and computational methods (AST4005Z), as well as an observational techniques component which includes optical and infrared astronomy (AST4002Z) and radio astronomy (MAM4012Z). 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.

**PHY5002F TAUGHT COMPONENT OF THE MSc IN ASTROPHYSICS AND 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 (AST5001Z), extragalactic astronomy (AST5002Z), space technology (EEE5024Z), hot topics in cosmology (MAM5005Z), advanced general relativity (MAM5006Z), high energy astrophysics (MAM5007Z), observational cosmology (MAM5008Z), geomagnetism and aeronomy (MAM5009Z), plasma physics (PHY5004Z) and magnetohydrodynamics (PHY5005Z).

**PHY5003W THESIS COMPONENT OF THE MSc IN ASTROPHYSICS AND SPACE SCIENCE**

**Entrance requirements:** PHY5002F

**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

- (a) satisfactorily completing a research project on which a dissertation must be presented, and
- (b) successful participation 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:**

P J Barham, MSc PhD Physics *Bristol*

D A Polakow, MSc PhD *Cape Town*

G H Visser, MSc PhD *Groningen*

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:**

C Ardington, BSc(Hons) MSc *Cape Town*

A Clark, MSc *Cape Town*

I Durbach, MBusSc *Cape Town*

B Erni, BSc (Hons) MSc *Cape Town* PhD *Basel*

F N Gumedze, MSc *Cape Town*

D Katshunga, BSc(Hons) *DRC* MSc *Cape Town*

L Zacna, MSc *Poland*

**Contract Assistant Lecturers:**

M L de Villiers, MSc PhD *Pretoria*

H Short, BSc (Hons) *Cape Town*

**Chief Scientific Officers:**

G Distiller, BBusSc (Hons) BCom (Hons) *Cape Town*

A R Joubert, BSc(Hons) PhD *Cape Town*

**Administrative Manager:**

M Gallon

**Senior Secretary:**

S Achilles

**Secretary:**

---

**Senior Clerk:**

H Williams

**Receptionist:**

A Davids

The Avian Demography Unit is located on floor 2 of the PD Hahn Annex.

**AVIAN DEMOGRAPHY UNIT**

**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*

**Chief Research Officer:**

J Cooper, BSc (Hons) *London*

**Research Assistants:**

M Brooks, National Diploma in Conservation

J Griffin, BSc (Hons) *Cape Town*

D M Harebottle, MSc *Natal*

J A Harrison, BSc *Rhodes* BSc (Hons) MSc *Cape Town*

S Kuyper, BA *Natal* HDLS *Unisa*

M G Nathan

H D Oschadleus, MSc *Cape Town*

M Wheeler, National Diploma in Conservation

M T E Wren-Sargent, BA HDE *Natal* PG Dip LIS *Cape Town*

D J Young, MSc *Cape Town*

**RESEARCH IN STATISTICAL SCIENCES**

**Research areas and research units:**

**AVIAN DEMOGRAPHY:** Applications of statistics to the population dynamics of seabirds, shorebirds, waterbirds and terrestrial birds (LG Underhill, B Erni, J Cooper, H D Oschadleus, J A Harrison, K M Calf, D J Young, D M Harebottle). The Avian Demography Unit is a research group within the department that manages the South African Bird Ringing Unit and a series of bird monitoring projects.

**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).

**RELIABILITY MODELLING AND QUALITY CONTROL:** System Reliability and Maintenance Modelling and statistical quality control methods and applications (R K Guo, T J Stewart, T T Dunne).

**BIOSTATISTICS:** Medical applications of statistics (T T Dunne, F Little, L M Haines, J M Juritz, F Gumedze). The objectives of the Biostatistics Interest Group are to develop statistical methodology motivated by medical problems, particularly in the area of Community Health, and to provide statistical support to medical researchers in the form of short courses and consulting.

**SPATIAL AND GIS MODELING:** Statistics of large geoscience datasets. Geographic information systems (GIS). Geostatistics and spatial modeling (C Thiart). Imprecise spatial data analysis (R K Guo). Mixed models with spatial data (B Erni).

**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. STA1000F and STA1000S are identical first-year half courses given in the first and second semesters respectively.
2. STA1006H and STA1006S are identical first-year half courses. These courses deal with similar topics to STA1000F/S, but at a more rigorous level needed for entry to STA2004F/STA2005S.
3. Students may not obtain credit for both STA3008S and either STA2004F or STA2005S.
4. To obtain a distinction in Statistics, a student must obtain four first class passes in the second and third year half courses.
5. Students who intend to specialise in Statistics are strongly advised to include Computer Science in their curriculum.
6. Note that MAM1000W is a prerequisite for STA3041F, STA3042F, STA3043S, STA3045F and MAM2000W is strongly recommended.
7. A specialisation in Statistics for the BSc requires one of STA3041F or STA3042F and one of STA3043S or STA3045S.
8. A specialisation in Statistics cannot be based on STA2020, STA2030, STA3030 and STA3036.

## 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:**

Exploratory data analysis and summary statistics. Probability theory. Random variables. Probability mass and density functions. Binomial, Poisson, exponential, normal and uniform distributions. Sampling distributions. Confidence intervals. Introduction to hypothesis testing. Tests on means, variances and proportions. Determining sample size. Simple linear regression and measures of correlation.

**Lectures:** *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 40%. One 3-hour examination in June (STA1000F) or November (STA1000S) counts 60%. Candidates awarded a supplementary examination for STA1000F MUST write this examination in the October/November examination period of the same year.

---

**STA1006H STATISTICS 1006**

*NOTE: This course may not be offered in 2007.*

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

**Entrance requirements:** Entry to STA1006H is restricted to BSc students who are concurrently registered for MAM1000W.

**Course outline:**

The syllabus covers the same material as STA1006S.

**Lectures:** Two or three lectures per week. Days/slots see MAM1043H

**Tutorials:** One tutorial per week, and workshops to be arranged.

**DP requirements:** Class record of 35%

**Examination requirements:** Class work counts 35%. One 3-hour examination in October/November counts 65%.

---

**STA1006S STATISTICS FOR MATHEMATICAL DISCIPLINES**

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

**Entrance requirements:** Matriculation mathematics (A or B symbol on higher grade). Concurrent MAM1000W registration.

**Course outline:**

Types of data variables. Exploratory data analysis. Grouping and graphing of data. Set theory. Probability: conditional probabilities, independence. Bayes theorem. Random variables and values, probability mass and density functions, cumulative distribution functions. Population models and parameters: Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric. Uniform, Exponential. Gaussian, Laplace. Expectation. Moments. Coefficient of variation. Sampling: Sampling distributions t, Gamma, Chi-square, F and their tables. Probability calculations in EXCEL and STATISTICA. Point and interval estimation. Sample size estimation. Hypotheses testing: Z-test and t-test (means, difference between means: matched vs independent samples). F-test (ratio of two independent variances). Chi-square-test. Meaning of p-values. Bivariate data (time series and associated variables): Line graph, scatterplot, simple linear regression and correlation. Transformation. Integral transform. Generation of random samples.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 4 4 4 4 4

**Tutorials:** One tutorial per week and workshops to be arranged.

**DP requirements:** Attendance and completion of all tests and assignments, class record of 35%.

**Examination requirements:** Class record counts 35%. One 3-hour written examination in November counts 65%.

---

**STA1007S BIONUMERACY**

The course will form part of the BEES programme.

**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 35%.

**Examination requirements:** Class record counts up to 50%. One 3-hour written examination in November counts up to 50%.

## Second-Year Courses

---

### STA2004F STATISTICS 2004

**Course co-ordinator(s):** Associate Professor C Thiar

**Entrance requirements:** MAM1000W and one of the following; STA1006S or STA1006H.

**Course outline:**

**DISTRIBUTIONS:** Univariate and bivariate distributions. Moments (including conditional). Generating functions (moment, probability and cumulant). Convergence in distribution and central limit theorem Transformations of random variables. Sampling distributions from the normal distribution (chi-squared, t, F). Order statistics.

**INFERENCE:** Estimation. Maximum likelihood. Asymptotic theory. Least squares. Methods of moments. Sufficiency and efficiency. Exponential families. Hypothesis testing and likelihood ratio tests.

**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%.

### STA2006S MANAGEMENT SCIENCE

*NOTE: This course will be offered for the last time in 2007.*

**Course co-ordinator(s):** Dr J Nyirenda

**Entrance requirements:** STA2020F or STA2004F; with permission of the Head of Department students will, however, be permitted to register for STA2020F concurrently with STA2006F/S (this concession being automatic for BBusSc students in the special field of Information Systems).

**Objective:** To familiarise students with developments in operational research and to illustrate the use of quantitative methods in the solution of business problems.

**Course outline:**

Scope and purpose of operational research in the organisation; use of models in Management Science; mathematical programming; queueing and simulation; implementation of the above in spreadsheets and specialised software.

**Lectures:** Four per week.

**Tutorials:** One tutorial per week.

**DP requirements:** Class record of 40%.

**Examination requirements:** Class record counts 40%. One 3-hour written examination in June/November counts 60%.

---

### STA2020F BUSINESS STATISTICS

**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).

**Objective:** To introduce Business and Commerce students to intermediate statistical techniques relevant to business and management problems.

**Course outline:**

Analysis of variance (ANOVA) and experimental design; Revision and extension of simple linear regression; Multiple regression; Econometric models; Time series analysis; Non-parametric statistics.

**Lectures:** 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

---

### STA3008S BUSINESS INFOMATICS

*NOTE: This course will be offered for the last time in 2007.*

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

**Entrance requirements:** STA2020F, STA3022F is recommended especially for those planning to continue to an Honours programme in Statistics.

**Objective:** To develop data-based quantitative models for use in business and industry; to develop an understanding of the manner in which sampling variability influences conclusions that can be drawn from data; to develop an understanding of the manner in which patterns and trends can meaningfully be extracted from large data sets.

**Course outline:**

*Statistical distributions and inference:* Use of computer simulation and data resampling techniques to investigate the following problems: one- and two-sample tests of means and variances; one-way analysis of variance (ANOVA); regression; moments and other properties of distributions; bias and efficiency of estimators; decision theory and Bayesian methods (subjective probability). Extension of the numerical results and insights to more generally applicable theory.

*Data mining*: Exploration and extraction of patterns from large data sets.

**Lectures**: Four lectures per week.

**Tutorials**: One tutorial per week.

**DP requirements**: 35% for class record and submission of all projects.

**Examination requirements**: Class record counts 30%. One 3-hour examination in November counts 70%.

### STA3022F RESEARCH AND SURVEY STATISTICS

This course is directed at Business, Commerce and other students outside of the Science Faculty, who have already completed a full year of studies in Statistics. The aim is to create a practical working familiarity with analysis of the data, focusing on the multivariate methods, as applied in areas such as marketing and social science research.

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

**Entrance requirements**: STA2020F or STA2004F.

**Course outline**:

Applied multivariate analysis; includes classification trees correspondence analysis; factor analysis; cluster analysis; discriminant analysis; other methods will also be reviewed.

#### Period

Mon Tue Wed Thu Fri

**Lectures**: 1 1 1 1 1

**Tutorials**: One period per week, by arrangement.

**DP requirements**: At least 35% for class record.

**Examination requirements**: Class record counts 40%. One 3-hour written examination in June counts 60%.

### STA3041F STATISTICS 3041

**Course co-ordinator(s)**: Professor T T Dunne

**Entrance requirements**: STA2004F and STA2005S, MAM2000W recommended (linear algebra and advanced calculus modules).

**Course outline**:

- Markov Processes*: Discrete Markov chains; application to experience rating; Poisson and renewal processes; continuous time Markov chains; Theory of Markov processes; Ruin theory;
- Time Series Analysis*: General concepts; filters; backward shift operators; concepts of AR, ARMA and ARIMA models; frequency domain analysis; multivariate autoregressive 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%.

### STA3042F STATISTICS 3042

**Course co-ordinator(s)**: Professor T T Dunne

**Entrance requirements**: STA2004F and STA2005S; MAM1000W (MAM2000W strongly recommended).

**Course outline**:

## 144 DEPARTMENT OF STATISTICAL SCIENCES

- (a) *Markov Processes*: The first 24 out of the 36 lectures from module (a) of STA3041F;
- (b) *Time Series Analysis*: The first 24 out of the 36 lectures from module (b) of STA3041F;
- (c) *Survey Sampling*: Simple random sampling; stratified random sampling; systematic sampling; cluster sampling; sources of error in surveys.

### 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

**Entrance requirements:** STA2004F and STA2005S; MAM1000W (MAM2000W strongly recommended).

### 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 AND 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%.

**STA3046C STATISTICS FOR BIOINFORMATICS**

*Models and methods for Molecular Biological data. The course will cater to the needs of students entering collaborative data analysis and/or research in Molecular Biology or Bioinformatics.*

**Course co-ordinator(s):** Professor T T Dunne

**Entrance requirements:** STA1006S/H, STA2004F

**Course outline:**

Entropy. Multiple distributions. Maxima and rare events, Order Statistics. Maximum Likelihood. Bayesian inference. Markov chains and stationarity. MCMC, Hastings-Metropolis, Gibbs and simulated annealing. Hidden markov models with applications to gene prediction and molecular sequence alignment. Continuous time markov chains, birth and death process. Homology searching, BLAST and Karlin-Altschul statistics.

**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 35%; one 3-hour examination counts 65%.

## 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 BUS4027Z (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.

Core courses	12 credits
Elective courses	8 credits
Individual Project	4 credits

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.

---

**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%.

---

**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.

---

**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 for STA5003W and STA5004W:** A relevant Honours degree.

**Financial Assistance:** Funding is available through the University of Cape Town's Postgraduate Scholarships Office.

Deadlines for Applications: International Students, 30th September for following year and local students, 31st October for next year.

---

**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. The dissertation is graded by two examiners, neither of whom is to be the supervisor, and at least one of which is to be external to UCT. In order to qualify with distinction, the student will need to pass all modules, obtain an average of at least 75% for the coursework, and obtain a distinction for the dissertation.

---

#### **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.

**Associate Professor and Head of Department:**

J H Hoffmann, MSc PhD *Rhodes*

**Professors of Zoology:**

G M Branch, BSc (Hons) PhD *Cape Town* FRSSAf

A Chinsamy-Turan, BSc (Hons) PhD *Witwatersrand*

T M Crowe, MSc *Chicago* PhD *Cape Town*

M A du Plessis, MSc Pret 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 Professor:**

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*

D S Jacobs, BSc (Hons) *Cape Town* PhD *Hawaii*

P G Ryan, MSc PhD *Cape Town*

**Honorary Research Associate:**

V C Moran, MSc PhD *Rhodes* FRES FLS FRSSAf

**Senior Lecturers:**

G N Bronner, MSc PhD *Natal*

A Govender, MSc PhD *UND*

M I Lucas, BSc (Hons) PhD *Wales*

C L Moloney, BSc (Hons) PhD *Cape Town*

M J O'Riain, BSc (Hons) PhD *Cape Town*

M D Picker, BSc (Hons) PhD *Witwatersrand*

**Lecturer:**

H Marco, BSc (Hons) PhD *Cape Town*

C Reed, MSc PhD *UFS*

**Postdoctoral Fellows:**

C Eising, MSc PhD *Groningen*

A Ridley, BSc(Hons) *Lincoln* PhD *Cantab*

L Roxburgh, BSc(Hons) *Natal* MSc *Witwatersrand* PhD *Ben Gurion*

A Taylor MSc PhD *Pretoria*

**Research Associates:**

L Compagno, BSc (Hons) PhD *Stanford*

P Haarhoff, BA *Cape Town*

P Hulley, BSc (Hons) PhD *Cape Town*

H Robertson, BSc (Hons) PhD *Rhodes*

M Roeleveld, MSc *Stell*

S van Noort, BSc (Hons) PhD *Rhodes*

**Principal Technical Officer:**

A Plos, BSc *Cape Town*



**Chief Technical Officers:**

G Du Plessis

P Müller

**Senior Technical Officer:**L V Phigeland, BSc *Cape Town***Administrative Officer:**

M Ledeboer

**Senior Secretary:**

H Battle

**Administrative Assistants:**

C April

L F Mansfield

**Laboratory Assistants:**

J Booysen

C J Hartnick

**MARINE BIOLOGY RESEARCH INSTITUTE****Director:**C L Griffiths, BSc (Hons) *Soton PhD Cape Town***Deputy Director:**G M Branch, BSc (Hons) PhD *Cape Town FRSSAf***Associates:**J J Bolton, BSc (Hons) PhD *Liverpool*J G Field, BSc (Hons) PhD *Cape Town FRSSAf*A Govender, MSc PhD *UND*M I Lucas, BSc (Hons) PhD *Wales*C L Moloney, BSc (Hons) PhD *Cape Town***Research Associates:**L Atkinson, MSc *Cape Town*J Augustyn, BSc (Hons) PhD *Cape Town*B Clarke, BSc (Hons) PhD *Cape Town*A Cockcroft, BSc (Hons) PhD *Cape Town*P A Cook, BSc (Hons) PhD *Wales*J David, BSc (Hons) PhD *Cape Town*J Harris, BSc (Hons) PhD *Cape Town*L Hutchings, BSc (Hons) 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***Research Associates:**C A Brown, BSc (Hons) PhD *Cape Town*H F Dallas, BSc(Hons) *Rhodes PhD Cape Town*E G Day, BSc (Hons) PhD *Cape Town*J Ewert-Smith, BSc (Hons) MSc *Cape Town*W R Harding, BSc (Hons) *Rhodes MSc PhD Cape Town*D Impson, MSc *RAU*R Magoba, BSc(Hons) *Venda MSc Stellenbosch*D Ollis, BSc(Hons) MSc *Cape Town MSc Stellenbosch*

## 150 DEPARTMENT OF ZOOLOGY

C Pemberton, BSc(Hons) *Cape Town*  
K Snaddon, BSc (Hons) MSc *Cape Town*

### **Scientific Officers:**

S Koni  
B Paxton, BSc (Hons) *Cape Town*  
G Ractliffe, BSc (Hons) *Cape Town*

## **SMALL MAMMAL RESEARCH INSTITUTE**

### **Director:**

D S Jacobs, BSc (Hons) *Cape Town* PhD *Hawaii*

### **Associates:**

G Bronner, MSc PhD *Natal*  
J O'Riain BSc (Hons) PhD *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:**

M A du Plessis, MSc *Pret* PhD *Cape Town*

### **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*

### **Senior Lecturer:**

P G Ryan, MSc PhD *Cape Town*

### **Research Associates:**

A Milewski, MSc *Cape Town* PhD *Murdoch*  
R Simmons, MSc *Acadia* PhD *Witwatersrand*

### **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:**

N Malamlela

## **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 (G M Branch and C L Griffiths), the upwelling zone off the Cape west coast (J G Field and M I Lucas) and the management of living marine

resources (A Govender and 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, M A du Plessis, 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.

## Undergraduate Courses

*Note: Supplementary examinations are not normally granted to students for senior courses in Zoology.*

### First-Year Courses

---

#### BIO1000F/BIO1000H CELL BIOLOGY

See course details under Department of Botany.

---

#### 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:**

An investigation of a range of plants and animals to illustrate the diversity and complexity of living things. Historical evidence and evolution as a means of interpreting change with time. Modern theories on the mechanism of evolution. The origin of species, including humans. Interdependence of organisms in South African biomes. Plant/animal symbiosis, mutualism and parasitism.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:** 5 5 5 5 5

**Practicals:** One practical per week, Monday, Tuesday, Wednesday 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

---

#### BIO2002S ENTOMOLOGY

*NOTE: Replaces ZOO202S: Entomology.*

**Course co-ordinator(s):** Dr M D Picker

**Entrance requirements:** BIO1000F/H, BIO1004F/S.

**Course outline:**

This course is designed to familiarise students with insects as living organisms, focusing on their roles in African ecosystems. Emphasis is placed on insect diversity and ecology, and applied entomology. Structure and function of the insect body provide the background for topics such as metamorphosis and flight. Ecological topics include herbivory and pollination, while behavioural topics include sex attractants, and sociality as a life style. The medical and agricultural importance of insects in Africa are covered, along with control measures for pest species and the use of insects as bioindicators for environmental assessment. A compulsory field trip of approximately three days during the September break provides a hands-on introduction to the diversity and ecology of insects, and an opportunity for students to obtain material for their collections.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	

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

**DP requirements:** Submission of essay and project by due date, attendance at 80% of practicals, and attendance at field camp.

**Examination requirements:** Class record counts 50%; one 2-hour theory paper in November counts 30%; one 3-hour practical examination in term time counts 20%.

**BIO2003F ECOPHYSIOLOGY: HOW PLANTS AND ANIMALS WORK**

**Course co-ordinator(s):** Professor G Gäde

**Entrance requirements:** BIO1000F/H, BIO1004F/S, 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.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	2	2	2	2	

**Tutorials:** Optional, one per week, Friday, 2nd period.

**Practicals:** One per week, Wednesday, 14h00-17h00, or by arrangement.

**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 June counts 30%; one 2-hour written practical in June counts 20%.

**BIO2004F PRINCIPLES OF ECOLOGY**

*NOTE: Replaces ZOO200F: Principles of Animal Ecology.*

**Course co-ordinator(s):** Professor G M Branch

**Entrance requirements:** BIO1000F/H, BIO1004F/S.

**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.

**Period**

	Mon	Tue	Wed	Thu	Fri
<b>Lectures:</b>	4	4	4	4	

**Tutorials:** Optional, one per week, Friday 4th period.

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

**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%.

### **BIO2005S AQUATIC BIODIVERSITY**

*Replaces ZOO2001S: INVERTEBRATE ZOOLOGY. Students may not count both courses towards the degree.*

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

**Entrance requirements:** BIO1000F/H and BIO1004S.

**Course outline:**

This course deals with marine and freshwater biodiversity (floral, faunal and microbial) with emphasis on the South African biota. The primary objective of the course is to provide an introduction to patterns and processes in aquatic biodiversity from prokaryotes through plants to invertebrates and vertebrates. Lectures will cover the principles of aquatic biodiversity and the diversity of aquatic life in relation to adaptation of form to function (locomotion, reproduction, feeding styles, etc) and to habitat (rocky shores, riverine systems, lakes, estuaries etc), and the conservation of, and threats to, aquatic biodiversity. Practicals will deal with the principles of morphological and anatomical adaptation to an aquatic existence and the identification of aquatic organisms.

**Period**

**Mon Tue Wed Thu Fri**

**Lectures:**       4    4    4    4

**Tutorials:** Optional, one per week, Friday 4th period.

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

**DP requirements:** Minimum of 40% for class record; submission of classwork by due dates; attendance at 2/3 of practicals.

**Examination requirements:** Classwork counts 50%; one 2-hour written examination in November counts 35%; one 2-hour practical examination in November counts 15%.

### **BIO2007S EVOLUTIONARY ECOLOGY**

(Replaces BOT2007S)

See course details under Department of Botany.

## **Third-Year Courses**

### **BIO3000S SYSTEMATICS & EVOLUTION**

See course details under Department of Botany.

### **BIO3001F VERTEBRATE ZOOLOGY**

*Replaces ZOO3000F: VERTEBRATE BIOLOGY.*

**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****Mon Tue Wed Thu Fri****Lectures:** 4 4 4 4 4**Practicals:** Two practicals per week: Friday, and Monday or Tuesday, 14h00-17h00.**DP requirements:** Attendance at 2/3 of practicals and at field camp; submission of classwork by due dates.**Examination requirements:** 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).**BIO3002S MARINE ECOLOGY***Replaces ZOO3002F: MARINE ECOLOGY.***Course co-ordinator(s):** Dr M I Lucas**Entrance requirements:** CEM1000W or equivalent and ZOO2000F (BIO2004F from 2007); 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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 2 2 2 2 2**Practicals:** One practical per week, Wednesday, 14h00-17h00.**DP requirements:** Submission of project and essay by due date; attendance at field camp.**Examination requirements:** Class record counts 50%; one 3-hour theory paper written in June counts 50% (a sub-minimum of 40% is required).**BIO3003S INLAND WATER ECOSYSTEMS***Replaces ZOO3003S: INLAND WATER ECOSYSTEMS.***Course co-ordinator(s):** Dr C Reed**Entrance requirements:** BIO1004S, CEM1000W or equivalent and ZOO2000F or 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.

**Period****Mon Tue Wed Thu Fri****Lectures:** 2 2 2 2 2**Practicals:** Two practicals per week, one on Monday, 14h00-17h00, the other by arrangement.**DP requirements:** Attendance at field camp; submission of all course assignments by due date.**Examination requirements:** 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%.

---

**BIO3004F BEHAVIOURAL ECOLOGY**

*Replaces ZOO3004F: BEHAVIOURAL ECOLOGY.*

This is a residential course starting four weeks before registration with a compulsory field camp during the last 2 weeks in January and the first week in February. Students wishing to register for this course must have applied by October of the preceding year.

**Course co-ordinator(s):** Associate Professor D S Jacobs

**Entrance requirements:** BIO1004S, STA1007S (or STA1000F/S) and two of BIO2004F, BIO2007S, BIO2005S and BIO2002S.

**Course outline:**

In this course students investigate the relationship between an organism's behaviour and its environment in an evolutionary context. Students will learn about foraging behaviour, competitive relationships, predator/prey arms races, sexual conflict and sexual selection, and selfishness and altruism in an ecological context in an attempt to understand how an organism's behaviour adapts it to its environment. The course is conducted mainly in the field, with an emphasis on observing animal behaviour in a natural setting. It should appeal to students who are interested in the design of behavioural experiments and computer analysis of behavioural data, as well as a deeper appreciation of evolutionary processes as applied, but not restricted, to behaviour. The fieldwork/lecture components of the course take place between the last two weeks in January and the first week in February. Research projects and essays will be completed during the rest of the semester.

**Lectures:** By arrangement

**Practicals:** By arrangement.

**DP requirements:** The field camp and a mini-project are compulsory. All assignments must be handed in by the due date.

**Examination requirements:** One 3-hour theory paper written in March/April; the examination counts 40%, the mini project 30% and remaining assignments 30% of the final mark. A subminimum of 40% must be attained for each of the final examination and the class record.

---

**BIO3005D MOLECULAR ECOLOGY****BIO3008B MACROEVOLUTION AND SPECIATION****BIO3009A SYSTEMATICS, EVOLUTION AND DEVELOPMENT**

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.

---

**ZOO4001W BSc (HONS) IN ZOOLOGY (MARINE BIOLOGY)**

*NOTE: Entrance is limited to 12 students per year.*

**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.

---

**ZOO4002W BSc (HONS) IN ZOOLOGY (AVIAN BIOLOGY)**

*NOTE: Entrance is limited to 12 students per year.*

**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.*

**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.

---

**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.

---

**BIO5001W and BIO5002W MSc IN SYSTEMATICS & BIODIVERSITY SCIENCE**

(by coursework and dissertation)

See course details under Department of Botany.

---

**ZOO5003W 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 (ZOO5003W) 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) intended for publication as a scientific paper. 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.

### **ZOO5005W 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 (ZOO5005W) 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. Component 2 (ZOO5006W) of the course is a research project intended for publication as a scientific paper. The expected duration of the research project is 5-6 months.

**DP requirements:** Satisfactory completion of each module, and a pass in the first examination; we reserve the right to ask students to leave part way through the course if their progress is deemed unsatisfactory.

**Examination requirements:** A composite pass for the degree will consist of contributions from coursework assessments (29%), two formal examinations (10% each), and the research project (51%).

### **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 incolumn energy filter and 2k x 2kx 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>.

# SCHEDULE OF COURSES, ENTRANCE REQUIREMENTS, LECTURE AND PRACTICAL TIMES

## LECTURE PERIODS

The academic day is divided into lecture periods as follows:

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

*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 CODE	COURSE TITLE	LECTURE TIMES	PRACTICAL/TUTORIAL TIMES	ENTRANCE REQUIREMENTS
AGE1002S	AFRICA AND WORLD ARCHAEOLOGY	5 M to W	See departmental entry	None
AGE2011S	HUMAN EVOLUTION	2 M to Th	See departmental entry	See departmental entry
AGE2012F	SOUTHERN AFRICAN HUNTERS AND HERDERS	2 M to Th	See departmental entry	See departmental entry
AGE3006H	DIRECTED READING AND RESEARCH	By arrangement		See departmental entry
AGE3011F	ROOTS OF BLACK IDENTITY	4 M to Th	See departmental entry	See departmental entry
AGE3012S	GLOBAL INTERACTION AND THE TRANSFORMATION OF SOUTH AFRICAN SOCIETY	4 M to Th	One two hour practical per week, at times to be arranged	See departmental entry
AGE3013H	ARCHAEOLOGY IN PRACTICE	See departmental entry	See departmental entry	See departmental entry
APG1016S	GEOMATICS I	4 M to F	W 6th to 8th	APG1015F or CSC1015F or equivalent
APG2014S	GEOMATICS II	3 M to F	M 6th to 8th	See departmental entry
APG2015F	GEOGRAPHIC INFORMATION SYSTEMS I	3 M to F	M 6th to 8th	See departmental entry
APG2018X	GEOGRAPHIC INFORMATION SYSTEMS CAMP	See departmental entry	See departmental entry	See departmental entry
APG2026F	ELEMENTARY SURVEYING	5 M to F	Tu 6th to 8th	Refer departmental entry
APG3011F	GEOGRAPHIC INFORMATION SYSTEMS II	4 M to F	Tu 6th to 8th	See departmental entry
APG3012S	GEOMATICS III	5 M to F	M 6th to 8th	See departmental entry
APG3016C	SURVEYING II	3 M to F	W 6th to 8th	See departmental entry
APG3020X	SPATIAL DATA ANALYSIS PROJECT	See departmental entry	See departmental entry	See departmental entry
APG4004A	REMOTE SENSING	1 M to F	W 6th to 8th	See departmental entry
AST1000F	INTRODUCTION TO ASTRONOMY	5 M to F	See departmental entry	None
AST2002S	ASTROPHYSICS	2 M to F	One tutorial per week,	See departmental entry

**160 SCHEDULE OF COURSES**

			Wednesday, 14h00-16h30	
AST3002F	STELLAR ASTROPHYSICS	5 M to F	See departmental entry	See departmental entry
AST3003S	GALACTIC AND EXTRAGALACTIC ASTROPHYSICS	5 M to F.	See departmental entry	See departmental entry
BIO1000F	CELL BIOLOGY	5 M to F	See departmental entry	See departmental entry
BIO1000H	CELL BIOLOGY	5 M to F	See departmental entry	See departmental entry
BIO1004S	BIOLOGICAL DIVERSITY	5 M to F	See departmental entry	See departmental entry
BIO2002S	ENTOMOLOGY	2 M to Th	One practical per week, W, 14h00- 17h00	BIO1000F/H, BIO1004F/S
BIO2003F	ECOPHYSIOLOGY: HOW PLANTS AND ANIMALS WORK	2 M to Th	See departmental entry	See departmental entry
BIO2004F	PRINCIPLES OF ECOLOGY	4 M to Th	See departmental entry	BIO1000F/H; BIO1004F/S
BIO2005S	AQUATIC BIODIVERSITY	4 M to Th	See departmental entry	BIO1000F/H and BIO1004S
BIO2006F	MARINE AND TERRESTRIAL PLANT DIVERSITY	3 M to F	See departmental entry	BIO1000F/H, BIO1004S
BIO2007S	EVOLUTIONARY ECOLOGY	3 M to F	See departmental entry	See departmental entry
BIO3001F	VERTEBRATE ZOOLOGY	4 M to F	Two practicals per week, F and M or T, 14h00 to 17h00	See departmental entry
BIO3002S	MARINE ECOLOGY	2 M to F	One practical per week, W, 14h00- 17h00	See departmental entry
BIO3003S	INLAND WATER ECOSYSTEMS	2 M to F	See departmental entry	See departmental entry
BIO3004F	BEHAVIOURAL ECOLOGY	By arrangement	By arrangement	See departmental entry
BIO3005D	MOLECULAR ECOLOGY	3 M to F	Tuesdays and Thursdays 14h00- 17h00	BIO3009A, MCB3013C
BIO3006F	ECOSYSTEM ECOLOGY	By arrangement	By arrangement	See departmental entry
BIO3007S	ECOSYSTEM PHYSIOLOGY: FROM THE LEAF TO THE GLOBE	4 M to F	Two practicals per week, W and F, 14h00-17h00	See departmental entry
BIO3008B	MACROEVOLUTION AND SPECIATION	3 M to F	See departmental entry	See departmental entry
BIO3009A	SYSTEMATICS AND EVOLUTIONARY DEVELOPMENT	3 M to F	Tuesdays and Thursdays 14h00- 17h00	See departmental entry
CEM1000W	CHEMISTRY 1000	See departmental entry	See departmental entry	See departmental entry
CEM1009H	CHEMISTRY 1009	4 W to F	See departmental entry	See departmental entry
CEM1010F	CHEMISTRY 1010	2 M to F	See departmental entry	CEM1009H
CEM2007F	PHYSICAL CHEMISTRY AND SPECTROSCOPY	3 M to F	See departmental entry	See departmental entry
CEM2008S	ORGANIC AND	3 M to F	See departmental	See departmental entry

	INORGANIC CHEMISTRY		entry	
CEM2009F	ANALYTICAL AND ENVIRONMENTAL CHEMISTRY	1 M to F	One practical per week, Tuesday, 14h00-17h00	See departmental entry
CEM2012F/S	CURRENT ISSUES IN CHEMISTRY	2 M to Th	See departmental entry	See departmental entry
CEM2013S	CHEMISTRY IN HEALTH AND DISEASE	5 M to F	One practical per week, Tuesday, 14h00-17h00	See departmental entry
CEM3005W	CHEMISTRY 3005	3 M to F	Two practicals per week, Wednesday and Friday, 14h00-17h00	See departmental entry
CEM3009S	ADVANCED ANALYTICAL CHEMISTRY	1 M to F	One practical per week, Tuesday, 14h00-17h00	CEM2009F, CEM2007F and CEM2008S are strongly recommended
CEM3011F	MEDICINAL CHEMISTRY	5 M to F	One practical per week, Tuesday, 14h00-17h00	CEM2007F, CEM2008S, CEM2013S (or CEM2011S) and MCB2000F
CEM4000W	BSc (HONS) IN CHEMISTRY	By arrangement	See departmental entry	See departmental entry
CHE2039D	BIOPROCESS TECHNOLOGY	3 M to F	See departmental entry	See departmental entry
CSC1010H	COMPUTER SCIENCE 1010	5 M to Th	One practical per week, Thursday, 14h00-17h30	See departmental entry
CSC1011H	COMPUTER SCIENCE 1011	4 M to Th	One practical per week, Monday, 14h00-17h30	CSC1010H, MAM1005H
CSC1015F	COMPUTER SCIENCE 1A	5 M to F	See departmental entry	See departmental entry
CSC1016S	COMPUTER SCIENCE 1B	5 M to F	See departmental entry	See departmental entry
CSC1018F	COMPUTER SCIENCE 1018	4 M and F	One practical per week	See departmental entry
CSC2001F	COMPUTER SCIENCE 2A	2 M to F	One 4-hour practical per week, Monday to Friday, 14h00-18h00	See departmental entry
CSC2002S	COMPUTER SCIENCE 2B	2 M to F	One 4-hour practical per week, Monday to Friday, 14h00-18h00	See departmental entry
CSC2003S	COMPUTER GAMES AND SIMULATION	3 M to F	One 4-hour practical per week, Monday to Friday, 14h00-18h00	CSC2001F, MAM1000W or equivalent
CSC3002F	COMPUTER SCIENCE 3002	2 M to F	Two 4-hour practicals per week, Monday to Friday, 14h00-18h00	See departmental entry
CSC3003S	COMPUTER SCIENCE 3003	2 M to F	Two 4-hour practicals per week, Monday to	As for CSC3002F

## 162 SCHEDULE OF COURSES

			Friday, 14h00-18h00	
CSC3014C	INFORMATION MANAGEMENT (1/4 course)	2 M to F	Unscheduled work in Laboratories	CSC2001F & CSC2002S
CSC3015D	THEORY OF ALGORITHMS (1/4 course)	2 M to F	Unscheduled work in Laboratories	CSC2001F & CSC2002S
CSC3018A	COMPUTER SCIENCE 3018A (1/4 course)	2 M to F	Two 4-hour practicals per week, M to F 14h00 to 18h00	See departmental entry
CSC3019B	COMPUTER SCIENCE 3019B (1/4 course)	2 M to F	Two 4-hour practicals per week, M to F 14h00 to 18h00	See departmental entry
CSC3020H	THREE DIMENSIONAL AND DISTRIBUTED GAMES DESIGN	3 M to F	4 hours per week, by arrangement	CSC2001F, CSC2002S and CSC2003S
EGS1002S	HUMAN GEOGRAPHY	2 M to F	See departmental entry	Matric Geography on the Higher Grade, or ERT1000F
EGS2010F	ENVIRONMENTAL PROBLEMS	5 M to F	One practical per week, Thursday or Friday, 14h00-17h00	ERT1000F (or ERT1002S) and EGS1002S
EGS2011S	CITIES OF THE SOUTH	4 M to Th	See departmental entry	See departmental entry
EGS2012S	PHYSICAL ENVIRONMENTAL PROCESSES	5 M to F	One practical per week, Friday, 14h00-17h00	ERT1000F (or ERT1002S)
EGS3012S	SYNOPTIC CLIMATOLOGY	1 M to F	One practical per week, Tuesday or Wednesday, 14h00-17h00	See departmental entry
EGS3013F	ENVIRONMENTAL ANALYSIS	5 Tu to F	Two practicals per week, Wednesday and Friday, 14h00-17h00	EGS2010F and either EGS2012S or EGS2011S
EGS3014S	ENVIRONMENTAL CHANGE	5 M to F	One practical per week, Wednesday, 14h00-17h00	EGS2010F or EGS2012S
EGS3015S	URBAN GEOGRAPHY	Meridian M to Th	See departmental entry	EGS2010F or EGS2011S
EGS3016F	POPULATION DYNAMICS, MEASUREMENT AND PROCESSES I	4 Tu to F	One tutorial per week, Friday, 6th and 7th period	See departmental entry
EGS3017S	POPULATION DYNAMICS, MEASUREMENT AND PROCESSES II	4 Tu to F	One tutorial per week, Friday, 6th and 7th period	EGS3016F
EGS3018F	INTRODUCTION TO POPULATION STUDIES	3 M to Th	One tutorial per week, Friday, 3rd period	EGS2011S or SOC2019F
EGS3019S	POPULATION AND DEVELOPMENT	3 M to Th	One tutorial per week, Friday, 3rd period	EGS2011S or SOC2019F
ERT1000F	INTRODUCTION TO	2 M to F	See departmental	See departmental entry

**SCHEDULE OF COURSES 163**

	EARTH AND ENVIRONMENTAL SCIENCES 1000		entry	
GEO1006S	INTRODUCTION TO MINERALS, ROCKS AND STRUCTURE	5 M to F	One practical per week, Thursday, 14h00-17h00	A minimum of 45% in ERT1000F or ERT1002S
GEO1007S	EARTH STEWARDSHIP	5 M to F	By arrangements on the website	None.
GEO2001F	MINERALOGY AND CRYSTALLOGRAPHY	2 M to F	One practical per week, Wednesday, 14h00-17h00	See departmental entry
GEO2004S	PHYSICAL GEOLOGY	2 M to F	One practical per week, Wednesday, 14h00-17h00	GEO2001F
GEO2005X	FIELD GEOLOGY AND GEOLOGICAL MAPPING (second-year half course)	None	See departmental entry	GEO1006S, GEO2004S (co-requisite)
GEO3001S	STRATIGRAPHY AND ECONOMIC GEOLOGY	2 M to F	Two practicals per week, Tuesday and Thursday, 14h00-17h00	GEO2004S, DP in GEO3005F
GEO3005F	PETROLOGY AND STRUCTURAL GEOLOGY	2 M to F	Two practicals per week, Tuesday and Thursday, 14h00-17h00	GEO2001F, GEO2004S, first qualifying course in Chemistry
HUB2013S	HUMAN PHYSIOLOGY: PHYSIOLOGY OF ORGAN SYSTEMS	1 M to F	See departmental entry	HUB2019F, CEM1000W or equivalent
HUB2019F	INTRODUCTION TO HUMAN BIOLOGY	1 M to Th	See departmental entry	CEM1000W (or equivalent), BIO1000F
HUB3006F	GENERAL & APPLIED PHYSIOLOGY	1 M to F	See departmental entry	HUB2013S, CEM1000W or equivalent
HUB3007S	BIOPHYSICS & NEUROPHYSIOLOGY	1 M to F	See departmental entry	HUB2013S, CEM1000W or equivalent
HUB3010F	FUNCTIONAL ANATOMY AND HISTOLOGY	Four lectures per week	See departmental entry	See departmental entry
HUB3011S	COMPARATIVE ANATOMY & BIOLOGICAL ANTHROPOLOGY	Four lectures per week	See departmental entry	See departmental entry
MAM1000W	MATHEMATICS I	See departmental entry	One 2-hour tutorial per week	See departmental entry
MAM1004F	MATHEMATICS 1004	1 M to F	One per week, M or W afternoon, 14h00-16h00	See departmental entry
MAM1004H	MATHEMATICS 1004	Three lectures per week, days to be arranged, in Meridian	By arrangement	See departmental entry
MAM1005H	MATHEMATICS 1005	1 M to F	See departmental entry	See departmental entry
MAM1006H	MATHEMATICS 1006	See departmental entry	See departmental entry	See departmental entry
MAM1043H	MODELLING AND APPLIED COMPUTING	See departmental entry	One practical every second week, Friday, 6th	See departmental entry

**164 SCHEDULE OF COURSES**

			and 7th periods	
MAM1044H	DYNAMICS	See departmental entry	One practical every second week, Friday, 6th and 7th periods	See departmental entry
MAM2000W	MATHEMATICS II	See departmental entry	See departmental entry	MAM1000W or equivalent
MAM2001H, MAM2004H and MAM2002S	MATHEMATICS 2001, 2004 AND 2002	See departmental entry	See departmental entry	See departmental entry
MAM2043S	INTRODUCTION TO BIOLOGICAL MODELLING	5 M to F	See departmental entry	MAM1004F or MAM1004H or MAM1005H
MAM2046W	APPLIED MATHEMATICS II	3 M to F	One tutorial per week, Thursday, 14h00-16h00	See departmental entry
MAM2047H	APPLIED MATHEMATICS 2047	Depending on modules chosen, as for MAM2046W	One tutorial per week, Thursday, 14h00-16h00	MAM1043H, MAM1044H and MAM1000W
MAM2048H	APPLIED MATHEMATICS 2048	Depending on modules chosen, as for MAM2046W	One tutorial per week, Thursday, 14h00-16h00	MAM2047H
MAM2052F	QUANTITATIVE SKILLS FOR SCIENTISTS	4 M to F	Friday 3rd or Thursday 5th period	MAM1004F or MAM1004H or MAM1005H or MAM1000W
MAM3000W	MATHEMATICS III	5 M to F with options in 4th period	See departmental entry	See departmental entry
MAM3001W	MATHEMATICS 3001	5 M to F with options in 4th period	See departmental entry	See departmental entry
MAM3002H and MAM3003S	MATHEMATICS 3002 AND MATHEMATICS 3003	5 M to Th with options in 4th period	See departmental entry	See departmental entry
MAM3040W	APPLIED MATHEMATICS III	3 M to F	One tutorial per week, Thursday, 6th and 7th periods	See departmental entry
MAM3041H	APPLIED MATHEMATICS III (half course)	3 M to F, depending on modules chosen, as for MAM3040W	One tutorial per week, Thursday, 6th and 7th periods	MAM2046W, or MAM2047H and MAM2048H, and MAM2000W
MAM3042H	FURTHER BIOLOGICAL MODELLING	Average of two and a half per week, to be arranged	One every two to three weeks, to be arranged	MAM2043S
MAM3048H	APPLIED MATHEMATICS 3048	Depending on modules chosen, as for MAM3040W	One tutorial per week, Thursday, 6th and 7th period	MAM3041H
MCB2000F	INTRODUCTION TO BIOCHEMISTRY	4 M to F	See departmental entry	See departmental entry
MCB2001S	MOLECULAR BIOLOGY AND PHYSIOLOGICAL BIOCHEMISTRY	4 M to F	See departmental entry	MCB2000F
MCB2003F	INTRODUCTION TO GENETICS	2 M to F	See departmental entry	See departmental entry



MCB2005F	INTRODUCTORY MICROBIOLOGY I	5 M to F	See departmental entry	See departmental entry
MCB2006S	INTRODUCTORY MICROBIOLOGY II	5 M to F	See departmental entry	MCB2005F
MCB2007F	TRADITIONAL BIOTECHNOLOGY	3 M to F	See departmental entry	See departmental entry
MCB2009C	INDUSTRIAL BIOTECHNOLOGY	3 M to F	See departmental entry	MCB2000F, MCB2005F, MCB2007F
MCB2013S	MOLECULAR GENETICS AND DEVELOPMENT	2 M to F	See departmental entry	MCB2003F
MCB3000C	BIOCHEMISTRY: EUKARYOTIC GENE REGULATION	4 M to F	One practical per week, Thursday or Friday, 14h00-18h00	See departmental entry
MCB3001B	BIOCHEMISTRY: ADVANCED METABOLISM	4 M to F	One practical per week, Thursday or Friday, 14h00-18h00	MCB2001S, MAM1004F and STA1000F/S (or MAM1000W)
MCB3003B	MARINE AND PLANT BIOTECHNOLOGY	3 M to F	See departmental entry	See departmental entry
MCB3007A	RECOMBINANT DNA TECHNOLOGY	5 M to F	Two practicals per week, Monday and Tuesday, 14h00-17h00	See departmental entry
MCB3008B	MOLECULAR MICROBIAL GENETICS	5 M to F	Two practicals per week, Monday and Tuesday, 14h00-17h00	As for MCB3007A, MCB2006S
MCB3010S	PROCESS OPTIMISATION AND PRODUCTION IN BIOTECHNOLOGY	3 M to F	Students will have to complete an experimentally based project	MCB3007A, MCB3003B
MCB3011S	MOLECULAR VIROLOGY AND ADVANCED MICROBIAL GENETICS	5 M to F	See departmental entry	MCB3007A, MCB3008B
MCB3013C	MOLECULAR EVOLUTIONARY GENETICS	3 M to F		See departmental entry
MCB3014B	ADVANCED MOLECULAR DEVELOPMENT I	4 M to F	W 7th to 9th period	MCB3013B
MCB3015A	PROTEIN AND STRUCTURAL BIOCHEMISTRY	4 M to F		See departmental entry
MCB3016D	PLANT BIOCHEMISTRY AND PHYSIOLOGY OF STRESS	4 M to F		MCB2001S, MAM1004F and STA1000F/S (or MAM1000W)
MCB3017D	TOPICS IN BIOINFORMATICS	4 M to F		MCB2001S, MCB3007A, MAM1004F and STA1000F/S (or MAM1000W)
MCB3018D	ADVANCED MOLECULAR DEVELOPMENT II	2 M to F		MCB3014B
PHY1004W	INTRODUCTORY PHYSICS	3 M to F	One practical or tutorial per week, Tuesday 14h00 to	See departmental entry

**166 SCHEDULE OF COURSES**

			17h00	
PHY1023H	FOUNDATIONS AND PRINCIPLES OF PHYSICS	3 M to F	One practical or tutorial per week, Tuesday, 14h00-17h00	See departmental entry
PHY1024F	PHYSICS OF RADIATION AND MATTER	3 M to F	One practical or tutorial per week, W, 14h00 to 17h00	See departmental entry
PHY1031F	PHYSICS OF NATURAL SYSTEMS 1	3 M to F	See departmental entry	See departmental entry
PHY1032S	PHYSICS OF NATURAL SYSTEMS 2	3 M to F	See departmental entry	At least 40% in PHY1031F or PHY1023H
PHY2009S	THE PHYSICS OF FLUIDS AND FIELDS	5 M to F	One practical or tutorial per week, F, 14h00-17h00	See departmental entry
PHY2014F	WAVES AND ELECTROMAGNETISM	4 M to F	One practical per week, Monday, 14h00-17h00	See departmental entry
PHY2015S	CLASSICAL AND QUANTUM MECHANICS	4 M to F	One practical per week, Monday, 14h00-17h00	PHY1004W or PHY2009S, a full first-year course in Mathematics
PHY3021F	ADVANCED PHYSICS 1	4 M to F	Two sessions per week, M and Th, 14h00-17h00	See departmental entry
PHY3022S	ADVANCED PHYSICS 2	4 M to F	Two sessions per week, M and Th, 14h00-17h00	See departmental entry
SAN1014F	INTRODUCTION TO SOCIAL ANTHROPOLOGY AND ARCHAEOLOGY	1 M to W, F	Thursday 1st period, or by arrangement	None
SEA2002S	COASTAL OCEANOGRAPHY	1 M to F	One tutorial or practical per week, Tu, 14h00-17h00	SEA2003F (or SEA2000F)
SEA2003F	INTRODUCTORY PHYSICAL OCEANOGRAPHY AND MARINE DISASTERS	1 M to F	One tutorial or practical per week, Tuesday, 14h00-17h00	PHY1031F or PHY1032S or EGS1002S or ERT1000F (ERT1002H/S)
SEA3002F	OCEAN CIRCULATION	1 M to F	One practical per week, M, 14h00-17h00	See departmental entry
STA1000F AND STA1000S	STATISTICS 1000	See departmental entry	By arrangement	See departmental entry
STA1006H	STATISTICS 1006	See departmental entry	One tutorial per week, and workshops to be arranged	See departmental entry
STA1006S	STATISTICS FOR MATHEMATICAL DISCIPLINES	4 M to F	One tutorial per week and workshops to be arranged	See departmental entry
STA1007S	BIONUMERACY	1 M to F	None	See departmental entry
STA2004F	STATISTICS 2004	See departmental entry	See departmental entry	MAM1000W and one of the following: STA1006S or STA1006H
STA2005S	STATISTICS 2005	1 M to F	One practical per	DP for STA2004F

			week, by arrangement	
STA2006S	MANAGEMENT SCIENCE	Four per week, refer department	One per week, refer department	See departmental entry
STA2020F	BUSINESS STATISTICS	See departmental entry	Tutorials/Worksh ops by arrangement	See departmental entry
STA3008S	BUSINESS INFOMATICS	Four lectures per week	One tutorial per week	See departmental entry
STA3022F	RESEARCH AND SURVEY STATISTICS	1 M to F	One period per week by arrangement	STA2020F or STA2004F
STA3041F	STATISTICS 3041	1 M to F	M and W, 6th and 7th period	See departmental entry
STA3042F	STATISTICS 3042	1 M to F	M and W, 6th and 7th period	STA2004F and STA2005S, MAM1000W (MAM2000W strongly recommended)
STA3043S	STATISTICS 3043	1 M to F	M and W, 6th and 7th period	MAM1000W (MAM2000W strongly recommended)
STA3045F	MARKOV PROCESSES AND ADVANCED TIME SERIES	Five per week, refer department	One tutorial per week, refer department	See departmental entry
STA3046C	STATISTICS FOR BIOINFORMATICS	Five lectures per week, refer department	One tutorial per week, refer department	STA1006S/H; STA2004F

# INDEX

Actuarial Science, BSc(Hons) in .....	145
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 .....	10
Advanced level school examinations, Exemption on grounds of .....	11
Analytical Chemistry, MSc in .....	56
Applied Marine Science, MSc in .....	127
Archaeology .....	30
Astronomy .....	36
Astrophysics, BSc(Hons) in .....	134
Astrophysics, BSc(Hons) in .....	134
Atmospheric Science, BSc (Hons) in .....	73
Avian Biology, BSc (Hons) in .....	156
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 .....	56
Chemistry .....	48
Class medals .....	13
Computer Science .....	57
Conservation Biology, MSc in .....	156
Convenors for Degree Programmes .....	2
Course codes, Explanatory note on .....	13
Curriculum for the BSc degree programmes, SB006, SB012, SB013 and SB014 .....	15
Curriculum for the General Entry Programme in Science, SB011 .....	22
Dean's Merit List .....	13
Degree Programmes offered in the Faculty of Science .....	15
Degrees offered in the Faculty .....	6
Distinction, Award of .....	11
Distinguished Teachers in the Faculty .....	4
DSc, Rules for the degree of .....	28
Electron Microscope Unit .....	158
Environmental and Geographical Science .....	66
Environmental Evaluation Unit .....	66
Environmental Geochemistry, MSc in .....	83
Environmental Management, MPhil in .....	75
Examinations, Supplementary .....	9
Faculty Student Council (SSC) .....	3
Fellows in the Faculty .....	4
Geochemistry, BSc (Hons) in .....	83
Geology .....	78
Geomatics Division (Faculty of Engineering and the Built Environment) .....	85
Human Biology .....	90
Industrial Mathematics, BSc (Hons) in .....	110
Marine Biology, BSc (Hons) in .....	156
Mathematical Statistics, MSc in .....	146
Mathematics and Applied Mathematics .....	95

Mathematics of Computer Science, BSc (Hons) in .....	110
Mathematics of Finance, MSc in .....	112
Molecular and Cell Biology .....	113
MSc, Dissertation for the degree of .....	26
MSc, Rules for the degree of .....	25
MSc, Subjects for the degree of .....	25
Ocean and Atmosphere Science, MSc in .....	127
Oceanography .....	124
Operational Research in Development, MSc in .....	146
Operational Research, MSc in .....	146
PhD, Rules for the degree of .....	27
Physical Oceanography, BSc(Hons), MSc or PhD in .....	127
Physics .....	128
Postgraduate Centre, The.....	3
Prizes .....	5
Programme Convenors in the Faculty .....	2
Quaternary Science, BSc(Hons), MSc in .....	75
Readmission to the Faculty, Refusal of .....	9
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.....	145
Statistical Sciences, MSc in .....	146
Statistics .....	137
Student Advisers in the Faculty .....	3
Student Council, Faculty, (SSC) .....	3
Supplementary examinations .....	9
Systematics and Biodiversity Science, MSc in .....	47
Theoretical Physics, BSc (Hons) or MSc in .....	135
Transfer from other faculties .....	10
UCT Book Award .....	5
Zoology .....	148