NOTICE

All particulars in this calendar are applicable as from January 1, 2019. The University reserves the right to amend any regulation or provision at any time without prior notice.

Although every attempt has been made to ensure that the information is accurate, the University does not accept any liability concerning inaccuracies of any of the contents in the Calendar. Please check the University Website for the latest version of this calendar.
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The following provides an overview of the structure of this Calendar to guide users.

**General Information**
This section provides the contact information for the Faculty and University.

**Degrees and Diplomas conferred in the Faculty**
This section provides information on each of the qualifications conferred in the Faculty.

**Explanation of the National Qualifications Framework (NQF)**
This is a brief section on the NQF levels and qualification types.

**Faculty Board and Faculty Office Staff**
This section lists staff members who constitute the Faculty Board and Faculty Office staff members.

**Lecturing and Technical Staff**
A comprehensive Faculty staff listing per Department, Centre, Institute, School or Unit is provided.

**Rules for Programmes**
This section provides information on the rules for each academic programme at Undergraduate and Postgraduate level offered by the Faculty. These rules should be read in conjunction with the academic rules (Section 3) of the General Calendar (Part 1). Students should acquaint themselves with the rules in both Calendars and annually check for rule and curriculum changes. Certain Faculties offer Access Programmes; however these programmes are not accredited but do provide access to further studies. Please consult the relevant Faculty for further information.

**Module Descriptors**
This section provides information on all the modules offered by the Faculty at Undergraduate and Postgraduate level. Module descriptors contain information which relate to the main outcomes and content for each module, including the credit value and NQF level of the module. It is set forth in alphanumeric order per Undergraduate and Postgraduate offering.

**Explanation of Symbols and Remarks on Academic Transcript**
This section provides an explanation of the symbols used and the remarks on the academic transcript.
GENERAL INFORMATION

CORRESPONDENCE WITH THE UNIVERSITY

All postal correspondence should be addressed to the relevant person or department at:

The University of the Western Cape
Private Bag X17
Bellville
7535

Should you not know the person or department, please direct all correspondence to The Registrar.

Faculty related enquiries can be directly forwarded to:

The Faculty Manager
Faculty of Sciences
The University of the Western Cape
Private Bag X17
Bellville
7535
Tel: +27 (0)21 959 3134
Fax: +27 (0)21 959 2266
Email: science-undergrad@uwc.ac.za

CONTACT NUMBERS

UWC Contact Centre: +27 (0)21 959 3900/1/2/3
General Fax: +27 (0)21 959 3126
E-mail: info@uwc.ac.za

THE UNIVERSITY’S WEBSITE

www.uwc.ac.za

GENERAL BURSARIES AND LOANS

Full particulars of bursaries and loans are set out in a separate brochure that is obtainable from:

Financial Aid Office
University of the Western Cape
Private Bag X17
Bellville
7535
Tel: +27 (0)21 959 3114/2737
Fax: +27 (0)21 959 2396
**CALENDAR**

The calendar is obtainable in the following separate parts:

| Part 1 | General Information |
| Part 2 | Faculty of Natural Sciences |
| Part 3 | Faculty of Arts (Undergraduate) |
| Part 4 | Faculty of Arts (Postgraduate) |
| Part 5 | Faculty of Economic and Management Sciences (Undergraduate) |
| Part 6 | Faculty of Economic and Management Sciences (Postgraduate) |
| Part 7 | Faculty of Education |
| Part 8 | Faculty of Dentistry |
| Part 9 | Faculty of Law |
| Part 10 | Faculty of Community and Health Sciences |
| Part 11 | Schedule of Fees |

A separate publication containing the Faculty’s teaching and examination time-tables is obtainable from the Faculty Office. Students may also access this information via the student portal.
## DEGREES AND DIPLOMAS CONFERRED IN THE FACULTY

### DEGREES

<table>
<thead>
<tr>
<th>Degree</th>
<th>Title</th>
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<tr>
<td>Bachelor of Science in Applied Geology</td>
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<tr>
<td>Bachelor of Science in Biodiversity &amp; Conservation Biology</td>
<td>BSc (Biodiversity &amp; Conservation Biology)</td>
</tr>
<tr>
<td>Bachelor of Science in Biotechnology</td>
<td>BSc (Biotechnology)</td>
</tr>
<tr>
<td>Bachelor of Science in Chemical Sciences</td>
<td>BSc (Chemical Sciences)</td>
</tr>
<tr>
<td>Bachelor of Science in Computer Science</td>
<td>BSc (Computer Science)</td>
</tr>
<tr>
<td>Bachelor of Science in Environmental &amp; Water Science</td>
<td>BSc (Environmental &amp; Water Science)</td>
</tr>
<tr>
<td>Bachelor of Science in Mathematical &amp; Statistical Sciences</td>
<td>BSc (Mathematical &amp; Statistical Sciences)</td>
</tr>
<tr>
<td>Bachelor of Science in Medical Bioscience</td>
<td>BSc (Medical Bioscience)</td>
</tr>
<tr>
<td>Bachelor of Science in Physical Science</td>
<td>BSc (Physical Science)</td>
</tr>
<tr>
<td>Bachelor of Pharmacy</td>
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<tr>
<td>Bachelor of Science Honours in Applied Geology</td>
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</tr>
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<td>Bachelor of Science Honours in Astrophysics</td>
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<tr>
<td>Master of Science in Mathematical Science</td>
<td>MSc (Mathematical Science)</td>
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<tr>
<td>Master of Science in Medical Bioscience</td>
<td>MSc (Medical Bioscience)</td>
</tr>
<tr>
<td>Master of Science in Nanoscience</td>
<td>MSc (Nanoscience)</td>
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<tr>
<td>Master of Science in Petroleum Geology [not offered in 2019]</td>
<td>MSc (Petroleum Geology)</td>
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</tr>
<tr>
<td>Master of Science in Pharmaceutical Science</td>
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<tr>
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<td>MSc (Pharmacy Administration &amp; Policy Regulation)</td>
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<td>MSc (Physical Science)</td>
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<td>Master of Science in Statistical Science</td>
<td>MSc (Statistical Science)</td>
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<tr>
<td>Master of Science in Structural Biology [not offered in 2019]</td>
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<tr>
<td>Doctor of Philosophy *</td>
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<td>DPharm</td>
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<tr>
<td>Doctor of Science</td>
<td>DSc</td>
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</table>

**DIPLOMAS**

| Postgraduate Diploma in Integrated Water Resource Management | PGDip (IWRM) |

* Please refer to the programme information for the specialisations.

**EXPLANATION OF THE NATIONAL QUALIFICATIONS FRAMEWORK**

The National Qualifications Framework (NQF) is "a single integrated system for the classification, registration, publication and articulation of quality – assured national qualifications" as stipulated in Section 4 of the NQF Act, 2008 (Act No 67 of 2008).

The National Qualifications Framework (NQF) has ten levels of which Higher Education qualifications occupy 6 levels of the NQF, namely levels 5-10.

Levels 5 to 7 comprise the undergraduate qualifications (with the exception of the Professional Bachelor’s degree at Level 8) and levels 8 to 10 comprise the postgraduate qualifications.

<table>
<thead>
<tr>
<th>NQF LEVELS</th>
<th>QUALIFICATION TYPES</th>
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<tr>
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<td>Higher Certificate</td>
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<tr>
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<td>Advanced Certificate Diploma</td>
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<td>7</td>
<td>Advanced Diploma Bachelor’s Degree</td>
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<tr>
<td>8</td>
<td>Honours Degree Postgraduate Diploma Professional Bachelor’s Degree</td>
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<tr>
<td>9</td>
<td>Master’s Degree Professional Master’s Degree</td>
</tr>
<tr>
<td>10</td>
<td>Doctoral Degree Professional Doctoral Degree</td>
</tr>
</tbody>
</table>

As cited in the Higher Education Qualifications Sub-Framework (CHE, 2013)
**Ex Officio Members:** The Rector, Vice Rector/s, the Registrar and the Dean


**Messrs:** MS Allie, LF Cyster, M Dlamini, H Harribhai, A Henney, A Ismail, M Kasu, A Latief, T Lesch, C Mupfiga, S Matshawule, N Vivier, G Williams

**Mmes:** MB Bennett, L Bosman, LT Dube, RC Eager, C Franke, N Haines-Arries, Y Hoosain, R Jacobs, R Lombard-Jacobus, E Kapp, B Langa, S Maku-Vyambwera, H Mellville, GR Raitt, SA Short

**Representatives from the Faculties of:**

**Education:** Prof S Hartley

**Arts:** Dr J Volschenk

**Community & Health Sciences:** Dr E Kunneke

**Economic & Management Sciences:** Mr G Hearn

**FACULTY OFFICE STAFF**

**Dean:** Prof M Davies-Coleman, BSc (Hons) PhD (RU)

**Deputy Deans:** Prof D Holgate, PhD (UCT)

**Teaching & Learning Specialist:** Prof NN Ludidi, PhD (UWC)

**Faculty Manager:** Dr H Conana, MEd (SU) PhD (UWC)

**Administrator to the Dean:** Mr L Corner, BSc HDE (UWC) BSc (Hons) MBA (Wits)

**Senior Faculty Officer:** Ms MD Dietrich, NDSOAD NDH (CPUT)

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**Web Facilitator:** Ms R Ramulifho, BA (UWC) ND (UNISA)

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**Admin Officer:** Ms S Cupido

**Admin Assistant:** Mr D du Plooy

**General Assistant:** Ms Y Velabayi, BSc (Hons) (UWC)
BIODIVERSITY AND CONSERVATION BIOLOGY

Departmental Chairperson:  Dr V Couldridge, PhD (Wits)
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Lecturers:  Dr MI Samuels, PhD (UCT)
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BIOTECHNOLOGY

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Emeritus Professor:  Prof NN Ludidi, PhD (UWC)
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Associate Professors:  Prof S Davison, PhD (Otago)
Extra-Ordinary Prof:  Prof R Den Haan, PhD (SU)
Emeritus Professors:  Prof NN Ludidi, PhD (UWC)
DaCS FRSC FNAI
Emeritus Researchers:  Prof DJR Pugh, DPhil (Oxon)
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Extra-Ordinary Professors:  Prof KV Katti, PhD (Indian Institute of Science)
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Dr M Keyster, PhD (SU)  
Dr AJ Klein, PhD (UWC)  
Dr U Hesse, PhD (Martin Luther)  

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Dr T Mulaudzi-Masuku, PhD (UWC)  

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Dr MG du Plessis, PhD (UWC)  

Chief Officer:  
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Ms E Anthony, BSc ADM (UWC) BSc (Hons) (UCT)  
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Mr A Lilelo, BSc Hons (UWC)  
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Admin Officer:  
Ms F Starkey  

Admin Assistant:  
Ms M Pool  

CHEMISTRY  

Departmental Chairperson:  
Prof WT Mabusela, BSc (Fort Hare) MSc (RU) PhD (UCT)  

SARChI Chair (NanoElectrochemistry & Sensor Technology):  
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SARChI Chair (Analytical Systems and Processes for Priority and Emerging Contaminants (ASPPEC):  
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Professors:  
Prof OM Onani, MSc (Kenya) PhD (UKZN)  
Prof JJS Titinchi, MSc (Basrah) PhD (Indian IT Roorkee)  

Associate Professors:  
Prof F Ameer, BSc (Hons) PhD (UKZN)  
Prof E Beukes, BSc (Hons) MSc PhD (RU)  
Prof MN Jahed, MTech (CPUT) PhD (UWC)  
Prof L Khotseng, PhD (SU)  
Prof WT Mabusela, BSc (UFH) MSc (RU) PhD (UCT)  

Emeritus Professor:  
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Extra-Ordinary Professors:  
Prof E Dempsey, MSc PhD (Dublin)  
Prof A Nechaev, PhD (Moscow)  
Prof K Ozoemena, BSc (Hons) PhD (RU)  

Senior Lecturers:  
Dr RF Ajayi, BSc (Hons) PhD (UWC)  
Dr L Mciteka, PhD (RU)  

Lecturers:  
Ms C Franke, BSc (Hons) MSc (UWC)  
Dr C Ikpo, BSc (Hons) (Owerri) MSc (Lagos) PhD (UWC)  

Senior Researcher:  
Dr T Waryo, BSc MSc (Addis Ababa) PhD (Graz)  

Chief Officers:  
Ms SW Grové, BSc (Hons) MSc (SU)  
Mr T Lesch, BTech (CPUT)  

Senior Officer:  
Mr A Mantyi, BCom BSc (UWC)  

Senior Technical Officer:  
Vacant
Officers:  Mr B de Wet, BSc (UWC)  
Mr BD Makhoba, BSc (UWC)  
Admin Officer:  Ms W Jackson

COMPUTER SCIENCE
Departmental Chairperson:  Prof A Bagula, MEng (Belgium) MSc (SU) PhD (Royal Institute of Technology, Sweden)  
Professor:  Prof A Bagula, MEng (Belgium) MSc (SU) PhD (Royal Institute of Technology, Sweden)  
Emeritus Professor:  Prof IM Venter, BSc HED (SU) MSc (UNISA) PhD (UP)  
Extra-Ordinary Professors:  Prof JM Blackledge, BSc ARCS PhD DIC (London) PhD (Jyvaskyla, Finland)  
Prof N Boudriga, PhD (Orsay, France) PhD (Tunis II, Tunisia) PhD (Paris XI)  
Prof P Eisert, PhD (Karlsruhe, Germany)  
Prof R Glitho, MSc (Geneve) PhD (Royal Institute of Technology, Sweden)  
Prof U Klauck, PhD (Heidelberg)  
Prof B McMillan, PhD (Missouri)  
Associate Professor:  Prof WD Tucker, BA (Trinity) MS (ASU) PhD (UCT)  
Senior Lecturers:  Dr M Ghaziasgar, MSc (UWC)  
Dr MJ Norman, BSc (Hons) PhD (UWC) MSc (UCT)  
Dr C Nyirenda, PhD (TokyoTech, Japan)  
Lecturers:  Mr A Ismail, BSc (Hons) HDE (UWC) MSc (UP)  
Mr A Henney, MSc (UWC)  
Senior Officers:  Mr AF Kruger, MSc (SU)  
Mr DJD Leenderts  
Officer:  Mr MT Allie, BSc (UWC)  
Admin Officer:  Ms R Abbott  
Administrative Assistant:  F Jacobs, BCom (UWC)

EARTH SCIENCES
Departmental Chairperson:  Prof D Frei, MSc (Berlin University of Technology) Drrer nat (Göttingen)  
Senior Professor:  Prof Y Xu, MSc (Chengdu) PhD (UFS)  
Professor:  Prof D Mazvimavi, BSc (Hons) (Zimbabwe) MSc (Free U Brussel) PhD (Wageningen)  
UNESCO Chair (Hydrogeology):  Prof Y Xu, MSc (Chengdu) PhD (UFS)  
Associate Professor:  Prof T Chatterjee, MSc PhD (India School of Mines)  
Emeritus Professors:  Prof C Okujeni, Dr rer nat (Berlin University of Technology)  
Prof J van Bever Donker, Drs (Leiden) PhD (UCT)  
Extra-Ordinary Professors:  Prof E Braune, MSc (Imperial College, London) PhD (UWC)  
Prof J Goldin, BA (RU) PhD (UCT)  
Prof AD Levine, BA (Bates) MS (Tulane) PhD (California)  
Prof PJ Oberholster, PhD (UP)  
Prof A Turton, PhD (UNISA)
Senior Lecturers:  
Dr R Bailie, MSc (Wits) PhD (UJ) Pr Nat Sci  
Dr T Dube, MSc (Twente, Netherlands) PhD (UKZN)  
Dr M Grenfell, MSc (UKZN) PhD (Exeter)  
Dr T Kanyerere, BEd, MSc (Malawi) MPhil (Norway) PhD (UWC)  
Dr M Opuwari, MSc (Port Harcourt) PhD (UWC)  
Dr J Reinhardt, PhD (James Cook, Australia)  
Dr A M Siad, MSc (Delft) PhD (TU, Berlin)  

Lecturer:  
Ms Y Hoosain, BSc MSc (UWC)  

N-Gap Lecturer:  
Mr M Dlamini, BA (Zululand) BSc (Hons) (UKZN) MSc (NMMU)  

Chief Officer:  
Mr H Solomon, BSc (Eritrea) MSc (UWC)  

Senior Officers:  
Mr EJ Swartbooi, MSc (UWC)  
Mr AS Williams, BSc (Hons) MSc (UWC)  

Officer:  
Mr R Harrison  

Admin Officer:  
Ms W Davids  

Admin Assistant:  
Ms M Naidoo  

Technical Assistants:  
Ms J Becorney  
Mr S Davids  

UNESCO Chair PA:  
Ms C Carnow

MATHEMATICS AND APPLIED MATHEMATICS

Departmental Chairperson:  
Prof K Patidar, PhD (IIT Kanpur)  

Senior Professors:  
Prof K Patidar, PhD (IIT Kanpur)  
Prof PJ Witbooi, MSc (UWC) PhD (UCT)  

Professors:  
Prof D Holgate, PhD (UCT)  
Prof ECS Mwambene, BSc (Hons) (Malawi) MSc (London) Dr rer nat (Vienna)  

Emeritus Professor:  
Prof RL Fray, MSc (UWC) MSc PhD (SU)  

Extra-Ordinary Professor:  
Prof J Key, MPhil PhD (London)  

Senior Lecturers:  
Dr W Fish, HDE MSc (UNISA) MSc (UCT) PhD (UWC)  
Dr C Makasu, DPhil (Zimbabwe)  
Dr J Munyakazi, PhD (UWC)  

Lecturers:  
Dr GE Muller, PhD (UWC)  
Dr A Razafindrakoto, PhD (SU)  
Dr D Solomons, PhD (UCT)  

Associate Lecturer:  
Ms S Maku-Vyambwera, BSc (WSU) BSc (Hons) MSc (UWC)  

ECP Lecturer:  
Dr J Swanepoel, MITE (Institute of Engineering Surveyor) BSc BEd (UWC) MEd (UCT) PhD (Cornell)  

Chief Officer:  
Mr A Taylor, HDE MSc (UWC)  

Senior Officers:  
Ms L Adams, MSc (UCT)  
Ms F Karriem, MSc (UWC)  

Officer:  
Mr T Gongxeka  

Admin Officers:  
Ms GL Hendricks, MDP (UWC)  
Ms N Lukas, BTech (CPUT)
MEDICAL BIOSCIENCES

Departmental Chairperson: Prof R Henkel, BEd (Marburg) PhD (Marburg) Habil (Giessen)
Senior Professor: Prof R Henkel, BEd (Marburg) PhD (Marburg) Habil (Giessen)
Professors: Prof C Africa, PhD (London)
Prof GD Hughes, MPH DrPH (California, Berkeley)
Prof TK Monsees, BSc MSc PhD (Bremen) Habil (Giessen)
Prof A Oelofse, BSc (Hons) (Potchefstroom) MSc (SU) PhD (Wageningen)
Prof E Pool, BSc (Hons) (UCT) PhD (SU)
Associate Professors: Prof M de Kock, PhD (UP)
Dr O Ekpo, PhD (UP)
Prof DW Fisher, MSc (UCT) PhD (UWC)
Prof DC Hiss, PhD (UCT)
Prof JA Klaasen, MSc (UWC) PhD (Penn State, USA)
Emeritus Professors: Prof G van der Horst, PhD (SU) PhD (UPE) EM Cert (Zeiss, Germany)
Prof GS Maritz, BSc (Hons) PhD MBA (SU)
Senior Lecturers: Dr S Abdul-Rasool, MBChB (Baghdad) MSc (Al-Nahrain) PhD (UCT)
Dr L Maree, MSc (SU) PhD (UWC)
Dr L Mbonile, MBChB (Dar) MPH (UP) PG Dip (ITM-Antwerp)
Lecturers: Dr J de Smidt, MBChB (SU) BSc Dipl (UWC)
Dr BT Flepisi, MSc PhD (SU)
Ms N Haines-Arries, MSc (UWC)
Mr H Harribhai, BMedSci (Hons) (UDW) MSc (UWC)
Ms B Langa, MSc (UWC)
Dr T Morris, MSc PhD (UWC)
Mr C Mupfiga, MSc (UWC)
Dr F Rahiman, PhD (UWC)
Dr C Willemse, MSc PhD (UWC) PGCE (UNISA)
Associate Lecturers: Dr C Kotze, MSc PhD (NWU)
Mr G Williams, MSc (SU)
Chief Officers: Mr MS Allie, Dipl (RSA Tech) MAdmin (UWC)
Ms M Bennett, MSc (UWC)
Ms V Jooste, MSc (UWC)
Senior Officers: Mr B Abrahams, MSc (UWC)
Mr A Braaf, BSc (Hons) (UWC)
Ms I Messeir, BSc (Hons) MSc (UWC)
Mr Y Mnyamana, MSc (UWC)
Senior Officer (Finance): Ms A Borchjes, BCom (UWC)
Officers: Mr M Ntsabo
Mr TB Shabalala, BSc (Hons)(UKZN)
Mr F Sifuba
Admin Officers: Ms C Davids, Dipl (INTEC)
Ms N Louw, Dipl (Financial Manage Institute of SA) Cert (AGATE)
SCHOOL OF PHARMACY

Director: Prof SF Malan, DTE, BPharm MSc PhD (North West)
Professor: Prof NC Butler, BPharm MPharm (UWC) BSc (Hons) (SU) PhD (Minnesota)
Emeritus Professor: Prof P Mugabu, BSc MBChB (Rwanda) MMed (Louvain) PhD (Ghent)
Associate Professors: Prof DR Beukes, BSc BSc (Hons) PhD (RU)
Prof A Bheekie, BSc (Dublin) BPharm (UKZN) MPharm PhD (UWC)
Prof A Dube, BPharm (Zimbabwe) MPharm (UWC) PhD (Monash)
Prof J Joubert, BPharm MSc PhD (North West)
Prof S Khoza, BPharm MSc (Zimbabwe) PhD (Texas, Austin)
Prof M Viljoen, MPharm MSc PhD (North West)
Extra-Ordinary Professors: Prof WR Folk, BA (Rice, Texas) PhD (Stanford)
Prof P Valodia, BPharm MPharm (UWC) PhD (UCT)
Senior Lecturers: Dr M Aucamp, BPharm MSc PhD (North West)
Dr R Coetzee, BPharm MPharm (North West) PhD (RU)
Dr N Ebrahim, BPharm MPharm PhD (UWC)
Dr JA McCartney, DipPharm MSc (UPE) PhD (NMU)
Dr K Obikeze, BPharm (Nigeria) MPharm PhD (UWC)
Dr MB Parker, BPharm MPharm PhD (UWC)
Dr H Samsodien, BPharm MPharm (UWC) PhD (UCT)
Dr M van Huyssteen, BPharm MSc PhD (NMMU)
Dr KL Ward, BPharm MPharm PhD (UWC)
Lecturers: Ms LT Dube, BPharm (RU) MPH (UWC)
Dr S Egiewegh, BPharm (Lagos) MPharm PhD (UWC)
Extra-Ordinary Senior Lecturer: Dr GL Muntingh, BPharm (UP) MSc PhD (Medunsa)
Senior Officers: Ms EMR Braaf, BSc (SU) BSc (Hons) (UWC)
Mr ST Dyantyi, BSc (UCT) BSc (Hons) (UWC) MSc (UJ)
Mr Y Kippie, BTech (CPUT)
Ms A Ramplin, BSc (Hons) (UWC)
Admin Officers: Mr R Maart
Mr B Minnis
Ms M Orffer van Zyl
Ms R Symonds
Ms BL van Rooyen

PHYSICS AND ASTRONOMY

Departmental Chairperson: Prof C Arendse, PhD (UWC)
SARCHI Chairs (Astrophysics): Prof R Maartens, PhD (UCT)
Prof MGR Santos, MA (Cantab) PhD (Oxon)
SARCHI Chair (Nuclear Science) Prof S Triambak, MSc (Pune) PhD (Notre Dame)
SKA Chair (UWC-UCT):
    Prof R Taylor, PhD (British Columbia)
Senior Professors:
    Prof R Lindsay, BSc (Hons) (SU) DPhil (Oxon)
Professors:
    Prof C Arendse, PhD (UWC)
    Prof D Marshall, BSc (Hons) (UCT) DPhil (Oxon)
    Prof JN Orce, PhD (Brighton)
    Prof MGR Santos, MA (Cantab) PhD (Oxon)
Associate Professors:
    Prof R Madjoe, HDE MSc (UWC) MSc PhD (Louisiana State)
    Prof M Tchokonte, DEA (Yaounde), MSc PhD (Wits)
Emeritus Professor:
    Prof D Knoesen, PhD (SU)
Extra-Ordinary Professors:
    Prof R Bharuthram, PhD (UKZN)
    Prof C Clarkson, PhD (Glasgow)
    Prof R Dave, PhD (California)
    Prof P Garrett, PhD (McMaster)
    Prof RJ de Meijer, PhD (Utrecht)
    Prof D Kilkenny, PhD (St Andrews)
    Prof M Kosch, PhD (UKZN)
    Prof G Lakhina, PhD (Indian Institute of Technology)
    Prof E Lawrie, PhD (Paris-XI)
    Prof M Maaza, PhD (Paris-VI)
    Prof S Maharaj PhD (UKZN)
    Prof P Miceli, DPhil (Illinois at Urbana-Champaign)
    Prof JF Sharpey-Shafer, BA (Cantab) PhD (Liverpool)
    Prof S Singh, PhD (Indian Institute of Technology)
    Prof J Wood, PhD (Clark)
Extra-Ordinary Associate Professors:
    Prof M Cluver, DPhil (UCT)
    Prof C Cress, PhD (Columbia)
    Prof DE Motaung, PhD (UWC)
    Prof CJ Oliphant, PhD (UWC)
Adjunct Professors:
    Prof M Jarvis, DPhil (Oxon)
    Prof A Karastergiou, DPhil (Bonn)
    Prof D McIntosh, PhD (Arizona)
    Prof JC Holbrook, PhD (California)
Adjunct Associate Professor
Senior Lecturers:
    Dr S Halindintwali, MSc (Rwanda) PhD (UWC)
    Dr M Herbert, HDE PhD (UCT)
    Dr G Malgas, PhD (UWC)
    Dr TFG Muller, HDE PhD (UWC)
Extra-Ordinary Senior Lecturers:
    Dr AS Bolokang, PhD (UWC)
    Dr S Camera, PhD (Università degli Studi di Torino)
    Dr L Kotsedi, PhD (UWC)
Extra-Ordinary Researchers:
    Dr D Cunnama, PhD (UWC)
    Dr M Serylak, PhD (Amsterdam)
Lecturer:
    Dr EE Elson, PhD (UCT)
    Mr S Matshawule, MSc (UWC)
ECP Lecturers:
    Dr L Square, PhD (UWC)
    Dr J Ongori, PhD (UWC)
    Mr N Vivier, HDE, BSc (Hons) (UWC)
Chief Officers:
    Mr I Hlatshwayo, MSc (Zululand)
    Mr B van Heerden, MSc (UWC)
Officers: Mr I Schroeder, BSc (Hons) PGDip (UCT)  
Mr V van de Heyde, MSc (UWC)  
Mr M van Rooyen, MSc (UWC)  

PC Lab Manager: Ms BJ Volkwyn  
Admin Officers: Ms A Adams  
Admin Officer (Astrophysics): Ms M Gabler  
Admin Assistant: Vacant  

STATISTICS AND POPULATION STUDIES  
Departmental Chairperson: Prof N Stiegler, PhD (UWC), DEA Analyse Démographique (Bordeaux Montesquieu) Maitrise Administration Economique et Sociale (Bordeaux IV) Licence (Bordeaux I)  
Professor: Prof RJ Blignaut, BSc (UJ) BSc (Hons) (UP) MSc (UCT) PhD (UP)  
Associate Professors: Prof SS Appunni, PhD (Kerela)  
Prof N Stiegler, PhD (UWC) DEA Analyse Démographique (Bordeaux Montesquieu) Maitrise Administration Economique et Sociale (Bordeaux IV) Licence (Bordeaux I)  
Prof G Tati, PhD (Bristol), DEA (Pantheon Sorbonne) MSc (IFORD), Maitrise Licence (Congo)  
Emeritus Professors: Prof C Koen, PhD (UCT) PhD (UJ)  
Prof D Kotze, DCom (SU) MSc MBL (UNISA)  
Extra-Ordinary Professors: Prof E van der Merwe, PhD (NMMU)  
Prof A Fauve-Chamoux, PhD (Ecole des Hautes Etudes en Sciences Sociales, Paris)  
Lecturers: Ms L Bosman, MSc (NWU)  
Dr H Brydon, MSc (UWC)  
Mrs R Jacobs, MSc (UWC)  
Mr A Latief, MSc (UWC)  
Ms R Lombard-Jacobus, MSc (UWC)  
Dr R Luus, MCom PhD (SU)  
Extra-Ordinary Senior Lecturer: Dr E Omoluabi, PhD (IEDUP, Paris)  
Extra-Ordinary Researcher: Mrs E Jordaan, MSc (UWC)  
Chief Officer: Vacant  
Senior Officers: Vacant  
Admin Officer: Ms J de Doncker, BCom (Hons) (UWC)  

ARC (UNIT OF THE RANGE AND FORAGE INST)  
Researchers: Mr C Cupido, MSc (SU)  
Dr MI Samuels, MSc (UWC) PhD (UCT)  
Research Assistant: Vacant  

ELECTRON MICROSCOPY UNIT (EMU)  
Acting HOD: Prof C Arendse, PhD (UWC)  
Head: Vacant  
Senior lecturers: Dr SS Botha, PhD (UWC)  
Dr F Cummings, PhD (UWC)  
Senior Technical Officer: Mr AB Josephs, BSc (UWC)  
Administrative Officer: Ms N Kensley
ENVIRONMENTAL EDUCATION AND RESOURCES UNIT (EERU)

Manager: Ms H Melville, BSc MEd (SU)
Horticulturalist: Ms Z Maphanga, BTech (CPUT)
Education & Research Officer: Ms L van Breda, Nat Dipl (CPUT)
Nature Conservator: Mr R Adams, BTech (CPUT)
Reserve Staff: Mr M Kapiera
Mr J Ntlitiza

INSTITUTE FOR MICROBIAL BIOTECHNOLOGY & METAGENOMICS (IMBM)

Director: Prof IM Trindade, PhD (UCT)
SARCHI Chair (Microbial Genomics): Prof IM Trindade, PhD (UCT)
Professor: Prof IM Trindade, PhD (UCT)
Senior Lecturer: Dr B Kirby-McCullough, PhD (UCT)
Lecturer (nGap): Dr A Hitzeroth, PhD (UFS)
Researcher and Innovation Manager: Dr A Burger, PhD (SU)
Senior Officer: Mr L van Zyl, MSc (SU)
Technical Officer: Mr L Blackway, BSc (Hons) (UWC)
General Assistant: Ms C Cupido
Ms R Karelse

INSTITUTE FOR WATER STUDIES (IWS)

Director: Prof D Mazvimavi, BSc (Hons) (Zimbabwe) MSc (Brussels) PhD (Wageningen)
Senior Lecturer: Dr J Nel, BSc (Hons) (UFS) PhD (UWC)
Extra-Ordinary Professors:
Prof L Brendanck, BSc PhD (Ghent)
Prof C Brown, BSc (Hons) (UKZN) MSc (UPE) PhD (UCT)
Prof JA Day, PhD (UCT)
Prof N Jovanovic, BSc (Belgrade) MSc (Bari) PhD (UP)
Prof J King, BSc (Hons) PhD (UCT)
Prof HHG Savenije, MSc PhD (Delft, The Netherlands)
Prof LA Swatuk, BA (Hons) MA (Windsor) PhD (Dalhousie)
Extra-Ordinary Senior Lecturers:
Dr S Dzikiti, MSc (Zimbabwe) PhD (Ghent)
Dr E Kapangaziwiri, BSc (Hons) (Zimbabwe) MPhil PhD (RU)
Dr K Pietersen, BSc (Hons) (UWC) MSc (UFS) PhD (UWC)
Dr NJ Walker, BSc (Brighton) MSc (Southampton) PhD (UKZN)
Admin Officer: Ms M Naidoo

INTER-UNIVERSITY INSTITUTE FOR DATA INTENSIVE ASTRONOMY (IDIA)

Director: SKA Chair (UWC-UCT) Prof R Taylor, PhD (British Columbia)
Professor: Prof R Taylor, PhD (British Columbia)
Associate Professor: Prof C Odman, PhD (Cantab)
Researcher: Dr M Vaccari, MSc PhD (Padova, Italy)
Chief Officer/Software Developer: Vacant
Admin Officer: Vacant
### SOUTH AFRICAN INSTITUTE FOR ADVANCED MATERIAL CHEMISTRY (SAIAMC)

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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<tbody>
<tr>
<td>Director</td>
<td>Prof V Linkov, PhD (SU)</td>
</tr>
<tr>
<td>HySA Systems Director</td>
<td>Dr S Pasupathi, PhD (Pisa, Italy)</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>Prof B Bladergroen, PhD (UWC)</td>
</tr>
<tr>
<td>Extra-Ordinary Professor</td>
<td>Prof M Mdleleni, PhD (California) MBA (Southern Queensland)</td>
</tr>
<tr>
<td>Senior Researcher</td>
<td>Dr M Lototskyy, PhD (LVIV)</td>
</tr>
<tr>
<td>HySA Programme Manager</td>
<td>Mr A Parsons, BSc (Wits)</td>
</tr>
<tr>
<td>Key Technology Specialist</td>
<td>Dr Piotr Bujlo, PhD (WROCLAW, Poland)</td>
</tr>
<tr>
<td>Finance Manager</td>
<td>Ms B Rodgers</td>
</tr>
<tr>
<td>Safety Manager</td>
<td>Mr S Chidziva, MSc (Ulster, UK)</td>
</tr>
<tr>
<td>Admin Officer</td>
<td>Vacant</td>
</tr>
<tr>
<td>Admin Assistant HySA Systems</td>
<td>Mr Y Arend</td>
</tr>
</tbody>
</table>

### SOUTH AFRICAN NATIONAL BIO-INFORMATICS INSTITUTE (SANBI)

<table>
<thead>
<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Director</td>
<td>Prof A Christoffels, PhD (UWC)</td>
</tr>
<tr>
<td>SARCHI Chair (Bioinformatics)</td>
<td>Prof A Christoffels, PhD (UWC)</td>
</tr>
<tr>
<td>Professor</td>
<td>Prof A Christoffels, PhD (UWC)</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>Prof J Gamieldien, PhD (UWC)</td>
</tr>
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<td>Prof S Travers, PhD (NU, Ireland)</td>
</tr>
<tr>
<td>Extra-Ordinary Professors</td>
<td>Prof V Bajic, D Eng Sc EE (Zagreb) ME Eng Sc (Belgrade)</td>
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<tr>
<td></td>
<td>Prof W Hide, PhD (Temple)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr G Harkins, PhD (UWC)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr R Cloete, PhD (UWC)</td>
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<tr>
<td>Researcher</td>
<td>Mr P van Heusden, BSc (UCT)</td>
</tr>
<tr>
<td>Personal Assistant of Director</td>
<td>Ms M Kumalo, Dipl (Terblanche Secretarial College)</td>
</tr>
<tr>
<td>Admin Assistant</td>
<td>Ms F Mpithi</td>
</tr>
<tr>
<td>Financial Administrator</td>
<td>Ms F Mullins, Dipl (Varsity College)</td>
</tr>
<tr>
<td>Student Administrator</td>
<td>Vacant</td>
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<tr>
<td>System Administrators</td>
<td>Mr E De Beste, BSc (Hons) (UCT)</td>
</tr>
<tr>
<td>Software Developers</td>
<td>Mr Q Coert, Dipl (CPUT)</td>
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<tr>
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<td>Mr T Lose, MSc (UWC)</td>
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<td>Mr B Lubinsky, MSc (UCT)</td>
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<td>Mr Z Mashologu, BSc (Hons) (UCT)</td>
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<td>Mr A Paterson, BA (RU)</td>
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<td>Mr A van der Merwe, Dipl (UNISA)</td>
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<td>Dr I Wright, PhD (UWC)</td>
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<tr>
<td>Project Manager</td>
<td>Dr K Miller-Duys, MBChB (UCT)</td>
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</table>
RULES FOR MAINSTREAM PROGRAMMES

BACHELOR OF SCIENCE IN APPLIED GEOLOGY (3214)

B.1 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science – BSc (Applied Geology)

B.1.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University's approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.1.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.1.3 Alternate admission

Alternate admission does not apply to this programme.

B.2 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.3 DURATION

Unless Senate decides otherwise, the normal duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
## B.4 CURRICULUM

### B.4.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
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<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
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<tr>
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<td>ESC111</td>
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<td>Earth Science 121</td>
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<td>English for Educational Development 127</td>
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<td>Chemistry 124 (N)</td>
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<td><strong>Group 5 (select all modules)</strong></td>
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<tr>
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<tr>
<td><strong>Electives (select one module)</strong></td>
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<td>Environmental &amp; Water Science 221</td>
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<td><strong>Sub-total</strong></td>
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<td><strong>Total</strong></td>
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### B.4.3 Level 3

<table>
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<tr>
<th>Module Name</th>
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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<tr>
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<tr>
<td><strong>Total</strong></td>
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</table>

**FINAL TOTAL** 375
B.5 ASSESSMENT

B.5.1 Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.5.2 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.5.3 Weight of practical component

B.5.3.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.5.3.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.5.4 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.5.5 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.5.6 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.6 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.6.1 Level 1

A student shall be admitted to the second year of study when 105 credits have been obtained of the 135 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.6.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 215 credits have been obtained after the second year of study and when all 135 credits of the first year of the curriculum have been obtained.
B.7 ADVANCE REGISTRATION

B.7.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.7.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.7.3 Level 2

B.7.3.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.7.3.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.8 RENEWAL OF REGISTRATION

B.8.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.8.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.8.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.9 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.9.1 Modules from other faculties

B.9.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.9.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.9.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.9.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events.
When exempted, such students must replace these modules with other modules of their choice to the same credit value.

**B.9.3  Restriction on choice of modules**

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

**B.9.3.1 Chemistry:** (CHE114 and CHE124) OR (CHE116 and CHM126).

**B.9.3.2 Physics:** (PHY111 and PHY121) OR (PHY116 and PHY126) OR PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

**B.9.3.3 Mathematics:** In the case of Mathematics a student will only be credited for either MAT105 or MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

**B.9.3.4 Statistics:** In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

**B.9.3.5** Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

**B.9.3.6** Students majoring with Environmental and Water Science and Applied Geology will only be credited for either EWP311 or APG311.

**B.9.4  Endorsed Degree**

**B.9.4.1** In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

**B.9.4.2** Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN BIODIVERSITY AND CONSERVATION BIOLOGY (3217)

B.10 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Biodiversity & Conservation Biology)

B.10.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science or
- level 4 (50-59%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.10.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher Grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above

B.10.3 Alternate admission

Alternate admission does not apply to this programme.

B.11 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.12 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
### B.13 CURRICULUM

#### B.13.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group 1 (select all modules)</strong></td>
<td></td>
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</tr>
<tr>
<td>Life Sciences 141</td>
<td>LSC141</td>
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<td>Life Sciences 142</td>
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<td>Chemistry 116</td>
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</tr>
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<td>Chemistry 126</td>
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<td>15</td>
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<td><strong>Group 3 (select 1 module)</strong></td>
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</tr>
<tr>
<td>English for Educational Development 117</td>
<td>EED117</td>
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<td>English for Educational Development 127</td>
<td>EED127</td>
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<tr>
<td><strong>Electives (select all groups)</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Group 4 (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Earth Science 111</td>
<td>ESC111</td>
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<tr>
<td>Earth Science 121</td>
<td>ESC121</td>
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<td><strong>Group 5 (select 1 module)</strong></td>
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<td>Statistics 125</td>
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#### B.13.2 Level 2

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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<tr>
<td>Biodiversity &amp; Conservation 211 (Animal diversity)</td>
<td>BDC211</td>
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<tr>
<td>Biodiversity &amp; Conservation 221 (Diversity of Photosynthetic Organisms)</td>
<td>BDC221</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 222 (Population Biology and Evolution)</td>
<td>BDC222</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 223 (Ecophysiology)</td>
<td>BDC223</td>
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</tr>
<tr>
<td><strong>Sub-total</strong></td>
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</tbody>
</table>

**Electives (select 1 group)**

| **Group 1**                                           |            |      |
| Environmental & Water Science 211                    | EWP211     | 20   |
| Environmental & Water Science 221                    | EWP221     | 20   |
| **Sub-total**                                         |            | 40   |

**Group 2 (select 40 credits)**

| **Biology 211 credits**                               |            |      |
| Biotechnology 211                                     | BTN211     | 20   |
| Biotechnology 215                                     | BTN215     | 20   |
| Biotechnology 216                                     | BTN216     | 20   |
| Biotechnology 218                                     | BTN218     | 20   |
| Biotechnology 223                                     | BTN223     | 20   |
| **Sub-total**                                         |            | 40   |

**Group 3 (select all modules)**

| **Environmental and Sustainability Studies 211**      | ESS211     | 10   |
| Environmental and Sustainability Studies 212          | ESS212     | 10   |
| Environmental and Sustainability Studies 221          | ESS221     | 10   |
| Environmental and Sustainability Studies 222          | ESS222     | 10   |
| **Sub-total**                                         |            | 40   |
| **Total**                                             |            | 120  |
B.13.3 Level 3

<table>
<thead>
<tr>
<th>Module Name</th>
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<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select 4 modules)</strong></td>
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</tr>
<tr>
<td>Biodiversity &amp; Conservation Biology 332 (Land-use and Conservation)</td>
<td>BDC332</td>
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<tr>
<td>Biodiversity &amp; Conservation Biology 333 (Animal Behaviour and Systematics)</td>
<td>BDC333</td>
<td>30</td>
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<tr>
<td>Biodiversity &amp; Conservation 334 (Biogeography and Global Ecology)</td>
<td>BDC334</td>
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<tr>
<td>Biodiversity &amp; Conservation 335 (Ecology of Communities and Ecosystems)</td>
<td>BDC335</td>
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<tr>
<td>Environmental &amp; Water Science 321</td>
<td>EWP321</td>
<td>30</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
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<tr>
<td><strong>FINAL TOTAL</strong></td>
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<td>360</td>
</tr>
</tbody>
</table>

B.14 ASSESSMENT

B.14.1 Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.14.2 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.14.3 Weight of practical component

B.14.3.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.14.3.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.14.4 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.14.5 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.14.6 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.15 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:
B.15.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.15.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

B.16 ADVANCE REGISTRATION

Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.16.1 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.16.2 Level 2

B.16.2.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.16.2.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.17 RENEWAL OF REGISTRATION

B.17.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.17.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.17.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.18 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.18.1 Modules from other faculties

B.18.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.18.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.
B.18.1.3 English for Educational Development (EED): is a compulsory credit bearing module, comprising of a semester module.

B.18.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.18.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.18.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.18.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.18.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.18.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.18.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.18.4 Endorsed Degree

B.18.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.18.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN BIOTECHNOLOGY (3211)

B.19 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Biotechnology)

B.19.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science or
- level 4 (50-59%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.19.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above

B.19.3 Alternate admission

Alternate admission does not apply to this programme.

B.20 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.21 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
### B.22 CURRICULUM

#### B.22.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Group 1 (select all modules)</strong></td>
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<tr>
<td>Life Sciences 141</td>
<td>LSC141</td>
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<tr>
<td>Life Sciences 142</td>
<td>LSC142</td>
<td>15</td>
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<tr>
<td>Chemistry 116 (N)</td>
<td>CHE116</td>
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<td>Chemistry 126 (N)</td>
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<td><strong>Group 2 (select 1 module)</strong></td>
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<tr>
<td>Computing Fundamentals</td>
<td>COS114</td>
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<tr>
<td>Computing Fundamentals</td>
<td>COS124</td>
<td>15</td>
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<tr>
<td><strong>Group 3 (select 1 module)</strong></td>
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<tr>
<td>English for Educational Development 117</td>
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<td>English for Educational Development 127</td>
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<td><strong>Electives (select 1 group)</strong></td>
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<tr>
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<td>Physics 116 (N)</td>
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#### B.22.2 Level 2

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<th>Module Name</th>
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<td><strong>Compulsory (select all modules)</strong></td>
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</tr>
<tr>
<td>Biotechnology 211</td>
<td>BTN211</td>
<td>20</td>
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<td>Biotechnology 215</td>
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#### B.22.3 Level 3

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</table>
B.23 ASSESSMENT

B.23.1 Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.23.2 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.23.3 Weight of practical component

B.23.3.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.23.3.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.23.4 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.23.5 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.23.6 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.24 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.24.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.24.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.
B.25 ADVANCE REGISTRATION

B.25.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.25.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.25.3 Level 2

B.25.3.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.25.3.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.26 RENEWAL OF REGISTRATION

B.26.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.26.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.26.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.27 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.27.1 Modules from other faculties

B.27.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.27.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.27.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.27.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.
B.27.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.27.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.27.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.27.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.27.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.27.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.27.4 Endorsed Degree

B.27.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.27.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN CHEMICAL SCIENCES (3220)

B.28 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Chemical Sciences)

B.28.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.28.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.28.3 Alternate admission

Alternate admission does not apply to this programme.

B.29 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.30 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
### B.31 CURRICULUM

#### B.31.1 Level 1

**Compulsory**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry 114 (N)</td>
<td>CHE114</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 124 (N)</td>
<td>CHE124</td>
<td>15</td>
</tr>
<tr>
<td>Group 2 (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 111</td>
<td>PHY111</td>
<td>15</td>
</tr>
<tr>
<td>Physics 121</td>
<td>PHY121</td>
<td>15</td>
</tr>
<tr>
<td>Group 3 (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Sciences 141</td>
<td>LSC141</td>
<td>15</td>
</tr>
<tr>
<td>Life Sciences 142</td>
<td>LSC142</td>
<td>15</td>
</tr>
</tbody>
</table>

**Sub total** 90

**Electives**

**Group 4 (select 1 sub-group)**

**Group 4.1 (select all modules)**

| Mathematics 105        | MAT105     | 30   |

**Group 4.2 (select all modules)**

| Mathematics 115 (N)    | MAM115     | 15   |
| Statistics 125         | STA125     | 15   |

**Group 4.3 (select all modules)**

| Mathematics 103        | MAT103     | 15   |
| Mathematics 104        | MAT104     | 15   |

**Sub-total** 30

**Total** 120

**Please Note:** Students who have passed CHE116 & CHM126 may also be allowed to proceed with the Chemical Sciences program provided that the candidate has obtained at least 60% in each of these modules and is recommended by the HOD.

#### B.31.2 Level 2

**Compulsory (select all modules)**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 211</td>
<td>CHM211</td>
<td>20</td>
</tr>
<tr>
<td>Chemistry 212</td>
<td>CHM212</td>
<td>20</td>
</tr>
</tbody>
</table>

**Electives (select 2 different groups)**

**Group 1 (select 1 sub-group)**

**Group 1.1 (select all modules)**

| Physics 212            | PHY212     | 20   |
| Physics 222            | PHY222     | 20   |

**Group 1.2 (select all modules)**

| Physics 217            | PHY217     | 20   |
| Physics 227            | PHY227     | 20   |

**Group 2 (select 1 sub-group)**

**Group 2.1 (select all modules)**

| Mathematics 211        | MAT211     | 20   |
| Mathematics 221        | MAT221     | 20   |

**Group 2.2 (select all modules)**

| Mathematics 211        | MAT211     | 20   |
| Mathematics 212        | MAT212     | 20   |
Group 3 (select 2 modules, with one in each semester)

First Semester
Biotechnology 211 OR BTN211 20
Biotechnology 215 BTN215 20

Second Semester
Biotechnology 213 OR BTN213 20
Biotechnology 223 BTN223 20
Sub-total 80
Total 120

B.31.3 Level 3

Compulsory (select all modules)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 311</td>
<td>CHM311</td>
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<tr>
<td>Chemistry 312</td>
<td>CHM312</td>
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<tr>
<td>Chemistry 321</td>
<td>CHM321</td>
<td>30</td>
</tr>
<tr>
<td>Chemistry 322</td>
<td>CHM322</td>
<td>30</td>
</tr>
</tbody>
</table>
Total 120
FINAL TOTAL 360

B.32 ASSESSMENT

B.32.1 Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.32.2 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.32.3 Weight of practical component

B.32.3.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.32.3.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.32.4 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.32.5 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.32.6 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.
B.33 PROMOTION RULES

B.33.1 Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.33.1.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.33.1.2 Level 1 with MAT103

Notwithstanding, students who are registered for MAT103 require 75 of the 105 available credits and when all pre-requisites for admission to second year level modules must be met. Students should note that decanting may extend the degree by one year.

B.33.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

B.34 ADVANCE REGISTRATION

B.34.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.34.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.34.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.34.4 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.35 RENEWAL OF REGISTRATION

B.35.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.35.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.35.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.
B.36 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.36.1 Modules from other faculties

B.36.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.36.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.36.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.36.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.36.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.36.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.36.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.36.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.36.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.36.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.36.4 Endorsed Degree

B.36.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.36.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN COMPUTER SCIENCE (3221)

B.37 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Computer Science)

B.37.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor's Degree study plus a score of no less than 33 points calculated according to the University's approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 5 (60-69%) in Mathematics and
- level 4 (50-59%) in Physical Science or
- level 4 (50-59%) in Life Sciences or
- level 4 (50-59%) in Information Technology

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.37.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.37.3 Alternate admission

Alternate admission does not apply to this programme.

B.38 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.39 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
B.40 CURRICULUM

B.40.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computing Fundamentals</td>
<td>COS114</td>
<td>15</td>
</tr>
<tr>
<td>English for Educational Development 127</td>
<td>EED127</td>
<td>15</td>
</tr>
<tr>
<td>Computer Science 101</td>
<td>COS101</td>
<td>30</td>
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<tr>
<td><strong>Core Modules (select one group)</strong></td>
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</tr>
<tr>
<td><strong>Group 1</strong></td>
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<td></td>
</tr>
<tr>
<td>Mathematics 105 OR</td>
<td>MAT105</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics 103 and</td>
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<td>15</td>
</tr>
<tr>
<td>Mathematics 104</td>
<td>MAT104</td>
<td>15</td>
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<tr>
<td><strong>Electives (select 1 group)</strong></td>
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<td></td>
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<tr>
<td><strong>Group 1 (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics 111</td>
<td>STA111</td>
<td>15</td>
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<tr>
<td>Information Systems 132</td>
<td>IFS132</td>
<td>15</td>
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<tr>
<td><strong>Group 2 (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics 112</td>
<td>APM112</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 125</td>
<td>STA125</td>
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<tr>
<td><strong>Group 3 (select all modules)</strong></td>
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<tr>
<td>Physics 111</td>
<td>PHY111</td>
<td>15</td>
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<tr>
<td>Physics 121</td>
<td>PHY121</td>
<td>15</td>
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<tr>
<td><strong>Group 4 (select all modules)</strong></td>
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<td>Physics 116 (N)</td>
<td>PHY116</td>
<td>15</td>
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<tr>
<td>Physics 126 (N)</td>
<td>PHY126</td>
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<td><strong>Group 5 (select all modules)</strong></td>
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<tr>
<td>Mathematics 112</td>
<td>APM112</td>
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<tr>
<td>Information Systems 132</td>
<td>IFS132</td>
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<td><strong>Sub-total</strong></td>
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<td><strong>Total</strong></td>
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B.40.2 Level 2

<table>
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<tr>
<th>Module Name</th>
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<th>Cred</th>
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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<tr>
<td>Computer Science 211</td>
<td>CSC211</td>
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<tr>
<td>Computer Science 212</td>
<td>CSC212</td>
<td>20</td>
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<tr>
<td><strong>Electives (select 2 groups)</strong></td>
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<td><strong>Group 1 (select all modules)</strong></td>
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<td></td>
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<tr>
<td>Information Systems 231</td>
<td>IFS231</td>
<td>20</td>
</tr>
<tr>
<td>Information Systems 233</td>
<td>IFS233</td>
<td>20</td>
</tr>
<tr>
<td><strong>Group 2.1 (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics 211 (compulsory for an Honours in Statistics)</td>
<td>MAT211</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics 212</td>
<td>MAT212</td>
<td>20</td>
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<tr>
<td><strong>Group 2.2 select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Mathematics 211 (compulsory for an Honours in Statistics)</td>
<td>MAT211</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics 221</td>
<td>MAT221</td>
<td>20</td>
</tr>
<tr>
<td><strong>Group 3 (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Statistics 211</td>
<td>STA211</td>
<td>20</td>
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<tr>
<td>Statistics 221</td>
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<tr>
<td><strong>Group 4 (select all modules)</strong></td>
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<td>Physics 212</td>
<td>PHY212</td>
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<tr>
<td>Physics 222</td>
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<td>20</td>
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<tr>
<td>Group 5 (select all modules)</td>
<td>Alpha Code</td>
<td>Cred</td>
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<tr>
<td>---------------------------------------------</td>
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</tr>
<tr>
<td>Physics 217</td>
<td>PHY217</td>
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<tr>
<td>Physics 227</td>
<td>PHY227</td>
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<td><strong>Sub-total</strong></td>
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<td><strong>Total</strong></td>
<td><strong>120</strong></td>
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**B.40.3 Level 3**

<table>
<thead>
<tr>
<th>Module Name</th>
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</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
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</tr>
<tr>
<td>Computer Science 311</td>
<td>CSC311</td>
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<tr>
<td>Computer Science 312</td>
<td>CSC312</td>
<td>30</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td><strong>60</strong></td>
<td></td>
</tr>
<tr>
<td>Electives (select 1 group)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 (select 2 modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics 311</td>
<td>MAT311</td>
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<td>Mathematics 321</td>
<td>MAT321</td>
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<td>Mathematics 322</td>
<td>MAT322</td>
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</tr>
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<td>Mathematics 312</td>
<td>MAT312</td>
<td>30</td>
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<tr>
<td>Group 2 (select 1 sub-group)</td>
<td></td>
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<td>Group 2.1 (select all modules)</td>
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<tr>
<td>Statistics 331 (compulsory for an Honours in Statistics)</td>
<td>STA331</td>
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<tr>
<td>Statistics 332 (compulsory for an Honours in Statistics)</td>
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<td>Group 2.2 (select all modules)</td>
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<td>Statistics 333</td>
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<td>Group 3 (select 2 modules)</td>
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<tr>
<td>Information Systems 361</td>
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<tr>
<td>Information Systems 362</td>
<td>IFS362</td>
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<tr>
<td>Group 4 (select all modules)</td>
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<td>Physics 312</td>
<td>PHY312</td>
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<tr>
<td>Physics 322</td>
<td>PHY322</td>
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<tr>
<td>Group 5 (select all modules)</td>
<td></td>
<td></td>
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<tr>
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<td>Physics 327</td>
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<td><strong>Sub-total</strong></td>
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</tr>
<tr>
<td><strong>FINAL TOTAL</strong></td>
<td><strong>360</strong></td>
<td></td>
</tr>
</tbody>
</table>

**B.41 ASSESSMENT**

**B.41.1** Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

**B.41.2 Subminima**

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

**B.41.3 Weight of practical component**

The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%. For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

**B.41.4 Final mark**

Except where otherwise indicated, the final mark shall be obtained by means of a system of
continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

**B.41.5  Re-evaluation of practical modules**

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

**B.41.6  Attendance of practicals**

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

**B.42 PROMOTION RULES**

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

**B.42.1.1 Level 1**

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

**B.42.1.2 Level 1 with MAT103**

Notwithstanding, students who are registered for MAT103 require 75 of the 105 available credits and when all pre-requisites for admission to second year level modules must be met. Students should note that decanting may extend the degree by one year.

**B.42.2  Level 2**

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

**B.43 ADVANCE REGISTRATION**

**B.43.1**  Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

**B.43.2  Level 1**

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

**B.43.3  Level 2**

**B.43.3.1**  The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

**B.43.3.2 Please Note:** Students are advised to complete all first year modules before proceeding to 3rd year level.
B.44 RENEWAL OF REGISTRATION

B.44.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.44.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.44.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.45 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.45.1 Modules from other faculties

B.45.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.45.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.45.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.45.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.45.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.45.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.45.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.45.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.45.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.45.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.
B.45.4 Endorsed Degree

B.45.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.45.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN ENVIRONMENTAL AND WATER SCIENCE (3331)

B.46 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Environmental and Water Science)

B.46.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science or
- level 4 (50-59%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.46.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) and (b) above.

B.46.3 Alternate admission

Alternate admission does not apply to this programme.

B.47 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.48 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
### B.49 CURRICULUM

#### B.49.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group 1 (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Earth Science 111</td>
<td>ESC111</td>
<td>15</td>
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<tr>
<td>Earth Science 121</td>
<td>ESC121</td>
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<tr>
<td><strong>Group 2 (select 1 module)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry 116</td>
<td>CHE116</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 126</td>
<td>CHM126</td>
<td>15</td>
</tr>
<tr>
<td><strong>Group 3 (select 1 module)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English for Educational Development 117</td>
<td>EED117</td>
<td>15</td>
</tr>
<tr>
<td>English for Educational Development 127</td>
<td>EED127</td>
<td>15</td>
</tr>
<tr>
<td><strong>Group 4 (select 1 module)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics 111</td>
<td>STA111</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 125</td>
<td>STA125</td>
<td>15</td>
</tr>
</tbody>
</table>

| Electives (select 2 groups)                       |            |      |
| **Group 1 (select all modules)**                   |            |      |
| Life Science 141                                   | LSC141     | 15   |
| Life Science 142                                   | LSC142     | 15   |
| **Group 2 (select all modules)**                   |            |      |
| Physics 116 (N)                                    | PHY116     | 15   |
| Physics 126 (N)                                    | PHY126     | 15   |

| Sub-total                                         |            | 75   |

| **Total**                                         |            | 135  |

#### B.49.2 Level 2

<table>
<thead>
<tr>
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<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory Modules</strong></td>
<td></td>
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</tr>
<tr>
<td>Environmental &amp; Water Science 211</td>
<td>EWP211</td>
<td>20</td>
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<tr>
<td>Environmental &amp; Water Science 221</td>
<td>EWP221</td>
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</tr>
<tr>
<td>Environmental &amp; Water Science 222</td>
<td>EWP222</td>
<td>20</td>
</tr>
</tbody>
</table>

| Sub-total                                         |            | 60   |

| **Total**                                         |            | 120  |

**Electives (select any 2 modules from groups 1 to 3 PLUS one other module = 60 credits)**

| **Group 1 (select 2 modules)**                     |            |      |
| Biodiversity & Conservation 211                    | BDC211     | 20   |
| Biodiversity & Conservation 221                    | BDC221     | 20   |
| Biodiversity & Conservation 222                    | BDC222     | 20   |
| Biodiversity & Conservation 223                    | BDC223     | 20   |

| **Group 2 (select all modules)**                   |            |      |
| Geology 231                                        | APG231     | 20   |
| Geology 232                                        | APG232     | 20   |

| **Group 3 (select all modules)**                   |            |      |
| Physics 217                                        | PHY217     | 20   |
| Physics 227                                        | PHY227     | 20   |

| Sub-total                                         |            | 60   |

| **Total**                                         |            | 120  |
B.49.3 Level 3

Module Name | Alpha Code | Cred
---|---|---
Environmental & Water Science 311 | EWP311 | 30
Environmental & Water Science 312 | EWP312 | 30
Environmental & Water Science 321 | EWP321 | 30
Environmental & Water Science 322 | EWP322 | 30

Total | 120
FINAL TOTAL | 375

B.50 ASSESSMENT

B.50.1 Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.50.2 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.50.3 Weight of practical component

B.50.3.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.50.3.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.50.4 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.50.5 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.50.6 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.51 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.51.1 Level 1

A student shall be admitted to the second year of study when 105 credits have been obtained of the 135 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.
B.51.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 215 credits have been obtained after the second year of study and when all 135 credits of the first year of the curriculum have been obtained.

B.52 ADVANCE REGISTRATION

B.52.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.52.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.52.3 Level 2

B.52.3.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.52.3.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.53 RENEWAL OF REGISTRATION

B.53.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.53.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.53.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.54 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.54.1 Modules from other faculties

B.54.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.54.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.54.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.
B.54.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events.

When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.54.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.54.3.1 Chemistry: (CHE114 and CHE124 OR (CHE116 and CHM126).

B.54.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.54.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.54.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.54.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.54.3.6 Students majoring with Environmental and Water Science and Applied Geology will only be credited for either EWP311 or APG311.

B.54.4 Endorsed Degree

B.54.4.1. In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.54.4.2. Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN MATHEMATICAL AND STATISTICAL SCIENCES (3227)

B.55 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Mathematical and Statistical Sciences)

B.55.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 5 (60-69%) in Mathematics and
- level 4 (50-59%) in Physical Science or
- level 4 (50-59%) in Life Sciences or
- level 4 (50-59%) in Information Technology

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.55.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.55.3 Alternate admission

Alternate admission does not apply to this programme.

B.56 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure. At the end of the first quarter of the academic year there will be a further selection of students to follow the Mathematics modules MAT105 or MAT103.

B.57 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
## Mathematics Stream

### B.58.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
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<th>Cred</th>
</tr>
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<tr>
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<tr>
<td>Group 1 (select all modules)</td>
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<tr>
<td>Mathematics 105 OR</td>
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<tr>
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<td><strong>Group 2 (select 1 module)</strong></td>
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<tr>
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<td>COS114</td>
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<td>English for Educational Development 127</td>
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<td><strong>Electives (select 1 group)</strong></td>
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<td><strong>Group 1 (select all modules)</strong></td>
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<td>Mathematics 112</td>
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<tr>
<td>Applied Mathematics 123</td>
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<td><strong>Group 3 (select all modules)</strong></td>
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<td>Physics 116 (N)</td>
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<td>Physics 126 (N)</td>
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<td><strong>Sub-total</strong></td>
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### B.58.2 Level 2

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<tr>
<td>Mathematics 211</td>
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<td><strong>Electives (select 4 modules)</strong></td>
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<td>MAT212</td>
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<td>Mathematics 232</td>
<td>MAT232</td>
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</tr>
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<td>PHY212</td>
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<td>Physics 227</td>
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### B.58.3 Level 3

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<tr>
<td>Group 1 (select all modules)</td>
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<tr>
<td>Mathematics 311</td>
<td>MAT311</td>
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</table>
Group 2 (select 1 module)
Mathematics 321 MAT321 30
Mathematics 322 MAT322 30
Mathematics 312 MAT312 30
Sub-total 60

Electives (select 2 modules)
Mathematics 321 (only if not selected in the compulsory list) MAT321 30
Mathematics 322 (only if not selected in the compulsory list) MAT322 30
Mathematics 312 (only if not selected in the compulsory list) MAT312 30
Statistics 331 (may not be selected with STA333) STA331 30
Statistics 332 STA332 30
Statistics 333 (may not be selected with STA331) STA333 30
Sub-total 60
Total 120
FINAL TOTAL 360

Statistics Stream
B.58.4 Level 1

<table>
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<tr>
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<td>Comfortable (select all groups)</td>
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<tr>
<td>Group 1 (select all modules)</td>
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<tr>
<td>Mathematics 105 OR</td>
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<td>Mathematics 103 and</td>
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<td>Mathematics 104</td>
<td>MAT104</td>
<td>15</td>
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<td>Statistics 121</td>
<td>STA121</td>
<td>15</td>
</tr>
<tr>
<td>Group 2 (select 1 module)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computing Fundamentals</td>
<td>COS114</td>
<td>15</td>
</tr>
<tr>
<td>Computing Fundamentals</td>
<td>COS124</td>
<td>15</td>
</tr>
<tr>
<td>Group 3 (select 1 module)</td>
<td></td>
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<tr>
<td>English for Educational Development 117</td>
<td>EED117</td>
<td>15</td>
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<tr>
<td>English for Educational Development 127</td>
<td>EED127</td>
<td>15</td>
</tr>
</tbody>
</table>
Sub-total 90

Electives (select electives to the value of 30 credits)
Group 1 (select all modules)
Physics 116 PHY116 15
Physics 126 PHY126 15
Group 2 (select all modules)
Economics 151 ECO151 10
Economics 152 ECO152 10
Management 131 or MAN131 15
Management 132 MAN132 15
Group 3
Computer Science 101 COS101 30
Sub-total 30
Total 120

B.58.5 Level 2

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics 211</td>
<td>STA211</td>
<td>20</td>
</tr>
<tr>
<td>Statistics 221</td>
<td>STA221</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics 211</td>
<td>MAT211</td>
<td>20</td>
</tr>
</tbody>
</table>
Sub-total 60

52
Electives (select modules to the value of 60 credits)

Group 1 (select all modules)
- Computer Science 211: CSC211, 20 credits
- Computer Science 212: CSC212, 20 credits

Group 2
- Mathematics 221 (compulsory for Honours in Statistics): MAT221, 20 credits
- Mathematics 212: MAT212, 20 credits
- Physics 217: PHY217, 20 credits
- Physics 227: PHY227, 20 credits

Group 3 (select all modules)
- Mathematics 231: MAT231, 10 credits
- Mathematics 232: MAT232, 10 credits
- Mathematics 235: MAT235, 10 credits
- Mathematics 241: MAT241, 10 credits
- Mathematics 242 (Pre-requisite for Economics 311): MAT242, 10 credits

Sub-total: 60 credits
Total: 120 credits

B.58.6 Level 3

Module Name | Alpha Code | Cred
---|---|---
Compulsory (select 1 group)
Group 1
- Statistics 331 (compulsory for Honours in Statistics): STA331, 30 credits
- Statistics 332 (compulsory for Honours in Statistics): STA332, 30 credits

Group 2
- Statistics 333: STA333, 30 credits
- Statistics 332: STA332, 30 credits

Sub-total: 60 credits
Total: 120 credits

Electives (select 1 group)
Group 1 (select 2 modules)
- Mathematics 311: MAT311, 30 credits
- Mathematics 321: MAT321, 30 credits
- Mathematics 312: MAT312, 30 credits
- Mathematics 322: MAT322, 30 credits

Group 2 (select all modules)
- Computer Science 311: CSC311, 30 credits
- Computer Science 312: CSC312, 30 credits

Group 3 (select 4 modules) Compulsory
- Economics 331: ECO331, 15 credits
- Economics 332: ECO332, 15 credits
- Economics 335: ECO335, 15 credits
- Economics 336: ECO336, 15 credits
- Economics 311 (Required for Honours in Economics): ECO311, 15 credits
- Economics 334: ECO334, 15 credits

Sub-total: 60 credits
Total: 120 credits
FINAL TOTAL: 360 credits

B.59 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:
B.59.1 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.59.2 Weight of practical component

B.59.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.59.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.59.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.59.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.60 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.60.1.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.60.1.2 Level 1 with MAT103

Notwithstanding, students who are registered for MAT103 require 75 of the 105 available credits and when all pre-requisites for admission to second year level modules must be met. Students should note that decanting may extend the degree by one year.

B.60.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

B.61 ADVANCE REGISTRATION

B.61.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.
B.61.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.61.3 Level 2

B.61.3.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.61.3.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.62 RENEWAL OF REGISTRATION

B.62.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.62.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.62.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.63 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.63.1 Modules from other faculties

B.63.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme or in the case of Statistics students who will be allowed to take Economics as a subject in their programme.

B.63.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.63.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.63.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.63.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:
B.63.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.63.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.63.4.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.63.4.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.63.4.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.63.5 Endorsed Degree

B.63.5.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.63.5.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN MEDICAL BIOSCIENCE (3230)

B.64 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Medical Bioscience)

B.64.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.64.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.64.3 Alternate admission

Alternate admission does not apply to this programme.

B.65 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.66 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
## B.67 CURRICULUM

### B.67.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Sciences 141</td>
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<tr>
<td>Statistics 125</td>
<td>STA125</td>
<td>15</td>
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<td>Chemistry 116 (N)</td>
<td>CHE116</td>
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<td>Chemistry 126 (N)</td>
<td>CHM126</td>
<td>15</td>
</tr>
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<td>Medical Biosciences 111</td>
<td>MBS111</td>
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<tr>
<td>Medical Biosciences 121</td>
<td>MBS121</td>
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<tr>
<td><strong>Group 1 (select all modules)</strong></td>
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<tr>
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<tr>
<td>Statistics 125</td>
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<tr>
<td>Chemistry 116 (N)</td>
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<tr>
<td>Chemistry 126 (N)</td>
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<td>Computing Fundamentals</td>
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<td>Computing Fundamentals</td>
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<td>English for Educational Development 117</td>
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<td>English for Educational Development 127</td>
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### B.67.2 Level 2

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<td>Medical Biosciences 232</td>
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<td>Medical Microbiology 251</td>
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<td>Medical Microbiology 252</td>
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<td><strong>Electives (select 2 modules)</strong></td>
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<td>Biotechnology 211</td>
<td>BTN211</td>
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<td>Biotechnology 223</td>
<td>BTN223</td>
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<tr>
<td>Biotechnology 215</td>
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<tr>
<td>Biotechnology 213</td>
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### B.67.3 Level 3

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<td>Medical Biosciences 332</td>
<td>MBS332</td>
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<td>Medical Microbiology 353</td>
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<td>Medical Microbiology 354</td>
<td>MIC354</td>
<td>30</td>
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<td><strong>Total</strong></td>
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<td>120</td>
</tr>
<tr>
<td><strong>FINAL TOTAL</strong></td>
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<td>360</td>
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</tbody>
</table>

## B.68 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

### B.68.1 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.
B.68.2 Weight of practical component

B.68.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.68.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.68.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.68.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.68.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.69 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.69.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.69.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

B.70 ADVANCE REGISTRATION

Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.70.1 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.
B.70.2 Level 2

B.70.2.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.70.2.2 Please Note: Students are advised to complete all first year modules before proceeding to 3\textsuperscript{rd} year level.

B.71 RENEWAL OF REGISTRATION

B.71.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.71.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.71.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.72 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.72.1 Modules from other faculties

B.72.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.72.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.72.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.72.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.72.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.72.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.72.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).
B.72.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.72.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.72.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.72.4 Endorsed Degree

B.72.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.72.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN PHYSICAL SCIENCE (3233)

B.73 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Physical Science)

B.73.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 33 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 5 (60-69%) in Mathematics and
- level 4 (50-59%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.73.2 Admission requirements for applicants who matriculated before 2008

(a) Unless Senate decides otherwise, no person shall be admitted to any of the programmes for the BSc degree without having obtained a full matriculation or age exemption. Furthermore, no person shall be admitted to any of the BSc programmes if he/she has not obtained a pass in Mathematics and either Physical Science or Biology at Higher grade with at least a D symbol or at Standard grade with at least a C symbol.

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.73.3 Alternate admission

Alternate admission does not apply to this programme.

B.74 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.75 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum is 3 years with a maximum permitted registration time of 5 years.
### B.76 CURRICULUM

#### B.76.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
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<td></td>
</tr>
<tr>
<td>Group 1 (select all modules)</td>
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<td></td>
</tr>
<tr>
<td>Physics 111</td>
<td>PHY111</td>
<td>15</td>
</tr>
<tr>
<td>Physics 121</td>
<td>PHY121</td>
<td>15</td>
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<tr>
<td><strong>Core Modules (select group 1 or group 2)</strong></td>
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<tr>
<td><strong>Group 1</strong></td>
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<tr>
<td>Mathematics 105</td>
<td>MAT105</td>
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<td><strong>Group 2 (select all modules)</strong></td>
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<tr>
<td>Mathematics 104</td>
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<td><strong>Sub-total</strong></td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

**Electives chosen from: (select 2 groups)**

| Group 3 (select 1 EED module and 1 COS module) | | |
| Computing Fundamentals | COS114 | 15 |
| Computing Fundamentals | COS124 | 15 |
| English for Educational Development 117 | EED117 | 15 |
| English for Educational Development 127 | EED127 | 15 |
| **Group 4 (select all module)** | | |
| Earth Science 111 | ESC111 | 15 |
| Earth Science 121 | ESC121 | 15 |
| **Group 5 (select all modules)** | | |
| Chemistry 114 (N) | CHE114 | 15 |
| Chemistry 124 (N) | CHE124 | 15 |
| **Group 6 (select all modules)** | | |
| Mathematics 112 | APM112 | 15 |
| Applied Mathematics 123 | APM123 | 15 |
| **Group 7** | | |
| Computer Science 101 | COS101 | 30 |
| **Sub-total** | | 60 |
| **Total** | | 120 |

#### B.76.2 Level 2

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<tr>
<td>Physics 212</td>
<td>PHY212</td>
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<tr>
<td>Physics 222</td>
<td>PHY222</td>
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</tr>
<tr>
<td>Mathematics 211</td>
<td>MAT211</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics 221</td>
<td>MAT221</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

**Electives (select any 2 modules)**

| Physics 217 | PHY217 | 20 |
| Physics 227 | PHY227 | 20 |
| Mathematics 212 | MAT212 | 20 |
| Mathematics 232 | MAT232 | 20 |
| Chemistry 211 | CHM211 | 20 |
| Chemistry 212 | CHM212 | 20 |
| Computer Science 211 | CSC211 | 20 |
| Computer Science 212 | CSC212 | 20 |
| **Sub-total** | | 40 |
| **Total** | | 120 |
### B.76.3 Level 3

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
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<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<td><strong>Total</strong></td>
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<tr>
<td><strong>FINAL TOTAL</strong></td>
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<td>360</td>
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### B.77 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

#### B.77.1 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

#### B.77.2 Weight of practical component

**B.77.2.1** The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

**B.77.2.2** For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

#### B.77.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

#### B.77.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

#### B.77.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.
B.78 PROMOTION RULES

B.78.1 Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.78.1.1 Level 1

A student shall be admitted to the second year of study when 90 credits have been obtained of the 120 credits required in the first year of study and when all prerequisites for admission to the second year level modules have been met.

B.78.1.2 Level 1 with MAT103

Notwithstanding, students who are registered for MAT103 require 75 of the 105 available credits and when all pre-requisites for admission to second year level modules must be met. Students should note that decanting may extend the degree by one year.

B.78.2 Level 2

Promotion to the third year of study will be allowed when at least a total of 200 credits have been obtained after the second year of study and when all 120 credits of the first year of the curriculum have been obtained.

B.79 ADVANCE REGISTRATION

B.79.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.79.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 40 credits, on obtaining at least 75 credits at year level 1.

B.79.3 Level 2

B.79.3.1 The maximum number of credits a year level 2 student may anticipate is 60 credits, on obtaining at least 80 credits at year level 2.

B.79.3.2 Please Note: Students are advised to complete all first year modules before proceeding to 3rd year level.

B.80 RENEWAL OF REGISTRATION

B.80.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.80.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.
B.80.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.81 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.81.1 Modules from other faculties

B.81.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.81.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.81.1.3 Computer Literacy in Science (CLS) and English for Educational Development (EED): These are compulsory, credit bearing modules, comprising one semester module for Computer Literacy and one semester module for EED.

B.81.2 Exemption from CLS and/or EED

Students, who have developed these skills already, may apply to the Faculty for exemption from this requirement subject to the general rules of the university. The process to determine their level of competency in these modules may involve one or more assessment events. When exempted, such students must replace these modules with other modules of their choice to the same credit value.

B.81.3 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.81.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.81.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.81.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.81.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.81.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.81.4 Endorsed Degree

B.81.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.81.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF PHARMACY (3305)

B.82 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: **Bachelor of Pharmacy - BPharm**

B.82.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 38 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 4 (50-59%) in Mathematics and
- level 4 (50-59%) in Physical Science and
- level 4 (50-59%) in Life Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.82.2 Admission requirements for applicants who matriculated before 2008

(a) A Matriculation Exemption with the following subject requirements:

- HG (50%, D symbol) Mathematics or
- SG (60%, C symbol) Mathematics and
- HG (50%, D symbol) Biology or
- SG (60%, C symbol) Biology and
- HG (50%, D symbol) Physical Science or
- SG (60%, C symbol) Physical Science

OR

(b) A qualification or level of competence that the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.83 SELECTION

Where the number of qualified candidates exceeds the number of available places in a study programme, the University reserves the right not to select all applicants who meet the minimum admission criteria.

B.84 DURATION

The curriculum shall extend over a minimum of four year’s full-time study.
B.85 CURRICULUM

Please Note: Students registered for the BPharm programme prior to 2013 should refer to the 2012 faculty calendar for the curriculum pertaining to them.

### B.85.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<td>Human Biology 113</td>
<td>HUB113</td>
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<td>Human Biology 123</td>
<td>HUB123</td>
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<td>Chemistry 114 (N)</td>
<td>CHE114</td>
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<td>Chemistry 124 (N)</td>
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<td>Physics 112</td>
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<td><strong>Group 2 (select 1 module)</strong></td>
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<td>Introduction to Xhosa (SC)</td>
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### B.85.2 Level 2

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### B.85.3 Level 3

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### B.85.4 Level 4

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<td><strong>Group 1 (select all modules)</strong></td>
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<td>Pharmacology and Clinical Pharmacy 423</td>
<td>PHC423</td>
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<td>Pharmacy Practice 414</td>
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<td><strong>Sub-total</strong></td>
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68
Electives (select 1 module)
Pharmaceutics 401 PCE401 15
Pharmaceutical Chemistry 402 PCH402 15
Pharmacology and Clinical Pharmacy 403 PHC403 15
Pharmacy Practice 404 PPR404 15
Pharmacy Practice 434 PPR434 15
Rational Medicine Use 425 PHC425 15
Community Engagement 427 PHA427 15
Global Pharmacy 424* PHC424 15

Sub-total 15
Total 120
FINAL TOTAL 500

*Please Note: This module may only be selected by USA exchange or affiliated students

B.86 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.86.1 Subminima

Modules in which a practical component is taken, a sub-minimum of 40% is required in the practical part.

B.86.2 Weight of practical examinations

The percentage of the total marks allocated to the practical examinations shall not exceed 40%.

B.87 PROMOTION RULES

B.87.1 Unless Senate decides otherwise and subject to Rule A3.2.3:

B.87.2 No student shall be admitted to the next year of study unless all the modules at the previous year of study have been successfully completed after no more than two attempts.

B.87.3 No student shall be promoted to the third year level unless he/she has passed in all the modules at the second year level.

B.87.4 No student shall be promoted to the fourth year level unless he/she has passed in all the modules at the third year level.

B.88 ADVANCE REGISTRATION

B.88.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration. Students registering modules in anticipation may not register for more than 90 credits in total for that year.

B.88.2 The maximum number of credits a BPharm I student may anticipate is 45 credits, on obtaining at least 60 credits at the BPharm I level.
B.88.3 The maximum number of credits a BPharm II student may anticipate is 60 credits, on obtaining at least 210 credits at the BPharm II level.

B.88.4 The maximum number of credits a BPharm III student may anticipate is 60 credits, on obtaining at least 310 credits and the completion of the BPharm II curriculum.

B.89 RENEWAL OF REGISTRATION

Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.90 SPECIAL REQUIREMENTS FOR THE PROGRAMME

The curriculum shall extend over four years, followed by one year of internship under the auspices of the SA Pharmacy Council. The internship may be done in a community, hospital, industrial practice or at an approved university.

Please Note: Foreign students completing the BPharm degree at a South African University does not automatically qualify for Internship or for registration as Pharmacist in South Africa.

All pharmacy students have to register with the SA Pharmacy Council from their first year at fees determined by SAPC.

All students will be required to provide proof of the necessary immunisation and personal indemnity insurance as required by SAPC to perform the acts pertaining to a pharmacy student at experiential sites.
RULES FOR EXTENDED PROGRAMMES

BACHELOR OF SCIENCE IN APPLIED GEOLOGY (3011)

B.91 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Applied Geology)

B.91.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.91.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please Note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.91.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
B.92 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.93 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

B.94 CURRICULUM

B.94.1 Level 1
Module Name
Compulsory (select all modules)
Mathematics 151 (SF) MAM151 15
Physics 151 (SF) PHY151 15
Introduction to Science ISC153 30
Total 60

B.94.2 Level 2
Module Name
Compulsory (select all modules)
Chemistry 116 CHE116 15
Chemistry 126 CHM126 15
Physics 152 (SF) PHY152 15
Earth Science 111 ESC111 15
Earth Science 121 ESC121 15
Total 75

B.94.3 Level 3
Module Name
Compulsory (select all modules)
Geology 231 APG231 20
Geology 232 APG232 20
Geology 233 APG233 20
Chemistry 211 CHM211 20
Chemistry 212 CHM212 20
Sub-total 100

Electives (select modules to value of 20 credits)
Environmental & Water Science 211 EWP211 20
Environmental & Water Science 221 EWP221 20
Sub-total 20
Total 120

B.94.4 Level 4
Module Name
Compulsory (select all modules)
Geology 311 APG311 30
Geology 312 APG312 30
Geology 321 APG321 30
Geology 322 APG322 30
Total 120

FINAL TOTAL 375
B.95 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.95.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.95.2 Weight of practical component

The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%. For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.95.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.95.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.95.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.96 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.96.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.96.2 Level 2

No student shall be promoted to study level 3 unless 105 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.96.3 Level 3

No student shall be promoted to study level 4 unless 215 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.97 ADVANCE REGISTRATION

B.97.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of
promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.97.1.1 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.97.1.2 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.97.1.3 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.97.1.4 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.98 RENEWAL OF REGISTRATION

B.98.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.98.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.98.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.99 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.99.1 Modules from other faculties

B.99.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.99.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.99.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:
B.99.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.99.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.99.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 or MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.99.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.99.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.99.3 Endorsed Degree

B.99.3.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.99.3.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN BIODIVERSITY AND CONSERVATION BIOLOGY (3015)

B.100 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Biodiversity and Conservation Biology)

B.100.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science or
- level 3 (40-49%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) and (b) above.

B.100.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please Note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.100.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
B.101 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.102 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

B.103 CURRICULUM

B.103.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Sciences 151(SF)</td>
<td>LFS151</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Mathematics</td>
<td>MAM150</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Science</td>
<td>ISC153</td>
<td>30</td>
</tr>
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<td><strong>Sub-total</strong></td>
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</table>

B.103.2 Level 2

<table>
<thead>
<tr>
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<th>Alpha Code</th>
<th>Cred</th>
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</thead>
<tbody>
<tr>
<td>Life Sciences 152(SF)</td>
<td>LFS152</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 151 (SF)</td>
<td>STA151</td>
<td>15</td>
</tr>
<tr>
<td>Earth Science 111</td>
<td>ESC111</td>
<td>15</td>
</tr>
<tr>
<td>Earth Science 121</td>
<td>ESC121</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 116 OR</td>
<td>CHE116</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 126</td>
<td>CHM126</td>
<td>15</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>75</strong></td>
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B.103.3 Level 3

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity &amp; Conservation 211 (Animal Diversity)</td>
<td>BDC211</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 223 (Ecophysiology)</td>
<td>BDC223</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 221 (Diversity of Photosynthetic Organisms)</td>
<td>BDC221</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 222 (Population Biology and Evolution)</td>
<td>BDC222</td>
<td>20</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>80</strong></td>
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</table>

**Elective Modules (select 1 group)**

**Group 1**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental &amp; Water Science 211</td>
<td>EWP211</td>
<td>20</td>
</tr>
<tr>
<td>Environmental &amp; Water Science 221</td>
<td>EWP221</td>
<td>20</td>
</tr>
</tbody>
</table>

**Group 2 (select 2 modules)**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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</thead>
<tbody>
<tr>
<td>Biotechnology 216</td>
<td>BTN216</td>
<td>20</td>
</tr>
<tr>
<td>Biotechnology 211</td>
<td>BTN211</td>
<td>20</td>
</tr>
<tr>
<td>Biotechnology 215</td>
<td>BTN215</td>
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<td>Biotechnology 218</td>
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<td>20</td>
</tr>
<tr>
<td>Biotechnology 223</td>
<td>BTN223</td>
<td>20</td>
</tr>
</tbody>
</table>

**Group 3 (select all modules)**

**These 2nd year level ESS modules will not be offered from 2020**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental and Sustainability Studies 211</td>
<td>ESS211</td>
<td>10</td>
</tr>
<tr>
<td>Environmental and Sustainability Studies 212</td>
<td>ESS212</td>
<td>10</td>
</tr>
</tbody>
</table>
Environmental and Sustainability Studies 221  ESS221  10  
Environmental and Sustainability Studies 222  ESS222  10  
Sub-total  40  
Total  120  

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select 4 modules, 3 of which must be BDC modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation Biology 332 (Land-use and Conservation)</td>
<td>BDC332</td>
<td>30</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation Biology 333 (Animal Behaviour and Systematics)</td>
<td>BDC333</td>
<td>30</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 334 (Biogeography and Global Ecology)</td>
<td>BDC334</td>
<td>30</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 335 (Ecology of Communities and Ecosystems)</td>
<td>BDC335</td>
<td>30</td>
</tr>
<tr>
<td>Environmental &amp; Water Science 321</td>
<td>EWP321</td>
<td>30</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>FINAL TOTAL</td>
<td></td>
<td>375</td>
</tr>
</tbody>
</table>

B.104 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.104.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.104.2 Weight of practical component

The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%. For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.104.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University's Assessment Policy.

B.104.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.104.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.105 PROMOTION RULES

Unless Senate decides otherwise and with due regard to rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.105.1 Level 1

Unless Senate decides otherwise and subject to Rule A3.2.3:
No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

**B.105.2 Level 2**

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

**B.105.3 Level 3**

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

**B.106 ADVANCE REGISTRATION**

**B.106.1** Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

**B.106.3 Level 1**

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

**B.106.4 Level 2**

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

**B.106.5 Level 3**

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

**B.106.6 Please Note:** Students are advised to complete all first year modules (level 1 and 2) before proceeding to 3rd year modules (level 4)

**B.107 RENEWAL OF REGISTRATION**

The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

**B.107.1** Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

**B.107.2 Please Note:** This rule may only be invoked once in the entire duration of the degree programme.
B.108 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.108.1 Modules from other faculties

B.108.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.108.2.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.108.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.108.3.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.108.3.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) or (PHY151 and PHY152).

B.108.3.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 (MAT103 and MAT104) or MAM151 and MAM152).

B.108.3.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.108.3.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.108.4 Endorsed Degree

B.108.4.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.108.4.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN BIOTECHNOLOGY (3007)

B.109 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Biotechnology)

B.109.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science or
- level 3 (40-49%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.109.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.109.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
### B.110 SELECTION
As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

### B.111 DURATION
Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

### B.112 CURRICULUM

#### B.112.1 Level 1

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Sciences 151(SF)</td>
<td>LFS151</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Mathematics 150</td>
<td>MAM150</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Science</td>
<td>ISC153</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>60</td>
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#### B.112.2 Level 2

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Sciences 152(SF)</td>
<td>LFS152</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 151(SF)</td>
<td>STA151</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 116(N)</td>
<td>CHE116</td>
<td>15</td>
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<tr>
<td>Chemistry 126(N)</td>
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#### B.112.3 Level 3

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biotechnology 211</td>
<td>BTN211</td>
<td>20</td>
</tr>
<tr>
<td>Biotechnology 215</td>
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<td>Biotechnology 223</td>
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<tr>
<td>Biotechnology 222</td>
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<td><strong>Sub-total</strong></td>
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<tr>
<td>Electives (select 2 modules)</td>
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<tr>
<td>Biotechnology 218</td>
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<tr>
<td>Chemistry 212</td>
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<td><strong>Sub-total</strong></td>
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<td><strong>Total</strong></td>
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#### B.112.4 Level 4

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<tr>
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<tr>
<td>Biotechnology 322</td>
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<tr>
<td>Biotechnology 315</td>
<td>BTN315</td>
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<td>Biotechnology 316</td>
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<td>Biotechnology 312</td>
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<tr>
<td><strong>Total</strong></td>
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<tr>
<td><strong>FINAL TOTAL</strong></td>
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<td>360</td>
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B.113 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.113.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.113.2 Weight of practical component

B.113.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.113.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.113.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University's Assessment Policy.

B.113.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.113.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.114 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.114.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.114.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.114.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.
B.115 ADVANCE REGISTRATION

B.115.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.115.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.115.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 30 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.115.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.115.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.116 RENEWAL OF REGISTRATION

B.116.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.116.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.116.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.117 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.117.1 Modules from other faculties

B.117.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.117.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.117.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:
B.117.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.117.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.117.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.117.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.117.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.117.3 Endorsed Degree

B.117.3.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.117.3.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN CHEMICAL SCIENCES (3019)

B.118 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Chemical Sciences)

B.118.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.118.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.118.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
B.119 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.120 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

B.121 CURRICULUM

B.121.1 Level 1

Module Name | Alpha Code | Cred
---|---|---
**Compulsory (select all modules)**
Physics 151 (SF) | PHY151 | 15
Mathematics 151 (SF) | MAM151 | 15
Introduction to Science | ISC153 | 30
**Sub-total** | **60**

B.121.2 Level 2

Module Name | Alpha Code | Cred
---|---|---
**Compulsory (select all modules)**
Physics 152 (SF) | PHY152 | 15
Mathematics 152 (SF) | MAM152 | 15
Chemistry 114 (N) | CHE114 | 15
Chemistry 124 (N) | CHE124 | 15
**Sub-total** | **60**

Please Note: Students who have passed CHE116 & CHM126 may also be allowed to proceed with the Chemical Sciences program provided that the candidate has obtained at least 60% in each of these modules and is recommended by the HOD.

B.121.3 Level 3

Module Name | Alpha Code | Cred
---|---|---
**Compulsory (select all modules)**
Chemistry 211 | CHM211 | 20
Chemistry 212 | CHM212 | 20
**Sub-total** | **40**

**Electives (select 2 groups)**

**Group 1 (select 1 sub-group)**

**Group 1.1 (select all modules)**
Physics 212 | PHY212 | 20
Physics 222 | PHY222 | 20

**Group 1.2 (select all modules)**
Physics 217 | PHY217 | 20
Physics 227 | PHY227 | 20

**Group 2 (select 1 sub-group)**

**Group 2.1 (select all modules)**
Mathematics 211 | MAT211 | 20
Mathematics 221 | MAT221 | 20

**Group 2.2 (select all modules)**
Mathematics 211 | MAT211 | 20
Mathematics 212 | MAT212 | 20
**Sub-total** | **80**
**Total** | **120**
### B.121.4 Level 4

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<tr>
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<td><strong>FINAL TOTAL</strong></td>
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</table>

### B.122 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

#### B.122.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

#### B.122.2 Weight of practical component

**B.122.2.1** The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

**B.122.2.2** For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

#### B.122.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

#### B.122.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

#### B.122.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

### B.123 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

#### B.123.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.
B.123.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.123.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.124 ADVANCE REGISTRATION

B.124.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.124.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.124.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.124.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.124.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.125 RENEWAL OF REGISTRATION

B.125.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.125.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.125.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.126 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.126.1 Modules from other faculties

B.126.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except
in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.126.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.126.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.126.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.126.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.126.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.126.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.126.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.126.3 Endorsed Degree

B.126.3.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.126.3.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in one major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN COMPUTER SCIENCE (3023)

B.127 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Computer Science)

B.127.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science or
- level 3 (40-49%) in Life Sciences or
- level 4 (50-59%) in Information Technology

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.127.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please Note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.127.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
B.128 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.129 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

B.130 CURRICULUM

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<td><strong>Electives (select 2 groups)</strong></td>
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<td>Mathematics 211 (compulsory for an Honours in Statistics)</td>
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<td>Mathematics 212</td>
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<td>Mathematics 221</td>
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<tr>
<td><strong>Group 3 (select all modules)</strong></td>
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<tr>
<td>Statistics 211</td>
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<td>Statistics 221</td>
<td>STA221</td>
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</table>
Group 4 (select all modules)
Physics 212
Physics 222

Group 5 (select all modules)
Physics 217
Physics 227

Sub-total 80
Total 120

B.130.4 Level 4
Module Name | Alpha Code | Cred
--- | --- | ---
**Compulsory (select all modules)**
Computer Science 311 | CSC311 | 30
Computer Science 312 | CSC312 | 30
Sub-total | 60

**Electives (select 1 group)**

**Group 1 (select 2 modules)**
Mathematics 311 | MAT311 | 30
Mathematics 321 | MAT321 | 30
Mathematics 322 | MAT322 | 30
Mathematics 312 | MAT312 | 30
Sub-total | 60

**Group 2 (select 1 sub-group)**

**Group 2.1 (select all modules)**
Statistics 332 (compulsory for an Honours in Statistics) | STA332 | 30
Statistics 331 (compulsory for an Honours in Statistics) | STA331 | 30

**Group 2.2 (select all modules)**
Statistics 333 | STA333 | 30
Statistics 332 | STA332 | 30

**Group 3 (select all modules)**
Information Systems 361 | IFS361 | 30
Information Systems 362 | IFS362 | 30

**Group 4 (select all modules)**
Physics 312 | PHY312 | 30
Physics 322 | PHY322 | 30

**Group 5 (select all modules)**
Physics 317 | PHY317 | 30
Physics 327 | PHY327 | 30
Sub-total | 60
Total | 120
FINAL TOTAL | 360

B.131 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.131.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.131.2 Weight of practical component

B.131.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.
B.131.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.131.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.131.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.131.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.132 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.132.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.132.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.132.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.133 ADVANCE REGISTRATION

B.133.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.133.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.133.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.
B.133.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.133.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.134 RENEWAL OF REGISTRATION

B.134.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.134.2 Unless Senate decides otherwise, students who are academically refused in terms of Rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.134.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.135 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.135.1 Modules from other faculties

B.135.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.135.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.135.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.135.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.135.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.135.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.135.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.135.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.
B.135.3 **Endorsed Degree**

B.135.3.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.135.3.2 Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN ENVIRONMENTAL AND WATER SCIENCE
(3027)

B.136 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Environmental and Water Science)

B.136.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science or
- level 3 (40-49%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.136.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please Note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.136.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
### B.137 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

### B.138 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

### B.139 CURRICULUM

**B.139.1 Level 1**

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<td>Introduction to Mathematics 150</td>
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**B.139.2 Level 2**

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<tr>
<td>Life Sciences 152 (SF)</td>
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<td>Statistics 151 (SF)</td>
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<td><strong>Group 1 (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth Science 111</td>
<td>ESC111</td>
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<td>Earth Science 121</td>
<td>ESC121</td>
<td>15</td>
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<tr>
<td><strong>Group 2 (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Chemistry 116</td>
<td>CHE116</td>
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<tr>
<td>Chemistry 126</td>
<td>CHE126</td>
<td>15</td>
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<tr>
<td><strong>Group 3 (select 1 module)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Chemistry 116</td>
<td>CHE116</td>
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<td>Chemistry 126</td>
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<td><strong>Sub-total</strong></td>
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</table>

**B.139.3 Level 3**

**Compulsory Modules**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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<tbody>
<tr>
<td>Environmental &amp; Water Science 211</td>
<td>EWP211</td>
<td>20</td>
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<td>Environmental &amp; Water Science 221</td>
<td>EWP221</td>
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</tr>
<tr>
<td>Environmental &amp; Water Science 222</td>
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</table>

**Electives (select any 2 modules from group 1 or 2 PLUS one other module)**

**Group 1 (select 2 modules)**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity &amp; Conservation 211</td>
<td>BDC211</td>
<td>20</td>
</tr>
<tr>
<td>Biodiversity &amp; Conservation 221</td>
<td>BDC221</td>
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</tr>
<tr>
<td>Biodiversity &amp; Conservation 222</td>
<td>BDC222</td>
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<tr>
<td>Biodiversity &amp; Conservation 223</td>
<td>BDC223</td>
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**Group 2 (select 2 modules)**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
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<tr>
<td>Geology 231</td>
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<td>Geology 232</td>
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<td>20</td>
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<td><strong>Sub-total</strong></td>
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<td>60</td>
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</tbody>
</table>

**Total**

120
B.139.4 Level 4
Module Name
Compulsory (select all modules)  |  Alpha Code  |  Cred
Environmental & Water Science 311 |  EWP311   |  30
Environmental & Water Science 312 |  EWP312   |  30
Environmental & Water Science 321 |  EWP321   |  30
Environmental & Water Science 322 |  EWP322   |  30
Total                          |          |  120
FINAL TOTAL                  |          |  375

B.140 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.140.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.140.2 Weight of practical component

B.140.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.140.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.140.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.140.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.140.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.141 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.141.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.
B.141.2  Level 2

No student shall be promoted to study level 3 unless 105 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.141.3  Level 3

No student shall be promoted to study level 4 unless 215 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.142  ADVANCE REGISTRATION

B.142.1  Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.142.2  Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.142.3  Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.142.4  Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.142.5  Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.143  RENEWAL OF REGISTRATION

B.143.1  The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.143.2  Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.143.3  Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.144  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.144.1  Modules from other Faculties

B.144.1.1  A maximum of 30 credits in modules from other faculties will be permitted, except
in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

**B.144.1.2** At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

**B.144.2 Restriction on choice of modules**

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

- **B.144.2.1 Chemistry:** (CHE114 and CHE124) OR (CHE116 and CHM126).

- **B.144.2.2 Physics:** (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

- **B.144.2.3 Mathematics:** In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) or (MAM151 and MAM152).

- **B.144.2.4 Statistics:** In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

- **B.144.2.5** Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

**B.144.3 Endorsed Degree**

- **B.144.3.1** In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

- **B.144.3.2** Those who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN MATHEMATICAL AND STATISTICAL SCIENCES (3031)

B.145 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Mathematical & Statistical Sciences)

B.145.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor's Degree study plus a score of no less than 27 points calculated according to the University's approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science or
- level 3 (40-49%) in Life Sciences or
- level 4 (50-59%) in Information Technology

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.145.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.145.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL
portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.

**B.146 SELECTION**

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

**B.147 DURATION**

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

**B.148 CURRICULUM**

**Mathematics Stream**

**B.148.1 Level 1**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
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</tr>
<tr>
<td>Mathematics 151 (SF)</td>
<td>MAM151</td>
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</tr>
<tr>
<td>Physics 151 (SF)</td>
<td>PHY151</td>
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<tr>
<td>Introduction to Science</td>
<td>ISC153</td>
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**B.148.2 Level 2**

<table>
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<tr>
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<th>Cred</th>
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</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics 152 (SF)</td>
<td>MAM152</td>
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</tr>
<tr>
<td>Statistics 111</td>
<td>STA111</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 121</td>
<td>STA121</td>
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<tr>
<td>Electives (select at least one module)</td>
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<tr>
<td>Mathematics 112</td>
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<td>Mathematics 123</td>
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**B.148.3 Level 3**

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<tr>
<td>Mathematics 211</td>
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<td>Mathematics 221</td>
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<td>Electives (select 4 modules)</td>
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</tr>
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<td>Mathematics 232</td>
<td>MAT232</td>
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<td>Statistics 221</td>
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<td>Physics 212</td>
<td>PHY212</td>
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<td>Physics 222</td>
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<td>Physics 217</td>
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### B.148.4 Level 4

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<td><strong>Group 2 (select 1 module)</strong></td>
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<tr>
<td>Mathematics 321</td>
<td>MAT321</td>
<td>30</td>
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<tr>
<td>Mathematics 322</td>
<td>MAT322</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics 312</td>
<td>MAT312</td>
<td>30</td>
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<tr>
<td><strong>Electives (select 2 modules)</strong></td>
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<tr>
<td>Mathematics 321 (only if not selected in the compulsory list)</td>
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<td>Mathematics 322 (only if not selected in the compulsory list)</td>
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<tr>
<td>Mathematics 312 (only if not selected in the compulsory list)</td>
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<tr>
<td>Statistics 331 (cannot be taken with STA333)</td>
<td>STA331</td>
<td>30</td>
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<tr>
<td>Statistics 332</td>
<td>STA332</td>
<td>30</td>
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<tr>
<td>Statistics 333 (cannot be taken with STA331)</td>
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<td><strong>Sub-total</strong></td>
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**Total** 120

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### Statistics Stream

### B.148.5 Level 1

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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics 151(SF)</td>
<td>MAM151</td>
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<tr>
<td>Physics 151(SF)</td>
<td>PHY151</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Science</td>
<td>ISC153</td>
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### B.148.6 Level 2

<table>
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<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Mathematics 152 (SF)</td>
<td>MAM152</td>
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</tr>
<tr>
<td>Statistics 111</td>
<td>STA111</td>
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</tr>
<tr>
<td>Statistics 121</td>
<td>STA121</td>
<td>15</td>
</tr>
<tr>
<td><strong>Electives (select 1 module)</strong></td>
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<td>Mathematics 112</td>
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<td>Mathematics 123</td>
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<td>Physics 152 (SF)</td>
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### B.148.7 Level 3

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<td><strong>Compulsory (select all)</strong></td>
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</tr>
<tr>
<td>Statistics 211</td>
<td>STA211</td>
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</tr>
<tr>
<td>Statistics 221</td>
<td>STA221</td>
<td>20</td>
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<tr>
<td><strong>Electives (select 4 modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Mathematics 211 (compulsory for an Honours in Statistics)</td>
<td>MAT211</td>
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<td>Mathematics 221 (compulsory for an Honours in Statistics)</td>
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<td>MAT212</td>
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<td>Physics 227</td>
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<td><strong>Total</strong></td>
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<td>120</td>
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</table>
Level 4
Module Name | Alpha Code | Cred
--- | --- | ---
Compulsory (select 1 group)

**Group 1**
Statistics 331 (compulsory for an Honours in Statistics) | STA331 | 30
Statistics 332 (compulsory for an Honours in Statistics) | STA332 | 30

**Group 2**
Statistics 333 | STA333 | 30
Statistics 332 | STA332 | 30

**Electives (select 2 modules)**
Mathematics 311 | MAT311 | 30
Mathematics 312 | MAT312 | 30
Mathematics 321 | MAT321 | 30
Mathematics 322 | MAT322 | 30

Sub-total | 60

Total | 120
FINAL TOTAL | 360

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**B.149 ASSESSMENT**

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

**B.149.1 Subminima**

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

**B.149.2 Weight of practical component**

**B.149.2.1** The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

**B.149.2.2** For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

**B.149.3 Final mark**

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

**B.149.4 Re-evaluation of practical modules**

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

**B.150 PROMOTION RULES**

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:
B.150.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.150.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.150.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.151 ADVANCE REGISTRATION

B.151.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.151.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.151.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.151.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.151.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.152 RENEWAL OF REGISTRATION

B.152.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.152.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.152.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.
B.153 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.153.1 Modules from other Faculties

B.153.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.153.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.153.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.153.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.153.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.153.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.153.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.153.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.154. Endorsed Degree

B.154.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.154.2 Those who do who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN MEDICAL BIOSCIENCE (3035)

B.154 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Medical Bioscience)

B.154.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Life Sciences

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.154.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.154.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
B.155 SELECTION

As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

B.156 DURATION

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

B.157 CURRICULUM

B.157.1 Level 1

Module Name | Alpha Code | Cred
---|---|---
Life Sciences 151 (SF) | LFS151 | 15
Introduction to Mathematics 150 | MAM150 | 15
Introduction to Science | ISC153 | 30
**Total** | **60**

B.157.2 Level 2

Module Name | Alpha Code | Cred
---|---|---
Statistics 151 (SF) | STA151 | 15
Medical Biosciences 111 | MBS111 | 15
Medical Biosciences 121 | MBS121 | 15
Chemistry 116 (N) | CHE116 | 15
Chemistry 126 (N) | CHM126 | 15
**Sub-total** | **75**

B.157.3 Level 3

Year Level 3

Module Name

**Compulsory Modules (select all modules)**

Medical Biosciences 231 | MBS231 | 20
Medical Biosciences 232 | MBS232 | 20
Medical Microbiology 251 | MIC251 | 20
Medical Microbiology 252 | MIC252 | 20
**Sub-total** | **80**

**Electives (select 2 modules)**

Biotechnology 211 | BTN211 | 20
Biotechnology 223 | BTN223 | 20
Biotechnology 213 | BTN213 | 20
**Sub-total** | **40**
**Total** | **120**

B.157.4 Level 4

Module Name

**Compulsory (select all modules)**

Medical Biosciences 331 | MBS331 | 30
Medical Biosciences 332 | MBS332 | 30
Medical Microbiology 353 | MIC353 | 30
Medical Microbiology 354 | MIC354 | 30
**Total** | **120**
**FINAL TOTAL** | **375**
B.158 ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

B.158.1 Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

B.158.2 Weight of practical component

B.158.2.1 The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

B.158.2.2 For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

B.158.3 Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University’s Assessment Policy.

B.158.4 Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.

B.158.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.159 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.159.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.159.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.159.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.
B.160 ADVANCE REGISTRATION

B.160.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.160.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.160.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.160.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.160.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).

B.161 RENEWAL OF REGISTRATION

B.161.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.161.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.161.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.162 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.162.1 Modules from other faculties

B.162.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.162.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.
B.162.2  Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.162.2.1  Chemistry:  (CHE114 and CHE124) OR (CHE116 and CHM126).

B.162.2.2  Physics:  (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.162.2.3  Mathematics:  In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) OR (MAM151 and MAM152).

B.162.2.4  Statistics:  In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.162.2.5  Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.162.3  Endorsed Degree

B.162.3.1  In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.162.3.2  Those who do who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
BACHELOR OF SCIENCE IN PHYSICAL SCIENCE (3120)

B.163 ADMISSION

Unless Senate decides otherwise, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science - BSc (Physical Science)

B.163.1 Admission requirements for applicants who matriculated from 2008

(a) The National Senior Certificate for Bachelor’s Degree study plus a score of no less than 27 points calculated according to the University’s approved points system, as well as the following specific subject requirements:

- level 4 (50-59%) in English (home or first additional language) and
- level 3 (40-49%) in Another Language (home or first additional language) and
- level 3 (40-49%) in Mathematics and
- level 3 (40-49%) in Physical Science

OR

(b) A qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

B.163.2 Admission requirements for applicants who matriculated before 2008

(a) Senate, upon recommendation of the faculty, may admit students with a full Matriculation exemption with Mathematics and either Science or Biology at Higher Grade with an E-symbol or Standard Grade with a D-symbol.

OR

(b) a qualification or level of competence which the Senate of the University has deemed to be equivalent to the requirements stipulated in (a) above.

Please note: In order to determine the level of competency, the Faculty may subject students applying for equivalent status, to one or more assessment events.

B.163.3 Alternate admission

Alternate admission requirements for applicants according to Recognition of Prior Learning (RPL)

Students who completed the NSC in 2008 or thereafter, but have not obtained endorsements, will be considered for alternative admission after the age of 23. Such candidates will be required to complete a RPL portfolio development course and submit to a process where relevant learning and/or experience will be assessed.

Candidates who are 23 or older and do not have a matriculation certificate or NSC, but who might have obtained other qualifications or experience that may be deemed to be equivalent to admission criteria for particular study programmes, will also be required to complete a RPL portfolio development course or an RPL portfolio process as agreed and to submit to a process where such learning, qualification and/or experience will be assessed.
As only a limited number of students can be admitted to the programmes, applicants will be subject to a selection procedure.

Unless Senate decides otherwise, the minimum prescribed time to complete the degree is 4 years full-time study but shall not exceed 6 years of full-time study.

**B.166 CURRICULUM**

**B.166.1 Level 1**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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</thead>
<tbody>
<tr>
<td>Mathematics 151 (SF)</td>
<td>MAM151</td>
<td>15</td>
</tr>
<tr>
<td>Physics 151(SF)</td>
<td>PHY151</td>
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</tr>
<tr>
<td>Introduction to Science</td>
<td>ISC153</td>
<td>30</td>
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<td><strong>Sub-total</strong></td>
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**B.166.2 Level 2**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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<tbody>
<tr>
<td>Mathematics 152 (SF)</td>
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</tr>
<tr>
<td>Physics 152 (SF)</td>
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<td><strong>Sub-total</strong></td>
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**Electives (select 1 group)**

**Group 1 (select all modules)**

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<thead>
<tr>
<th>Module Name</th>
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<th>Cred</th>
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<tbody>
<tr>
<td>Chemistry 114 (N)</td>
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<td>Chemistry 124 (N)</td>
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**Group 2 (select all modules)**

<table>
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<tr>
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<th>Cred</th>
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<tbody>
<tr>
<td>Mathematics 112</td>
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</tr>
<tr>
<td>Mathematics 122</td>
<td>APM122</td>
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**Group 3**

<table>
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<th>Module Name</th>
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<th>Cred</th>
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<tr>
<td>Computer Science 101</td>
<td>COS101</td>
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</tr>
<tr>
<td><strong>Sub-total</strong></td>
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<td><strong>30</strong></td>
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<tr>
<td><strong>Total</strong></td>
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</table>

**B.166.3 Level 3**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
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</thead>
<tbody>
<tr>
<td>Physics 212</td>
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<td>Physics 222</td>
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<td>Mathematics 211</td>
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<td>Mathematics 221</td>
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<td><strong>Sub-total</strong></td>
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**Electives (select 1 group)**

**Group 1 (select 2 modules)**

<table>
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<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
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</thead>
<tbody>
<tr>
<td>Physics 217</td>
<td>PHY217</td>
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<tr>
<td>Physics 227</td>
<td>PHY227</td>
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<tr>
<td>Mathematics 212</td>
<td>MAT212</td>
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</tr>
<tr>
<td>Mathematics 232</td>
<td>MAT232</td>
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<tr>
<td>Chemistry 211</td>
<td>CHM211</td>
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</tr>
<tr>
<td>Chemistry 212</td>
<td>CHM212</td>
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</table>
### Group 2 (select all modules)

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<tr>
<th>Module Name</th>
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<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science 211</td>
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</tr>
<tr>
<td>Computer Science 212</td>
<td>CSC212</td>
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**Sub-total**: 40

**Total**: 120

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### B.166.4  Level 4

#### Module Name

**Compulsory (select all modules)**

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<th>Module Name</th>
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<th>Cred</th>
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<tbody>
<tr>
<td>Physics 312</td>
<td>PHY312</td>
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<tr>
<td>Physics 322</td>
<td>PHY322</td>
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**Sub-total**: 60

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#### Electives (select 1 group)

**Group 1 (select 2 modules)**

<table>
<thead>
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<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 317</td>
<td>PHY317</td>
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<tr>
<td>Physics 327</td>
<td>PHY327</td>
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<tr>
<td>Mathematics 311</td>
<td>MAT311</td>
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<td>Mathematics 321</td>
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<td>Chemistry 311</td>
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<td>Chemistry 312</td>
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<td>Mathematics 312</td>
<td>MAT312</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics 322</td>
<td>MAT322</td>
<td>30</td>
</tr>
</tbody>
</table>

**Sub-total**: 60

**Total**: 120

**FINAL TOTAL**: 360

---

### B.167  ASSESSMENT

Assessment is generally governed by Rule A5 as stipulated in the General Calendar: General Information Part 1 in addition to the following:

#### B.167.1  Subminima

Except where otherwise indicated, modules in which a practical component is taken require a sub-minimum of 40% in the practical component.

#### B.167.2  Weight of practical component

**B.167.2.1** The percentage of the total marks allocated to the practical examination where it forms part of the theory evaluation shall not exceed 50%.

**B.167.2.2** For the purpose of promotion, the practical modules shall not be credited independently of the theory modules of a particular subject.

#### B.167.3  Final mark

Except where otherwise indicated, the final mark shall be obtained by means of a system of continuous evaluation, which will differ from subject to subject, combined with examinations as indicated in the University's Assessment Policy.

#### B.167.4  Re-evaluation of practical modules

No re-evaluation will be allowed for practical modules that are evaluated on a continuous basis.
B.167.5 Attendance of practicals

In the programme Medical Biosciences and Biotechnology a minimum attendance of 80% of the practicals is required to gain access to the examination in addition to the 40% subminimum needed in the coursework mark.

B.168 PROMOTION RULES

Unless Senate decides otherwise and with due regard to Rule A.3.2.3 or unless specified differently for the programme concerned, the following will apply:

B.168.1 Level 1

No student shall be promoted to study level 2 unless 45 credits have been obtained and when all pre-requisites for admission to level 2 modules have been met.

B.168.2 Level 2

No student shall be promoted to study level 3 unless 90 credits have been obtained at Level 2 and all pre-requisites for admission to level 3 modules have been met.

B.168.3 Level 3

No student shall be promoted to study level 4 unless 200 credits have been obtained and all required modules prescribed for study levels one and two have been successfully completed.

B.169 ADVANCE REGISTRATION

B.169.1 Notwithstanding the above, a student who has not obtained sufficient credits to promote, may register for subject modules at the higher level in anticipation of promotion in the following year, provided all pre-requisites for the higher level module have been met and no time-table clashes will occur as a result of this registration.

B.169.2 Level 1

The maximum number of credits a year level 1 student may anticipate is 30 credits or one full year course, on passing 2 of 3 courses at year level 1.

B.169.3 Level 2

The maximum number of credits a year level 2 student may anticipate is 40 credits, on obtaining at least 30 credits at year level 2, and completing all courses at level 1. Total credits registered may not exceed 90.

B.169.4 Level 3

The maximum number of credits a year level 3 student may anticipate is 30 credits, on obtaining at least 80 credits at year level 3, and completing all courses at level 1 and 2. Total credits registered may not exceed 90.

B.169.5 Please Note: Students are advised to complete all first year modules (level 1 and level 2) before proceeding to 3rd year courses (level 4).
B.170 RENEWAL OF REGISTRATION

B.170.1 The renewal of registration will be governed by the Rule A.3.2.3, as stipulated in the University Calendar: General Information Part 1.

B.170.2 Unless Senate decides otherwise, students who are academically refused in terms of rule A.3.2.3 may apply in writing to the Dean to be re-admitted if they can provide evidence of extenuating circumstances which have prevented them from doing justice to the course AND can show that these circumstances have changed to the extent that success upon re-registration can reasonably be expected.

B.170.3 Please Note: This rule may only be invoked once in the entire duration of the degree programme.

B.171 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.171.1 Modules from other faculties

B.171.1.1 A maximum of 30 credits in modules from other faculties will be permitted, except in the case of Computer Science students who will be allowed to take Information Systems as a subject in their programme.

B.171.1.2 At least 100 of the total number of credits obtained at second and third year level shall be in one and the same programme.

B.171.2 Restriction on choice of modules

The following limitations apply as regard to modules that can be credited towards obtaining a degree or certificate. Credit will not be granted for:

B.171.2.1 Chemistry: (CHE114 and CHE124) OR (CHE116 and CHM126).

B.171.2.2 Physics: (PHY111 and PHY121) OR (PHY116 and PHY126) OR (PHY112 and PHY113 and PHY116) OR (PHY151 and PHY152).

B.171.2.3 Mathematics: In the case of Mathematics a student will only be credited for either MAT105 OR MAM115 OR (MAT103 and MAT104) or (MAM151 and MAM152).

B.171.2.4 Statistics: In the case of Statistics a student will only be credited for either STA111 or STA125 or STA151 or BUS131 or BUS132 or STA141 or STA142.

B.171.2.5 Students who obtained credits prior to 1999 will not be allowed to obtain credits for the equivalent modules as offered from 1999.

B.171.3 Endorsed Degree

B.171.3.1 In order to obtain an “endorsed degree” one must obtain at least 240 credits in the core modules of the degree.

B.171.3.2 Those who do who do not fulfill this criterion may be awarded with a BSc degree (not endorsed) provided they have completed 130 credits in a major subject (i.e. at first, second and third year level) and have accumulated a total of 360 credits, with at least 120 credits at each year level.
POSTGRADUATE DIPLOMA IN INTEGRATED WATER RESOURCE MANAGEMENT (3880)

B.172 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Postgraduate Diploma in Integrated Water Resource Management - PGDip (Integrated Water Resource Management)

B.172.1 Candidates must be in possession of a Bachelor’s degree in any relevant discipline or a National Diploma in a relevant discipline plus at least two years appropriate experience (Rule A.2.1.4 applies).

B.173 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.174 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.175 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Group 1 (select all modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Environmental Management &amp; Water Regulations 734</td>
<td>WAT734</td>
<td>20</td>
</tr>
<tr>
<td>Water Resources Management 732</td>
<td>WAT732</td>
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</tr>
<tr>
<td>Integrated Water Resources Management in Practice 731</td>
<td>WAT731</td>
<td>20</td>
</tr>
<tr>
<td>Spatial Analysis for Integrated Water Resources Management 733</td>
<td>WAT733</td>
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<td><strong>Sub-total</strong></td>
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<td><strong>Electives (select 2 modules)</strong></td>
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<tr>
<td>Water Quality Management 735</td>
<td>WAT735</td>
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<tr>
<td>Aquatic Ecosystems Management</td>
<td>WAT736</td>
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<td>Environmental Education &amp; Water Security 737</td>
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<td><strong>TOTAL</strong></td>
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B.176 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.177 PROGRESS RULES

B.177.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.177.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 40 credits per annum to proceed with his or her studies. A student who accumulated 80 credits within two years may be allowed to proceed to the following year to complete the programme.

B.178 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.179 SPECIAL REQUIREMENTS FOR THE PROGRAMME

There are no special requirements for this programme.
BACHELOR OF SCIENCE HONOURS IN APPLIED GEOLOGY (3710)

B.180  ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Applied Geology)

B.180.1  A student should have obtained at least a 60% pass in third year level Geology with a minimum of 55% per semester (or its equivalent modules at other universities). If less than 55% was obtained in third year level geology, the candidate may be subjected to an assessment of skills obtained or to re-take one of or more appropriate modules at third year level or both.

B.181  SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.182  DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.183  CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Project</td>
<td>APG709</td>
<td>30</td>
</tr>
<tr>
<td>Advance Geology and Field School</td>
<td>APG721</td>
<td>30</td>
</tr>
<tr>
<td>Applied Geochemistry</td>
<td>APG722</td>
<td>20</td>
</tr>
<tr>
<td>Economic Geology and Exploration Techniques</td>
<td>APG723</td>
<td>20</td>
</tr>
<tr>
<td>Petroleum Geology</td>
<td>APG724</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>120</strong></td>
<td></td>
</tr>
</tbody>
</table>

B.184  ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.185  PROGRESS RULES

B.185.1  Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.185.2  Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.
B.186  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.187  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.187.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.187.2 The Honours programme shall extend over a period of ten months. A period of eight months is required to complete taught Compulsory Modules after which a period of two months is required for the Honours project.

B.187.3 Contact time entails 2 hrs for theoretical/conceptual work and 3 hrs for practical work per day.
BACHELOR OF SCIENCE HONOURS IN BIODIVERSITY AND CONSERVATION BIOLOGY (3731)

B.188 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Biodiversity and Conservation Biology)

B.188.1 Admission to the Honours Programme in BCB can be effected through one of two routes:

(a) A student must have a first degree in whole organism biology AND have attained at least 60% in EITHER zoological OR botanical subjects in the final year,

OR

(b) With the permission of Senate, a student without a degree but with demonstrable and equivalent experience in whole organism biology.

B.189 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.190 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.191 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project 700</td>
<td>BCB700</td>
<td>40</td>
</tr>
<tr>
<td>Biostatistics 744</td>
<td>BCB744</td>
<td>20</td>
</tr>
<tr>
<td>Research Method 742</td>
<td>BCB742</td>
<td>20</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Electives (select two modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity Information Management 736</td>
<td>BCB736</td>
<td>20</td>
</tr>
<tr>
<td>Plant Community Ecology Field Course 737</td>
<td>BCB737</td>
<td>20</td>
</tr>
<tr>
<td>Marine Biology 738</td>
<td>BCB738</td>
<td>20</td>
</tr>
<tr>
<td>Herpetology 739</td>
<td>BCB739</td>
<td>20</td>
</tr>
<tr>
<td>Systematics and Evolution 731</td>
<td>BCB731</td>
<td>20</td>
</tr>
<tr>
<td>Quantitative Ecology 743</td>
<td>BCB743</td>
<td>20</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

B.192 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.193 PROGRESS RULES

B.193.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.193.2 Part-time

Unless Senate decides otherwise, a part-time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 100 credits within two years may be allowed to proceed to the following year to complete the programme.

B.194 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.195 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.195.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.195.2 With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.

B.195.3 The elective modules are to be selected in conjunction with the project supervisor. All students shall complete a minimum of 100 credits from the BCB programme. The final module selection is dependent on the availability of academic staff and the absence of timetable clashes.
BACHELOR OF SCIENCE HONOURS IN BIOTECHNOLOGY (3707)

B.196 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Biotechnology)

B.196.1 Students should at least obtain a 60% pass at 3rd year level in an appropriate subject, and with the approval of the departmental Post-Graduate committee is required for admission into the programme.

B.197 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.198 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year full-time study and two years’ part-time study.

B.199 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Project 703</td>
<td>BTY703</td>
<td>40</td>
</tr>
<tr>
<td>MBP, Bioinformatics 701</td>
<td>BTY701</td>
<td>15</td>
</tr>
<tr>
<td>Literature Review 702</td>
<td>BTY702</td>
<td>15</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>70</strong></td>
</tr>
<tr>
<td><strong>Electives (select 5 modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Plant Biotechnology 704</td>
<td>BTY704</td>
<td>10</td>
</tr>
<tr>
<td>Drug Discovery 705 (not offered in 2019)</td>
<td>BTY705</td>
<td>10</td>
</tr>
<tr>
<td>Extremophiles 706 (not offered in 2019)</td>
<td>BTY706</td>
<td>10</td>
</tr>
<tr>
<td>Plant Breeding and Markers 708</td>
<td>BTY708</td>
<td>10</td>
</tr>
<tr>
<td>Genomics 709</td>
<td>BTY709</td>
<td>10</td>
</tr>
<tr>
<td>Apoptosis 710</td>
<td>BTY710</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Food Microbiology 711</td>
<td>BTY711</td>
<td>10</td>
</tr>
<tr>
<td>Forensic DNA Analysis 714</td>
<td>BTY714</td>
<td>10</td>
</tr>
<tr>
<td>Protein Structure Determination 715 (not offered in 2019)</td>
<td>BTY715</td>
<td>10</td>
</tr>
<tr>
<td>Special Topics 717</td>
<td>BTY717</td>
<td>10</td>
</tr>
<tr>
<td>Proteomics 718</td>
<td>BTY718</td>
<td>10</td>
</tr>
<tr>
<td>Biofuels 719</td>
<td>BTY719</td>
<td>10</td>
</tr>
<tr>
<td>Human genetic diversity origins 720</td>
<td>BTY720</td>
<td>10</td>
</tr>
<tr>
<td>Employee Management 651</td>
<td>MAN651</td>
<td>10</td>
</tr>
<tr>
<td>Operations Management 757</td>
<td>MAN757</td>
<td>10</td>
</tr>
<tr>
<td>Molecular Mechanisms of Cancer 721</td>
<td>BTY721</td>
<td>10</td>
</tr>
<tr>
<td>Next Generation Sequencing 722</td>
<td>BTY722</td>
<td>10</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>50</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>
B.200 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.201 PROGRESS RULES

B.201.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.201.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.202 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.203 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.203.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.203.2 With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.

B.203.3 In addition to the above modules, students will be required to present one or more seminars. The Research Project may be defended in an oral examination.
BACHELOR OF SCIENCE HONOURS IN CHEMISTRY (3734)

B.204 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Chemistry)

B.204.1 At least 60% pass at 3rd year level in Chemistry and with the approval of the Departmental Postgraduate Committee is required for admission into the programme.

B.205 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.206 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.207 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Chemistry 701</td>
<td>CHM701</td>
<td>15</td>
</tr>
<tr>
<td>Organic Chemistry 702</td>
<td>CHM702</td>
<td>15</td>
</tr>
<tr>
<td>Inorganic Chemistry 703</td>
<td>CHM703</td>
<td>15</td>
</tr>
<tr>
<td>Physical Chemistry 704</td>
<td>CHM704</td>
<td>15</td>
</tr>
<tr>
<td>Applied Chemistry 705</td>
<td>CHM705</td>
<td>15</td>
</tr>
<tr>
<td>Special Topic 706</td>
<td>CHM706</td>
<td>15</td>
</tr>
<tr>
<td>Research Project 707</td>
<td>CHM707</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>CHM707</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

B.208 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.209 PROGRESS RULES

B.209.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.209.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.
B.210  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.211  SPECIAL REQUIREMENTS FOR THE PROGRAMME

There are no special requirements for this programme.
BACHELOR OF SCIENCE HONOURS IN COMPUTATIONAL FINANCE
(3739)

B.212 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Computational Finance)

(a) A bachelor’s degree with majors in Mathematics and Statistics with at least a 60% average in STA331 and STA332 AND Mathematics 3 year level modules and the approval of the departmental Post-Graduate committee is required for admission into the programme.

(b) Candidates with extensive experience in a financial field will be considered on an individual basis.

(c) Students entering the program through the RPL route are required to complete a testing phase as determined by the departments.

B.213 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.214 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.215 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Project 748 OR</td>
<td>MAM748</td>
<td></td>
</tr>
<tr>
<td>Research Project 761</td>
<td>STA761</td>
<td>30</td>
</tr>
<tr>
<td>Financial Management 756</td>
<td>MAN756</td>
<td>15</td>
</tr>
<tr>
<td>Probability and Stochastic Processes 712</td>
<td>COF712</td>
<td>15</td>
</tr>
<tr>
<td>Stochastic Calculus for Finance 714</td>
<td>COF714</td>
<td>15</td>
</tr>
<tr>
<td>Principles of Management Accounts 753</td>
<td>MAN753</td>
<td>15</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td>90</td>
</tr>
<tr>
<td><strong>Electives (select module/s to the value of 30 credits)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Accounting 781</td>
<td>ACC781</td>
<td>15</td>
</tr>
<tr>
<td>Computational Linear Algebra 728</td>
<td>MAM728</td>
<td>15</td>
</tr>
<tr>
<td>Financial Engineering 716</td>
<td>COF716</td>
<td>15</td>
</tr>
<tr>
<td>Time Series Analysis 711</td>
<td>COF711</td>
<td>15</td>
</tr>
<tr>
<td>Research Methodology 702</td>
<td>STA702</td>
<td>15</td>
</tr>
<tr>
<td>Theoretical Statistics 705</td>
<td>STA705</td>
<td>15</td>
</tr>
<tr>
<td>Financial Risk Management 726</td>
<td>COF726</td>
<td>15</td>
</tr>
<tr>
<td>Simulation 710</td>
<td>COF710</td>
<td>15</td>
</tr>
<tr>
<td>Capita Selecta 735</td>
<td>STA735</td>
<td>15</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>
B.215.1 A student may take up to an equivalent of two Honours modules, not exceeding 30 credits, from cognate or associate disciplines, provided they have the permission from the Chairpersons of the said department(s) and the Chairperson of the Department of Mathematics and Applied Mathematics.

B.216 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.217 PROGRESS RULES

B.217.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.217.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.218 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.219 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.219.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.
BACHELOR OF SCIENCE HONOURS IN COMPUTER SCIENCE (3735)

B.220 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Computer Science)

B.220.1 A student must have a BSc degree in Computer Science or another degree with a major in Computer Science and must have obtained a 60% average for the 3rd year Computer Science modules. In addition, the prospective student is required to have completed EED (English for Educational Development) or equivalent or shall complete it as a co-requisite.

B.220.2 The approval of the departmental Post-Graduate committee is required for admission into the programme.

B.221 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.222 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.223 CURRICULUM

B.223.1 A student may take up to an equivalent of two Honours modules, not exceeding 30 credits, from cognate or associate disciplines, provided they have the permission from the Chairpersons of the said department(s) and the Chairperson of the Computer Science department.

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td>COS731</td>
<td>15</td>
</tr>
<tr>
<td>Project Analysis and Design 731</td>
<td>COS731</td>
<td>15</td>
</tr>
<tr>
<td>Project Implementation and Testing 732</td>
<td>COS732</td>
<td>15</td>
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<tr>
<td>Sub-total</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Electives (select 6 modules from group 1 or select 4 to 5 modules from group 1 and 1 to 2 modules from group 2)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (select 4 to 6 modules)</td>
<td>COS711</td>
<td>15</td>
</tr>
<tr>
<td>Machine Learning 711</td>
<td>COS711</td>
<td>15</td>
</tr>
<tr>
<td>Internet Programming 725</td>
<td>COS725</td>
<td>15</td>
</tr>
<tr>
<td>Advanced Software Engineering 726</td>
<td>COS726</td>
<td>15</td>
</tr>
<tr>
<td>Advanced Operating Systems 727</td>
<td>COS727</td>
<td>15</td>
</tr>
<tr>
<td>Compilers 729</td>
<td>COS729</td>
<td>15</td>
</tr>
<tr>
<td>Advanced Computer Networks 730</td>
<td>COS730</td>
<td>15</td>
</tr>
<tr>
<td>Software Engineering for Free and Open Source Software 733</td>
<td>COS733</td>
<td>15</td>
</tr>
<tr>
<td>Information and Communication Technologies for Development 734</td>
<td>COS734</td>
<td>15</td>
</tr>
<tr>
<td>Capita Selecta 792/3/4</td>
<td>COS792/3/4</td>
<td>15</td>
</tr>
<tr>
<td>Sub-total</td>
<td>60-90</td>
<td></td>
</tr>
</tbody>
</table>
**Group 2 (select 1 to 2 modules)**

**Mathematics**
- Computational Linear Algebra 728  
  MAM728  15
- Coding Theory 747  
  MAM747  15
- Number Theory 709  
  MAM709  15
- Graph Theory 710  
  MAM710  15
- Partial Differential Equations 717  
  MAM717  15
- Topology 737  
  MAM737  15
- Functional Analysis 767  
  MAM767  15
- Group Theory 739  
  MAM739  15
- Introduction to Optimal control 740  
  MAM740  15
- Stochastic Calculus for Finance 714  
  COF714  15
- Financial Engineering 716  
  COF716  15

**Statistics**
- Biostatistics 733  
  STA733  15
- Statistical Modelling 733  
  STA737  15
- Survey Methods 706  
  POP706  15
- Official Statistics 703  
  POP703  15
- Theoretical Statistics 705  
  STA705  15
- Population Projections 790  
  STA790  15
- Data Mining I 760  
  STA760  15
- Simulation 710  
  COF710  15
- Demographic Analysis 707  
  POP707  15
- Probability and Stochastic Processes 712  
  COF712  15
- Time Series Analysis 711  
  COF711  15
- Matrix Methods 734  
  STA734  15
- Multivariate Analysis 701  
  STA701  15
- Applied Statistics 501  
  STA501  15
- Social Demography 709  
  POP709  15
- Research Project 761  
  STA761  30

**Physics**
- Applied and Computational Physics 720  
  PHY720  30
- Nuclear Physics 723  
  PHY723  30
- Advanced Analytical Techniques 726  
  PHY726  30

**Information Systems**
- Delivering IS Benefits 711  
  IFS711  15
- IS Practice 721  
  IFS721  15
- Managing System Delivery 712  
  IFS712  15
- IS Research 721  
  IFS721  15

**Sub-total**  15-30

**TOTAL**  120

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**B.224 ASSESSMENT**

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

**B.225 PROGRESS RULES**

**B.225.1 Full-time**

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.
B.225.2  Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.226  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.227  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.227.1  Special topics presented by visiting lecturers, industry partners, etc., that may be offered instead of any of the topics given above or as an additional module.

B.227.2  Not all modules are offered every year, and the department may offer additional Capita Selecta modules.
BACHELOR OF SCIENCE HONOURS IN ENVIRONMENTAL AND WATER SCIENCE (3780)

B.228 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Environmental and Water Science)

B.228.1 For the Honours degree in Environmental and Water Science a student must have a BSc degree in Environmental and Water Science with an average of at least 60% in the Compulsory modules in Environmental and Water Science at 3rd year level.

B.228.2 Students with a BSc degree in a related field can on recommendation of the Post-Graduate Committee of the Department and approval of Faculty also be admitted. These students may, however, be required by the Department to obtain the necessary background by attending recommended third year modules in those fields where they have poor/no training.

B.229 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.230 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.231 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment and Management 701</td>
<td>EWP701</td>
<td>20</td>
</tr>
<tr>
<td>Advanced Geographical Information Systems 702</td>
<td>EWP702</td>
<td>20</td>
</tr>
<tr>
<td>Hydrogeology 703</td>
<td>EWP703</td>
<td>20</td>
</tr>
<tr>
<td>Surface Water Hydrology 704</td>
<td>EWP704</td>
<td>20</td>
</tr>
<tr>
<td>Research Project or Internship 705</td>
<td>EWP705</td>
<td>30</td>
</tr>
<tr>
<td>Fluvial Geomorphology 706</td>
<td>EWP706</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>EWP</strong></td>
<td><strong>130</strong></td>
</tr>
</tbody>
</table>

B.232 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.233 PROGRESS RULES

B.233.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.
B.233.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.234 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.235 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.235.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.235.2 With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.

B.235.3 The programme consists of six Compulsory Modules of 20 credits each of which one module is the research project or internship.
BACHELOR OF SCIENCE HONOURS IN HERBAL SCIENCE (3760)
(Not Offered in 2019)

B.236 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Herbal Science)

B.236.1 At least a Bachelors degree with Basic Science or Health Science majors.

B.236.2 Alternatively, a National Higher Diploma in any of the aforementioned specialities, and at least two years appropriate experience.

B.236.3 Furthermore, candidates with a tertiary qualification and at least five years appropriate experience, or other qualifications which are evaluated by the Faculty as equivalent, may at the discretion of the University Senate, be accepted.

B.237 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.238 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.239 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbal Research 712</td>
<td>HBS712</td>
<td>60</td>
</tr>
<tr>
<td>Herbal Medicine And Human Health 713</td>
<td>HBS713</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Pharmacology 715</td>
<td>HBS715</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Nutrition 716</td>
<td>HBS716</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Chemistry 722</td>
<td>HBS722</td>
<td>10</td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Electives (select 2 modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbal Taxonomy And Systematics 714</td>
<td>HBS714</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Science And Environmental Education 717</td>
<td>HBS717</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Biodiversity 718</td>
<td>HBS718</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Science And Anthropology 719</td>
<td>HBS719</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Economics 720</td>
<td>HBS720</td>
<td>10</td>
</tr>
<tr>
<td>Herbal Immunology 721</td>
<td>HBS721</td>
<td>10</td>
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<tr>
<td>Sub-Total</td>
<td></td>
<td>20</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

B.240 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.241 PROGRESS RULES

B.241.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.241.2 Part-time

Unless Senate decides otherwise, a part-time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.242 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.243 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.243.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.243.2 With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.
BACHELOR OF SCIENCE HONOURS IN MATHEMATICAL SCIENCE
(3736)

B.244 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Mathematical Science)

B.244.1 At least a 60% pass in third year level Mathematics or its equivalent at other universities and the approval of the departmental Post-Graduate committee is required for admission into the programme.

B.244.2 If less than 60% was obtained in third year level Mathematics the candidate may be required to take an entry examination (test) or re-take one or more appropriate modules at third year level.

B.245 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.246 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.247 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory</strong></td>
<td></td>
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</tr>
<tr>
<td>Research Project 748</td>
<td>MAM748</td>
<td>30</td>
</tr>
<tr>
<td><strong>Electives (choose any 6 modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary Differential Equations 707</td>
<td>MAM707</td>
<td>15</td>
</tr>
<tr>
<td>Algebraic Number Theory 708</td>
<td>MAM708</td>
<td>15</td>
</tr>
<tr>
<td>Number Theory 709</td>
<td>MAM709</td>
<td>15</td>
</tr>
<tr>
<td>Graph Theory 710</td>
<td>MAM710</td>
<td>15</td>
</tr>
<tr>
<td>Partial Differential Equations 717</td>
<td>MAM717</td>
<td>15</td>
</tr>
<tr>
<td>Measure and Integration 727</td>
<td>MAM727</td>
<td>15</td>
</tr>
<tr>
<td>Computational Linear Algebra 728</td>
<td>MAM728</td>
<td>15</td>
</tr>
<tr>
<td>Mathematical Modelling in Epidemiology 730</td>
<td>MAM730</td>
<td>15</td>
</tr>
<tr>
<td>Design Theory 736</td>
<td>MAM736</td>
<td>15</td>
</tr>
<tr>
<td>Topology 737</td>
<td>MAM737</td>
<td>15</td>
</tr>
<tr>
<td>Functions of a Complex Variable 738</td>
<td>MAM738</td>
<td>15</td>
</tr>
<tr>
<td>Group Theory 739</td>
<td>MAM739</td>
<td>15</td>
</tr>
<tr>
<td>Introduction to Optimal control 740</td>
<td>MAM740</td>
<td>15</td>
</tr>
<tr>
<td>Coding Theory 747</td>
<td>MAM747</td>
<td>15</td>
</tr>
<tr>
<td>Rings and Modules 757</td>
<td>MAM757</td>
<td>15</td>
</tr>
<tr>
<td>Functional Analysis 767</td>
<td>MAM767</td>
<td>15</td>
</tr>
<tr>
<td>Numerical Analysis 777</td>
<td>MAM777</td>
<td>15</td>
</tr>
<tr>
<td>Galois Theory 787</td>
<td>MAM787</td>
<td>15</td>
</tr>
<tr>
<td>Cryptography 797</td>
<td>MAM797</td>
<td>15</td>
</tr>
<tr>
<td>Stochastic Calculus for Finance 714</td>
<td>COF714</td>
<td>15</td>
</tr>
<tr>
<td>Financial Engineering 716</td>
<td>COF716</td>
<td>15</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td></td>
<td>90</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>
B.247.1 A student may take up to an equivalent of two Honours modules, not exceeding 30 credits, from cognate or associate disciplines, provided they have the permission from the Chairpersons of the said department (s) and the Chairperson of the Department of Mathematics and Applied Mathematics.

B.248 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.249 PROGRESS RULES

B.249.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.249.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.250 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.251 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.251.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.
BACHELOR OF SCIENCE HONOURS IN MEDICAL BIOSCIENCE (3721)

B.252 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours – BScHons (Medical Bioscience)

B.252.1 At least 60% pass at 3rd year level in one of the BSc (Medical Biosciences) subjects, or related field with the approval of the departmental chairperson.

B.253 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.254 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.255 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Technique Studies 702</td>
<td>MBS702</td>
<td>20</td>
</tr>
<tr>
<td>Research Project 704</td>
<td>MBS704</td>
<td>50</td>
</tr>
<tr>
<td>Applied Statistics 501</td>
<td>STA501</td>
<td>15</td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td><strong>Electives (Select 4 modules including at least 3 Medical Biosciences modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forensic Dna Analysis 714</td>
<td>BTY714</td>
<td>10</td>
</tr>
<tr>
<td>Specialist Module In Medical Bioscience 701 (Dependent On The Availability of Specialist Lecturers)</td>
<td>MBS701</td>
<td>10</td>
</tr>
<tr>
<td>Specialist Module in Anatomical Science 705</td>
<td>MBS705</td>
<td>10</td>
</tr>
<tr>
<td>The Microbiology of Female Morbidity 707</td>
<td>MBS707</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Nutritional Bioscience 708</td>
<td>MBS708</td>
<td>10</td>
</tr>
<tr>
<td>Apoptosis and Cell Signaling 709</td>
<td>MBS709</td>
<td>10</td>
</tr>
<tr>
<td>Physical Activity and The Environment 710</td>
<td>MBS710</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Cardiovascular Physiology 711</td>
<td>MBS711</td>
<td>10</td>
</tr>
<tr>
<td>Foetal Origins of Adult Disease 712</td>
<td>MBS712</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Studies in Reproduction and Health 713</td>
<td>MBS713</td>
<td>10</td>
</tr>
<tr>
<td>Applied Immunology 714</td>
<td>MBS714</td>
<td>10</td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>125</td>
</tr>
</tbody>
</table>

B.256 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.257  PROGRESS RULES

B.257.1  Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.257.2  Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.258  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.259  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.259.1  Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.259.2  With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.
BACHELOR OF SCIENCE HONOURS IN PHYSICAL SCIENCE (3714)

B.260 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Physical Science)

B.260.1 A student must have obtained a BSc degree with an average of 60% in Physics (Mathematics 211, 221 and 212 or their equivalent are recommended modules for admission to this programme.)

B.261 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.262 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.263 CURRICULUM

The following streams are offered in the BScHons (Physical Science) programme:

- Material Science (MATSCI)
- Accelerator and Nuclear Physics (MANUS)

B.263.1 Material Science (MATSCI)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Module 709</td>
<td>PHY709</td>
<td>20</td>
</tr>
<tr>
<td>Applied and Computational Physics 720</td>
<td>PHY720</td>
<td>30</td>
</tr>
<tr>
<td>Theoretical Materials Science 724</td>
<td>PHY724</td>
<td>20</td>
</tr>
<tr>
<td>Applied Materials Science 725</td>
<td>PHY725</td>
<td>20</td>
</tr>
<tr>
<td>Advanced Analytical Techniques 726</td>
<td>PHY726</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

B.263.2 Accelerator and Nuclear Physics (MANUS)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Module 709</td>
<td>PHY709</td>
<td>20</td>
</tr>
<tr>
<td>Applied and Computational Physics 720</td>
<td>PHY720</td>
<td>30</td>
</tr>
<tr>
<td>Accelerator Science 721</td>
<td>PHY721</td>
<td>20</td>
</tr>
<tr>
<td>Quantum and Statistical Physics 722</td>
<td>PHY722</td>
<td>20</td>
</tr>
<tr>
<td>Nuclear Physics 723</td>
<td>PHY723</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

B.264 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.265 PROGRESS RULES

B.265.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.265.2 Part-time

Unless Senate decides otherwise, a part-time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.266 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.267 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.267.1 Full-Time students

The final mark for each theory module will be a combination of marks obtained in tests and assignments (for example, computer tasks, essays, literature reviews or oral presentations).

B.267.2 Part-Time students

As above, except that the student takes 2 theory modules per year over a two-year period (in total 4 modules plus the Research module). The Honours Research module can be completed at any time during the two years.

B.267.3 Contact Time

Lectures per week: 10
Research module / Practical work: An average of 6 hours per week
BACHELOR OF SCIENCE HONOURS IN POPULATION STUDIES (3738)

B.268 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Population Studies)

B.268.1 A B-degree with at least 60% average in the appropriate third-year level modules/subject, some formal training in numeracy and the approval of the departmental Post-Graduate committee is required for admission into the programme. Students majoring in Demography, Statistics, Anthropology, Computer Science, Economics, Geography, Information Systems, Management, Public Health, Psychology, Sociology or its equivalent at other universities may apply.

B.269 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.270 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.271 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory (select all groups)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group 1 (select all modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official Statistics 703</td>
<td>POP703</td>
<td>15</td>
</tr>
<tr>
<td>Survey Methods 706</td>
<td>POP706</td>
<td>15</td>
</tr>
<tr>
<td>Demographic Analysis 707</td>
<td>POP707</td>
<td>15</td>
</tr>
<tr>
<td>Research Project 761</td>
<td>POP761</td>
<td>30</td>
</tr>
<tr>
<td><strong>Group 2 (select 1 module)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied Statistics 501 (Non Statistics majors)</td>
<td>STA501</td>
<td>15</td>
</tr>
<tr>
<td>Biostatistics 733 (Statistics majors) or</td>
<td>STA733</td>
<td>15</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td><strong>Electives (select 2 modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender Issues and Health 708</td>
<td>POP708</td>
<td>15</td>
</tr>
<tr>
<td>Social Demography 709</td>
<td>POP709</td>
<td>15</td>
</tr>
<tr>
<td>Mathematical Demography and Population Modelling 710</td>
<td>POP710</td>
<td>15</td>
</tr>
<tr>
<td>(Mathematical background in differential and integral calculus and Demographic Analysis needed)</td>
<td>STA790</td>
<td>15</td>
</tr>
<tr>
<td>Population Projections 790</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

B271.1 A student may take up to an equivalent of two Honours modules, not exceeding 30 credits, from cognate or associate disciplines, provided they have the permission from the Chairpersons of the said department (s) and the Chairperson of the Statistics and Population Studies department.
B.272 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.273 PROGRESS RULES

B.273.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.273.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.274 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.275 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.275.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.
BACHELOR OF SCIENCE HONOURS IN STATISTICAL SCIENCE (3737)

B.276 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Statistical Science)

B.276.1 At least a 60% pass in third year level Mathematics/Statistics with a minimum of 55% per semester or its equivalent at other universities and the approval of the departmental Post-Graduate committee is required for admission into the programme.

B.276.2 If less than 60% was obtained in third year level Mathematics/Statistics the candidate may be required to take an entry examination (test) or re-take one of or more appropriate modules at third year level or both.

B.276.3 In addition to the above admission to an Honours in Statistics requires 2nd year Mathematics.

B.276.4 For admission to the stream in Data Science a student must have passed 3rd year Statistics and 3rd year Computer Science with a minimum of 60%.

B.277 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.278 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.279 CURRICULUM

Stream 1: General Statistics

Module Name | Alpha Code | Cred
--- | --- | ---
Probability and Stochastic Processes 712 | COF712 | 15
Multivariate Analysis 701 | STA701 | 15
Matrix Methods 734 | STA734 | 15
Research Project 761 | STA761 | 30

Sub-total | 75

Electives (select 3 modules from the list below - Please check with Department which elective modules will be taught or from Mathematics modules)

Module Name | Alpha Code | Cred
--- | --- | ---
Simulation 710 | COF710 | 15
Financial Risk Management 726 | COF726 | 15
Survey Methods 706 | POP706 | 15
Demographic Analysis 707 | POP707 | 15
Mathematical Demography and Population Modeling 710 | POP710 | 15
(Theoretical Statistics 705 | STA705 | 15
Experimental Design 710 | STA710 | 15
Biostatistics 733 | STA733 | 15
Statistical Genetics 736 | STA736 | 15

145
Stream 2: Data Science

Module Name | Alpha Code | Cred
--- | --- | ---
Compulsory (select all modules)
Probability and Stochastic Processes 712 | COF712 | 15
Multivariate Analysis 701 | STA701 | 15
Matrix Methods 734 | STA734 | 15
Research Project 761 | STA761 | 30
Sub-total |  | 75
Electives (select 3 modules from the list below - Please check with Department which elective modules will be taught or from Mathematics modules)
Machine Learning 711 | COS711* | 15
Statistical Modelling 737 | STA737 | 15
Data Mining 760 | STA760 | 15
Sub-total |  | 45
TOTAL |  | 120

*Course offered by the Department of Computer Sciences (pre-requisites third year Computer Science)

B.279.1 A student may take up to an equivalent of two Honours modules, not exceeding 30 credits, from cognate or associate disciplines, provided they have the permission from the Chairpersons of the said department(s) and the Chairperson of the Statistics and Population Studies department.

B.280 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.281 PROGRESS RULES

B.281.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.281.2 Part-time

Unless Senate decides otherwise, a part time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.282 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.283 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.283.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.
BACHELOR OF SCIENCE HONOURS IN STRUCTURAL BIOLOGY (3790) (Not Offered in 2019)

B.284 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours - BScHons (Structural Biology)

B.284.1 At least 60% pass at 3rd year level in an appropriate subject, and with the approval of the departmental Post-Graduate committee is required for admission into the programme.

B.285 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.286 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.287 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular Biology Primer 710</td>
<td>STB710</td>
<td>10</td>
</tr>
<tr>
<td>Computational and Mathematical Primer 711</td>
<td>STB711</td>
<td>15</td>
</tr>
<tr>
<td>Three Dimensional Microscopy 712</td>
<td>STB712</td>
<td>15</td>
</tr>
<tr>
<td>Structural Bioinformatics and Molecular Modelling 713</td>
<td>STB713</td>
<td>10</td>
</tr>
<tr>
<td>Protein Nuclear Magnetic Resonance Spectroscopy 714</td>
<td>STB714</td>
<td>15</td>
</tr>
<tr>
<td>X-ray Crystallography of Proteins 715</td>
<td>STB715</td>
<td>20</td>
</tr>
<tr>
<td>Principles of Protein Structure 716</td>
<td>STB716</td>
<td>10</td>
</tr>
<tr>
<td>Protein Expression and Purification 717</td>
<td>STB717</td>
<td>10</td>
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<tr>
<td>Cell Biology Primer 718</td>
<td>STB718</td>
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<tr>
<td>Applications of Structural Biology 719</td>
<td>STB719</td>
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</table>

B.288 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.289 PROGRESS RULES

B.289.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.
B.289.2 Part-time

Unless Senate decides otherwise, a part-time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.290 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.291 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.291.1 Please note that not all modules will be offered in a specific year and modules may be offered in either semester.

B.291.2 With a continuous assessment system in place, the assessment will be appropriate to the module and may take the form of tests and/or written assignments and/or oral presentations and/or practical work. A final oral examination may be required.
BACHELOR OF SCIENCE HONOURS IN ASTROPHYSICS (3793)

B.292 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.3, candidates will be required to meet the following criteria to be enrolled for the degree: Bachelor of Science Honours – BScHons (Astrophysics)

B.292.1 A student must have obtained a BSc degree with an average of 60% in Physics (Mathematics 211, 221 and 212 or their equivalent are recommended modules for admission to this programme).

B.293 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.294 DURATION

Unless Senate decides otherwise the duration of the programme shall extend over one year’s full-time study and two years part-time study.

B.295 CURRICULUM

The honours course in Astrophysics is presented in conjunction with the National Astrophysics and Space Science Programme (NASSP) at the University of Cape Town under a Memorandum of Agreement.

B.295.1 Astrophysics

<table>
<thead>
<tr>
<th>Module Name</th>
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<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Modules</td>
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<td></td>
</tr>
<tr>
<td>Research Module 701</td>
<td>ASP701</td>
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</tr>
<tr>
<td>Electives (to the total sum of 90 credits chosen from:)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spectroscopy 702</td>
<td>ASP702</td>
<td>10</td>
</tr>
<tr>
<td>General Astrophysics 703</td>
<td>ASP703</td>
<td>10</td>
</tr>
<tr>
<td>Computational Methods in Astronomy 704</td>
<td>ASP704</td>
<td>20</td>
</tr>
<tr>
<td>Advanced topics in Physics 706</td>
<td>ASP706</td>
<td>10</td>
</tr>
<tr>
<td>Geospace 707</td>
<td>ASP707</td>
<td>10</td>
</tr>
<tr>
<td>General Relativity 708</td>
<td>ASP708</td>
<td>10</td>
</tr>
<tr>
<td>Observational Techniques 709</td>
<td>ASP709</td>
<td>10</td>
</tr>
<tr>
<td>Cosmology 710</td>
<td>ASP710</td>
<td>10</td>
</tr>
<tr>
<td>Space Science topics 711</td>
<td>ASP711</td>
<td>20</td>
</tr>
<tr>
<td>Advanced topics in Astrophysics 712</td>
<td>ASP712</td>
<td>20</td>
</tr>
<tr>
<td>Electrodynamics 713</td>
<td>ASP713</td>
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</table>

B.296 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.297 PROGRESS RULES

B.297.1 Full-time

Unless Senate decides otherwise, a full-time student shall complete the programme in one year. A student who passed at least 60 credits may proceed with his/her studies to complete the programme the following year.

B.297.2 Part-time

Unless Senate decides otherwise, a part-time student shall complete the programme in two consecutive years and accumulate at least 60 credits per annum to proceed with his or her studies. A student who accumulated 90 credits within two years may be allowed to proceed to the following year to complete the programme.

B.298 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.299 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.299.1 Full-Time students

The final mark for each theory module will be a combination of marks obtained in tests and assignments (for example, computer tasks, essays, literature reviews or oral presentations).

B.299.2 Part-Time students

As above, except that the student takes 2 theory modules per year over a two-year period (in total 4 modules plus the Research module). The Honours Research module can be completed at any time during the two years.

B.299.3 Contact Time

Lectures per week: 10
Research module / Practical work: An average of 6 hours per week.
MASTER OF PHARMACY (3851)

B.300 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Pharmacy - MPharm

a) Candidates must have obtained a 4-year Pharmacy degree or diploma (e.g. BPharm, BSc(Pharm) or Dip.Pharm).

b) Factors considered in student selection include academic merit, appropriate experience, reports from referees, and compatibility of research and career interest with available research projects and/or supervisors and results of interview.

B.301 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.302 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.303 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmaceuticiae Magister Thesis 801</td>
<td>PHA801</td>
<td>180</td>
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<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmaceuticiae Magister Thesis 802</td>
<td>PHA802</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
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<td>180</td>
</tr>
</tbody>
</table>

B.304 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.305 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.306 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.307 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.307.1 A thesis dealing with an original research topic must be presented.

B.307.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.307.3 A thesis on a research topic must be presented. The student may be required to do extra module work if required by the supervisor which is not examinable.
MASTER OF PHILOSOPHY IN INTEGRATED WATER RESOURCE MANAGEMENT (3881)

B.308 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Philosophy - MPhil (Integrated Water Resource Management)

B.308.1 Candidates must be in possession of the Postgraduate Diploma in IWRM with an average mark of 60%.

B.309 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.310 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.311 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Methodology</td>
<td>WAT805</td>
<td>30</td>
</tr>
<tr>
<td>Capita Selecta (special topics in IWRM)</td>
<td>WAT843</td>
<td>30</td>
</tr>
<tr>
<td><strong>1st Enrolment Code</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini – Thesis</td>
<td>WAT803</td>
<td></td>
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<tr>
<td><strong>2nd Enrolment Code</strong></td>
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<td></td>
</tr>
<tr>
<td>Mini – Thesis</td>
<td>WAT804</td>
<td>120</td>
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<tr>
<td><strong>TOTAL</strong></td>
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</table>

B.312 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.313 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.314 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.315 SPECIAL REQUIREMENTS FOR THE PROGRAMME

There are no special requirements for this programme.
MASTER OF PHILOSOPHY IN POPULATION STUDIES (3921)

B.316 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Philosophy - MPhil (Population Studies)

B.316.1 Candidates must be in possession of an honours degree in Population Studies, Demography, Statistics or relevant field with at least 60% average for admission into the programme.

B.316.2 Only students with the required Population Studies knowledge and the needed research skills will be accepted into the full-thesis Masters programme.

B.316.3 Departmental approval is subject to the availability of a suitable supervisor.

B.317 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.318 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.319 CURRICULUM

The programme is offered in three different modes. Student must select only one mode of study.

B.319.1 Mode 1 – Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
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</tr>
<tr>
<td>Population Studies Masters Thesis</td>
<td>POP801</td>
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<tr>
<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Population Studies Masters Thesis</td>
<td>POP802</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>TOTAL</td>
<td>180</td>
</tr>
</tbody>
</table>

B.319.2 Mode 2 - Research Report & Coursework

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
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<tr>
<td>Research Project</td>
<td>STA839</td>
<td>90</td>
</tr>
<tr>
<td>Electives (Select 6 modules – * modules compulsory if not completed at Honours. Please check with department which elective modules will be taught).</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Demographic Analysis* 807</td>
<td>POP807</td>
<td>15</td>
</tr>
<tr>
<td>Official Statistics 809</td>
<td>POP809</td>
<td>15</td>
</tr>
<tr>
<td>Survey Methods * 811</td>
<td>POP811</td>
<td>15</td>
</tr>
<tr>
<td>Population Projections* 812</td>
<td>POP812</td>
<td>15</td>
</tr>
<tr>
<td>African Historical Demography 813</td>
<td>POP813</td>
<td>15</td>
</tr>
<tr>
<td>Social Demography 814</td>
<td>POP814</td>
<td>15</td>
</tr>
<tr>
<td>Gender Issues &amp; Reproductive Health 815</td>
<td>POP815</td>
<td>15</td>
</tr>
<tr>
<td>Mathematical Demography And Population Modelling 848</td>
<td>POP848</td>
<td>15</td>
</tr>
</tbody>
</table>

153
(Mathematical Background in Differential and Integral Calculus and Demographic Analysis needed)

Applied Statistics 501* (Only students who have not majored in Statistics) STA501 15
Research Methodology* 810 STA810 15
Biostatistics* 835 (Third-Year Statistics needed) STA835 15

Sub-Total 90
TOTAL 180

B.319.3 Mode 3 - Mini-Thesis & Course Work

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Population Studies Mini - Thesis</td>
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<tr>
<td>Population Studies Mini - Thesis</td>
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<td>120</td>
</tr>
</tbody>
</table>

Sub-Total 60
TOTAL 180

Electives (Select 4 Modules – * modules compulsory if not completed at Honours. Please check with department which elective modules will be taught.)

Demographic Analysis* 807 POP807 15
Official Statistics 809 POP809 15
Survey Methods * 811 POP811 15
Population Projections* 812 POP812 15
African Historical Demography 813 POP813 15
Social Demography 814 POP814 15
Gender Issues & Reproductive Health 815 POP815 15
Mathematical Demography and Population Modelling 848 POP848 15
(Mathematical Background in differential and integral calculus and demographic analysis needed)

Applied Statistics 501* (Only Students who have not majored in Statistics) STA501 15
Research Methodology* 810 STA810 15
Biostatistics* 835 (Third-Year Statistics needed) STA835 15

Sub-Total 60
TOTAL 180

B.320 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.321 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.322 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.323 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.323.1 Modules indicated with an asterix must be completed if not completed in the Honours level.

B.323.2 Modules may not be repeated at Masters Level if completed at Honours level.

B.323.3 The modules will be taught depending on availability of staff.
Electives at Masters level (maximum 30 credits) may be chosen from Anthropology, Economics, Geography, History, Management, Public Health or Sociology, with the approval of the Head of Department, only if these modules enhance the knowledge needed for Population Studies.

Assessment methods could also include written research projects, oral presentations and other activities.
MASTER OF SCIENCE IN APPLIED GEOLOGY (3891)

B.324 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science – MSc (Applied Geology)

B.324.1 A student must have obtained an Honours degree with a C-average in Geology and extensive practical experience.

B.324.2 Departmental approval is subject to the availability of a suitable supervisor.

B.324.3 In the case of applicants without a Honours degree, additional information on the following aspects must be submitted on application:

- Curriculum vitae detailing all previous work experience and the period of employment;
- Referee reports from current and previous employers;
- Any other information as may be required.

B.325 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.326 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.327 CURRICULUM

The programme is offered in two different modes. Student must select only one mode of study.

B.327.1 Mode 1 – Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

B.328 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.329 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.
B.330 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.331 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.331.1 A thesis dealing with an original research topic must be presented.

B.331.2 The Chairperson of the Department may prescribe additional undergraduate and postgraduate modules in Geology or related subjects as required for the intended research.
MASTER OF SCIENCE IN BIODIVERSITY AND CONSERVATION BIOLOGY (3824)

B.332 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science – MSc (Biodiversity and Conservation Biology)

B.332.1 A student must have obtained an appropriate Honours degree.

B.332.2 Departmental approval is subject to the availability of a suitable supervisor.

B.333 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.334 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.335 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
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B.336 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.337 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.338 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.339 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.339.1 A thesis dealing with an original research topic must be presented.

B.339.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN BIOINFORMATICS (3895)

B.340 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: **Master of Science - MSc** (Bioinformatics)

B.340.1 Participants in the programme should be in possession of a Honours (BSc) degree (average score not less than 60%) in a related scientific subject area.

B.340.2 Candidates with an undergraduate degree or diploma (M+3) having at least 3 - 5 years experience will also be considered.

B.340.3 Exceptionally, candidates who have shown significant potential, but did not achieve the necessary score requirements, may be considered at the discretion of the acceptance committee. The case, however, has to be well motivated. The application process requires that all candidates write a short essay on bioinformatics and their role and expectations from the programme. Also, all candidates will be interviewed by faculty members after which the decision on acceptance to the programme will be made.

B.340.4 Departmental approval is subject to the availability of a suitable supervisor.

B.341 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.342 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.343 CURRICULUM

<table>
<thead>
<tr>
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B.344 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.345 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.
B.346  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.347  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.347.1  A thesis dealing with an original research topic must be presented.

B.347.2  Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN BIOTECHNOLOGY (3185)

B.348 ADMISSION

Unless Senate decides otherwise and subject to rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Biotechnology)

B.348.1 Participants in the programme should be in possession of a Honours (BSc) degree (average score not less than 60%) in the relevant subject/field.

B.348.2 Departmental approval is subject to the availability of a suitable supervisor.

B.349 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.350 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.351 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
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B.352 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.353 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.354 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.355 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.355.1 A thesis dealing with an original research topic must be presented.

B.355.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN CHEMICAL SCIENCES (3823)

B.356  ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Chemical Sciences)

B.356.1  Participants admitted into the programme should be in possession of an Honours degree with an average of 60% in Chemistry or relevant subject/field.

B.356.2  Departmental approval is subject to the availability of a suitable supervisor.

B.357  SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.358  DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.359  CURRICULUM

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B.360  ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.361  PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.362  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.363  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.363.1  A thesis dealing with an original research topic must be presented.

B.363.2  Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.363.3  Modules may not be repeated at Masters Level if completed at Honours level.
MASTER OF SCIENCE IN COMPUTATIONAL FINANCE (3093)

B.364  ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Computational Finance)

B.364.1  Participants admitted into the programme should be in possession of an Honours degree with an average of 60% in the relevant subject/field.

B.364.2  Departmental approval is subject to the availability of a suitable supervisor.

B.365  SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.366  DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.367  CURRICULUM

The programme is offered in three different modes. Student must select only one mode of study.

B.367.1  Mode 1 – Mini-thesis & Coursework

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### B.367.2 Mode 2 – Research Project & Coursework

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### B.367.3 Mode 3 – Full Thesis

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### B.368 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

### B.369 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.
B.370  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.371  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.371.1  A thesis dealing with an original research topic must be presented.

B.371.2  Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.371.3  Electives will be taught depending on availability of staff.

B.371.4  Modules completed at Honours level may not be repeated at Masters Level.
MASTER OF SCIENCE IN COMPUTER SCIENCE (3848)

B.372 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Computer Science)

B.372.1 a student must have obtained an Honours degree with a C-average in Computer Science or

B.372.2 an equivalent 4-year Bachelor's Degree with a Computer Science major.

B.372.3 Departmental approval is subject to the availability of a suitable supervisor.

B.373 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.374 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.375 CURRICULUM

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<th>Module Name</th>
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B.376 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.377 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.378 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.379 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.379.1 A thesis dealing with an original research topic must be presented.
B.379.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.379.3 Modules may not be repeated at Masters Level if completed at Honours level.

B.379.4 Current research areas available for supervision include Machine Learning, Computational Intelligence, Internet Computing, Computer Networks and Mobile Computing and Information and Communication Technologies for Development (ICT4D). Details may be found at www.cs.uwc.ac.za
MASTER OF SCIENCE IN ENVIRONMENTAL AND WATER SCIENCE (3085)

B.380 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Environmental and Water Science)

B.380.1 An Honours Degree in Environmental and Water Science is required.

B.380.2 Students with a BSc Honours degree in a related field can on recommendation of the Department and approval of Faculty also be admitted.

B.380.3 Departmental approval is subject to the availability of a suitable supervisor.

B.381 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.382 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.383 CURRICULUM

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B.384 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.385 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.386 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.387 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.387.1 A thesis dealing with an original research topic must be presented.

B.387.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN HERBAL SCIENCE (3071)
(Not Offered in 2019)

B.388 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Herbal Science)

B.388.1 A BSc Honours in Herbal Sciences or a Honours Bachelor’s with a Basic Science or Health Science focus or

B.388.2 A BTech in any of the abovementioned specialities and a minimum of 2 years appropriate experience.

B.388.3 Departmental approval is subject to the availability of a suitable supervisor.

B.389 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.390 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.391 CURRICULUM

<table>
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<tr>
<th>Module Name</th>
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B.392 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.393 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.394 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.395 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.395.1 A thesis dealing with an original research topic must be presented.

B.395.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN MATHEMATICAL SCIENCE (3849)

B.396 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Mathematical Science)

An applicant's academic record should demonstrate strong aptitude in mathematics. In order to enrol candidates must be in possession of:

B.396.1 A 4 year Bachelors degree (NQF level 8) in mathematics with at least a 60% pass, or any science or engineering subject with a significant mathematics component, or

B.396.2 An honours degree (NQF level 8) in mathematics with at least a 60% pass, or any science or engineering subject with a significant mathematics component, or

B.396.3 A BEd degree with a 60% pass in Mathematics as a major subject for the undergraduate degree.

B.396.4 Any degree considered to be equivalent to the above.

B.396.5 Departmental approval is subject to the availability of a suitable supervisor.

B.397 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.398 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.399 CURRICULUM

The programme is offered in the following different modes/options. Student must select only one mode of study.

B.399.1 Mathematics – Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics MastersThesis 801</td>
<td>MAM801</td>
<td>180</td>
</tr>
<tr>
<td>Mathematics MastersThesis 802</td>
<td>MAM802</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
</tr>
</tbody>
</table>

B.399.2 Mathematics – Mini-Thesis and Coursework (Not offered in 2019)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics Mini - thesis 803</td>
<td>MAM803</td>
<td>120</td>
</tr>
<tr>
<td>Mathematics Mini - thesis 804</td>
<td>MAM804</td>
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</tr>
<tr>
<td>Sub–total</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>
Electives (select 4 modules)
- Algebraic Coding Theory 820
- Algebraic Number Theory 821
- Advanced Numerical Analysis 822
- Algebraic Topology 823
- Category Theory 824
- Design Theory 825
- Graph Theory 826
- Group Theory 827
- Representation Theory of Finite Groups 828

Sub-total 60
TOTAL 180

B.399.3 Mathematics Education - Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
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<tr>
<td>Mathematics Education MastersThesis 807</td>
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<tr>
<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Mathematics Education MastersThesis 808</td>
<td>MAM808</td>
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<tr>
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</table>

B.399.4 Mathematics Education – Mini-Thesis and Coursework (Not offered in 2019)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
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<td></td>
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<tr>
<td>Mathematics Education Mini - thesis 805</td>
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<tr>
<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Mathematics Education Mini - thesis 806</td>
<td>MAM806</td>
<td>120</td>
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</table>

Electives (select 4 modules)
- Mathematics Education 811
- Mathematics Education 812
- Mathematics Education 813
- Mathematics Education 814
- Mathematics Education 815
- Mathematics Education 816

Sub-total 60
TOTAL 180

B.399.5 AIMS Programme

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics Mini – Thesis / Research Project 803</td>
<td>AIM803</td>
<td>60</td>
</tr>
<tr>
<td>Communication Skills, Computing and LaTeX 811</td>
<td>AIM811</td>
<td>7</td>
</tr>
<tr>
<td>Mathematical Problem Solving 812</td>
<td>AIM812</td>
<td>7</td>
</tr>
<tr>
<td>Problem Solving in Physics 813</td>
<td>AIM813</td>
<td>7</td>
</tr>
<tr>
<td>Scientific Software Development in Python 814</td>
<td>AIM814</td>
<td>7</td>
</tr>
<tr>
<td>Experimental Math with SAGE 815</td>
<td>AIM815</td>
<td>7</td>
</tr>
<tr>
<td>Selected Topics in Mathematical Sciences 816</td>
<td>AIM816</td>
<td>7</td>
</tr>
<tr>
<td>Professional Development Modules 817</td>
<td>AIM817</td>
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171
Electives (select one module)

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Advanced Topics in Mathematics Science A 818</td>
<td>AIM818</td>
<td>77</td>
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<tr>
<td>Advanced Topics in Mathematics Science B 819</td>
<td>AIM819</td>
<td>77</td>
</tr>
<tr>
<td>Advanced Topics in Mathematics Science C 820</td>
<td>AIM820</td>
<td>77</td>
</tr>
<tr>
<td>Advanced Topics in Mathematics Science D 821</td>
<td>AIM821</td>
<td>77</td>
</tr>
<tr>
<td>Advanced Topics in Mathematics Science E 822</td>
<td>AIM822</td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
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<td><strong>186</strong></td>
</tr>
</tbody>
</table>

B.400 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.401 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.402 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.403 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.403.1 A thesis dealing with an original research topic must be presented.

B.403.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.403.3 Modules may not be repeated at Masters Level if completed at Honours level.

B.403.4 The academic assessment of students for the AIMS Master's Degree in Mathematical Sciences is completed in three ways:

(i) Continuous assessment through written assignments, tutorials, short tests and presentations set by the lecturers;

(ii) A written mini-thesis which the student is required to present (orally) to a panel of examiners. This panel includes an internal examiner, and an external examiner.

(iii) Integrated assessment - a portfolio for each student is compiled, containing the grades achieved for each of the courses attended as well as observations on their presentations, all their assignments, completed exercises and their final mini-thesis.

(iv) External evaluation of student’s performance and all aspects of the programme are conducted by six senior academics representing the different mathematical sciences disciplines (including Physics). The outcome of the integrated assessment reported to each university for those students registered in their science faculties. Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.
MASTER OF SCIENCE IN MEDICAL BIOSCIENCE (3819)

B.404  ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Medical Bioscience)

B.404.1 Candidates should have an Honours degree with at least a 60% pass in Medical Bioscience subjects or related field.

B.404.2 Departmental approval is subject to the availability of a suitable supervisor.

B.404.3 In the case of applicants without a Honours degree, additional information on the following aspects must be submitted on application:

- Curriculum vitae detailing all previous work experience and the period of employment;
- Referee reports from current and previous employers;
- Any other information as may be required.

B.405  SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.406  DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.407  CURRICULUM

The programme is offered in the following different modes/options. Student must select only one mode of study.

B.407.1 Mode 1 - Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Bioscience Masters Thesis</td>
<td>MBS801</td>
<td>180</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Bioscience Masters Thesis</td>
<td>MBS802</td>
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</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
</tr>
</tbody>
</table>

B.407.2 Mode 2 - Mini-Thesis and Coursework (Not offered in 2019)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Bioscience Mini - thesis</td>
<td>STA803</td>
<td>60</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Bioscience Mini - thesis</td>
<td>STA804</td>
<td>20</td>
</tr>
<tr>
<td>Advanced Technique Studies</td>
<td>MBS805</td>
<td>10</td>
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<tr>
<td>Biostatistics</td>
<td>STA835</td>
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<tr>
<td>Sub-total</td>
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<td>80</td>
</tr>
</tbody>
</table>
**Electives (select 4 modules)**

- Specialist module in Anatomical Science 806  
  MBS806  
  10
- The Microbiology of Female Morbidity and Mortality 808  
  MBS808  
  10
- Advanced Studies in Reproduction and Health 809  
  MBS809  
  10
- Advanced Nutritional Biosciences 810  
  MBS810  
  10
- Apoptosis and Cell Signalling 811  
  MBS811  
  10
- Physical Activity and the Environment 812  
  MBS812  
  10
- Advanced Cardiovascular Physiology 813  
  MBS813  
  10
- Specialist module in Medical Biosciences 814  
  MBS814  
  10

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>40</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

**B.408 ASSESSMENT**

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

**B.409 PROGRESS RULES**

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

**B.410 RENEWAL OF REGISTRATION**

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

**B.411 SPECIAL REQUIREMENTS FOR THE PROGRAMME**

**B.411.1** A thesis dealing with an original research topic must be presented.

**B.411.2** Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

**B.411.3** Modules may not be repeated at Masters Level if completed at Honours level.
MASTERS OF SCIENCE IN NANOSCIENCE (3089)

B.412 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Nanoscience)

Candidates should have an Honours degree in either Physics, Chemistry, Biotechnology or Medical Bioscience or related field.

B.413 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.414 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be two years.

B.415 CURRICULUM

The programme has three specialisation areas of which students should select only one.

### B.415.1 Stream 1 – Nanophysics

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Nanophysics 831</td>
<td>NSS831</td>
<td>48</td>
</tr>
<tr>
<td>Experimental Techniques in Nanophysics 832</td>
<td>NSS832</td>
<td>16</td>
</tr>
<tr>
<td>Nanoscience Research project 803</td>
<td>NSS803</td>
<td>15</td>
</tr>
<tr>
<td>Nanoscience Research project 804</td>
<td>NSS804</td>
<td>85</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>164</td>
</tr>
<tr>
<td>Electives (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Concepts in Nanoscience 809</td>
<td>NSS809</td>
<td>4</td>
</tr>
<tr>
<td>Management for Nanoscientists 810</td>
<td>NSS810</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanobiomedical Sciences for Non-Biologists 813</td>
<td>NSS813</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanochemistry for Non-Chemists 823</td>
<td>NSS823</td>
<td>4</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
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</table>

### B.415.2 Stream 2 – Nanobiomed

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Nanobiomedical Science 811</td>
<td>NSS811</td>
<td>48</td>
</tr>
<tr>
<td>Experimental Techniques in Nanobiomedical Science 812</td>
<td>NSS812</td>
<td>16</td>
</tr>
<tr>
<td>Nanoscience Research project 803</td>
<td>NSS803</td>
<td>15</td>
</tr>
<tr>
<td>Nanoscience Research project 804</td>
<td>NSS804</td>
<td>85</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>164</td>
</tr>
<tr>
<td>Electives (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Concepts in Nanoscience 809</td>
<td>NSS809</td>
<td>4</td>
</tr>
<tr>
<td>Management for Nanoscientists 810</td>
<td>NSS810</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanochemistry for Non-Chemists 823</td>
<td>NSS823</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanophysics for Non-Physicists 833</td>
<td>NSS833</td>
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<tr>
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<td></td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
</tr>
</tbody>
</table>
B.415.3 Stream 3 – Nanochemistry

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
</tr>
<tr>
<td>Advanced Nanochemistry 821</td>
<td>NSS821</td>
<td>48</td>
</tr>
<tr>
<td>Experimental Techniques in Nanochemistry 822</td>
<td>NSS822</td>
<td>16</td>
</tr>
<tr>
<td>Nanoscience Research project 803</td>
<td>NSS803</td>
<td>15</td>
</tr>
<tr>
<td>Nanoscience Research project 804</td>
<td>NSS804</td>
<td>85</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>NSS</strong></td>
<td><strong>164</strong></td>
</tr>
<tr>
<td>Electives (select all modules)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Concepts in Nanoscience 809</td>
<td>NSS809</td>
<td>4</td>
</tr>
<tr>
<td>Management for Nanoscientists 810</td>
<td>NSS810</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanobiomedical Sciences for Non-Biologists 813</td>
<td>NSS813</td>
<td>4</td>
</tr>
<tr>
<td>Foundations of Nanophysics for Non-Physicists 833</td>
<td>NSS833</td>
<td>4</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>NSS</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>NSS</strong></td>
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</tr>
</tbody>
</table>

B.416 ASSESSMENT

Assessment is governed by Rule A.5.4 as stipulated in the University Calendar: General Information Part 1.

B.417 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.418 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.419 SPECIAL REQUIREMENTS FOR THE PROGRAMME

There are no special requirements for this programme.
MASTER OF SCIENCE in Petroleum Geology (3836)
(Not offered in 2019)

B.420 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Petroleum Geology)

B.420.1 A student must have obtained an Honours degree with a C-average in Geology and extensive practical experience.

B.420.2 Departmental approval is subject to the availability of a suitable supervisor.

B.420.3 In the case of applicants without a Honours degree, additional information on the following aspects must be submitted on application:
   - Curriculum vitae detailing all previous work experience and the period of employment;
   - Referee reports from current and previous employers;
   - Any other information as may be required.

B.421 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.422 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.423 CURRICULUM

B.423.1 Mini-thesis & Coursework

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year Enrolment</td>
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</tr>
<tr>
<td>Reservoir Modelling 816</td>
<td>APG816</td>
<td>30</td>
</tr>
<tr>
<td>Field And Reservoir Management 817</td>
<td>APG817</td>
<td>30</td>
</tr>
<tr>
<td>Exploration and Production group projects</td>
<td>APG818</td>
<td>30</td>
</tr>
<tr>
<td>Field Work 825</td>
<td>APG825</td>
<td>30</td>
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<tr>
<td>Field Work 825</td>
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<td>Sub-Total</td>
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<tr>
<td>2nd Year Enrolment</td>
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<td></td>
</tr>
<tr>
<td>Geology Mini-thesis</td>
<td>GEL803</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
</tr>
</tbody>
</table>

B.424 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.425  PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.426  RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.427  SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.427.1  A thesis dealing with an original research topic must be presented.

B.427.2  The Chairperson of the Department may prescribe additional undergraduate and postgraduate modules in Geology or related subjects as required for the intended research.
MASTER OF SCIENCE IN PHARMACEUTICAL SCIENCES (3181)

B.428 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Pharmaceutical Sciences)

B.428.1 Candidates must have obtained either a 4-year Pharmacy degree [e.g. BPharm or BSc (Pharm)]

OR

B.428.2 a relevant professional degree (e.g. MBChB, etc.) OR

B.428.3 a 4-year Science degree (e.g. BSc Hons)

B.428.4 Candidates with other suitable equivalent qualifications may be considered under special circumstances and with suitable motivation. Factors considered in student selection include academic merit, appropriate experience, reports from referees, and compatibility of research and career interests with available research projects and/or supervisors and results of interview.

B.429 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.430 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be two years.

B.431 CURRICULUM

The degree by coursework consists of four components namely, an orientation course, two compulsory modules and four elective modules (combined 60 credits) and a Mini-thesis (120 credits)

Electives: Students are required to do a minimum of four (4) electives. Students are assessed for their performance in each elective and the 4 electives, collectively, contribute 33.3% towards the final mark for the degree.

B.431.1 Mode 1 – Mini-Thesis & Coursework

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmaceuticiae Mini-thesis 803</td>
<td>PHA803</td>
<td>120</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmaceuticiae Mini-thesis 804</td>
<td>PHA804</td>
<td></td>
</tr>
<tr>
<td>Research Methods I and Pharmaceutical Sciences 811</td>
<td>PHA811</td>
<td>10</td>
</tr>
<tr>
<td>Research Methods II and Pharmaceutical Sciences 812</td>
<td>PHA812</td>
<td>10</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>140</td>
</tr>
</tbody>
</table>
Electives (select 4 modules)

<table>
<thead>
<tr>
<th>Basic Principles: Pharmacy 821</th>
<th>PHA821</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Principles: Capita Selecta 825</td>
<td>PHA825</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Topics: Pharmacy 831</td>
<td>PHA831</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Topics: Capita Selecta 835</td>
<td>PHA835</td>
<td>10</td>
</tr>
<tr>
<td>Basic Practical Methods: Pharmacy 841</td>
<td>PHA841</td>
<td>10</td>
</tr>
<tr>
<td>Basic Practical Methods: Capita Selecta 845</td>
<td>PHA845</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Research Methods: Pharmacy 851</td>
<td>PHA851</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Research Methods: Capita Selecta 855</td>
<td>PHA855</td>
<td>10</td>
</tr>
</tbody>
</table>

Sub-total 40

TOTAL 180

B.431.2 Mode 2 – Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmaceutical Sciences Masters Thesis 801</td>
<td>PHS801</td>
<td>180</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Pharmaceutical Sciences Masters Thesis 802</td>
<td>PHS802</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>180</td>
</tr>
</tbody>
</table>

For the degree by research a thesis on an approved and supervised topic in one of the four disciplines of Pharmaceutical Sciences (Pharmacy Practice, Pharmaceutics, Pharmaceutical Chemistry or Pharmacology) shall be presented.

B.432 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.433 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.434 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.435 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.435.1 A thesis dealing with an original research topic must be presented.

B.435.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.435.3 A thesis on a research topic must be presented. The student may be required to do extra module work if required by the supervisor which is not examinable.
MASTER OF SCIENCE IN PHARMACY ADMINISTRATION AND POLICY REGULATION (3859)

B.436 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Pharmacy Administration and Policy Regulation)

B.436.1 Candidates must have obtained either a 4-year Pharmacy degree [(e.g. BPharm or BSc (Pharm)]

OR

B.436.2 a 4-year Science degree (e.g. BSc Hons) with relevant experience in pharmacy

B.436.3 Candidates with other suitable equivalent qualifications may be considered under special circumstances and with suitable motivation. Factors considered in student selection include academic merit, appropriate experience, reports from referees, and compatibility of research and career interests with available research projects and/or supervisors and results of interview.

B.437 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.438 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum shall be two years.

B.439 CURRICULUM

B.439.1 On-line lectures and tutorials and block weeks.

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory Module</td>
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<tr>
<td>1st Enrolment</td>
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</tr>
<tr>
<td>Pharmacy Admin &amp; Policy Mini- Thesis 803</td>
<td>PAR803</td>
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<td>2nd Enrolment</td>
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<tr>
<td>Pharmacy Admin &amp; Policy Mini- Thesis 804</td>
<td>PAR804</td>
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</tr>
<tr>
<td>Electives (select all)</td>
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<td></td>
</tr>
<tr>
<td>Ethics 811</td>
<td>PAR811</td>
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<tr>
<td>Common Technical Document 812</td>
<td>PAR812</td>
<td>10</td>
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<tr>
<td>Regulatory Science 813</td>
<td>PAR813</td>
<td>10</td>
</tr>
<tr>
<td>C &amp; T Medicine Regulatory Auth 814</td>
<td>PAR814</td>
<td>10</td>
</tr>
<tr>
<td>Regulatory Sc &amp; Medical Devices 815</td>
<td>PAR815</td>
<td>10</td>
</tr>
<tr>
<td>Pharmacovigilance 816</td>
<td>PAR816</td>
<td>10</td>
</tr>
<tr>
<td>Regulatory Affairs 817</td>
<td>PAR817</td>
<td>10</td>
</tr>
<tr>
<td>Research Methods 818</td>
<td>PAR818</td>
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<tr>
<td>Leadership &amp; Negotiations 819</td>
<td>PAR819</td>
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<tr>
<td>Clinical Trials &amp; Stats 820</td>
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</tr>
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</table>
B.440 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.441 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.442 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.443 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.443.1 A thesis dealing with an original research topic must be presented.

B.443.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.433.3 A thesis on a research topic must be presented. The student may be required to do extra module work if required by the supervisor which is not examinable.
MASTER OF SCIENCE IN PHYSICAL SCIENCE (3081)

B.434 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science - MSc (Physical Science)

Candidates should have an Honours degree in Physics or related field.

B.435 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure. Students who are part of the National Astrophysics and Space Science Programme (NASSP) need to pass the NASSP Master coursework for admission to this degree.

B.436 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.437 CURRICULUM

The programme has two modes of which students should select only one.

B.437.1 Mode 1 – Mini-Thesis & Coursework

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics Mini-thesis 803</td>
<td>PHY803</td>
<td>90</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics Mini-thesis 804</td>
<td>PHY804</td>
<td></td>
</tr>
<tr>
<td>Electives (select 3 modules)</td>
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<td></td>
</tr>
<tr>
<td>Quantum Mechanics 820</td>
<td>PHY820</td>
<td>30</td>
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<tr>
<td>Nuclear Physics 830</td>
<td>PHY830</td>
<td>30</td>
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<tr>
<td>Solid State Physics 840</td>
<td>PHY840</td>
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<tr>
<td>Physics Education 850</td>
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<td>Mathematical Methods of Physics 860</td>
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</table>

B.437.2 Mode 2 – Full Thesis

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Physics Masters Thesis 801</td>
<td>PHY801</td>
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<tr>
<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Physics Masters Thesis 802</td>
<td>PHY802</td>
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</tr>
<tr>
<td>TOTAL</td>
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<td>180</td>
</tr>
</tbody>
</table>
B.438 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.439 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.440 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.441 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.441.1 A thesis dealing with an original research topic must be presented.

B.441.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.441.3 Specific additional modules may be prescribed.
B.442 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Science – MSc (Statistical Science)

B.442.1 Candidates should have an Honours degree with at least a 60% pass in Mathematics/Statistics/Data Science. If less than 60% was obtained for Mathematics/Statistics/Data Science Honours the candidate may be required to take an entry examination (test) or re-take one or more appropriate Mathematics/Statistics/Data Science Honours modules or both.

B.442.2 A candidate may be required to take module(s) from the general stream as may be required to strengthen background knowledge.

B.442.3 Students entering the program through the RPL route are required to complete a testing phase as determined by the Post-Graduate Committee of the department. Such students, on recommendation of the department, may be allowed to enrol for the Honours degree instead of the Masters programme. Upon completion of the Honours degree the student may proceed with the Masters programme if an average of 60% was obtained in the Honours programme.

B.442.4 In the case of applicants without a Honours degree, additional information on the following aspects must be submitted on application:

- Curriculum vitae detailing all previous work experience and the period of employment;
- Referee reports from current and previous employers;
- Any other information as may be required.

B.443 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.444 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be one year and two years for part-time students.

B.445 CURRICULUM

The programme has three modes of which students should select only one.

**B.445.1 Mode 1 – Full Thesis**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Statistics Magister Thesis 801</td>
<td>STA801</td>
<td>180</td>
</tr>
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<td>2nd Enrolment Code</td>
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<td></td>
</tr>
<tr>
<td>Statistics Magister Thesis 802</td>
<td>STA802</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>TOTAL</strong></td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>
B.445.2  Mode 2 – Mini-thesis & Coursework

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1st Enrolment Code</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics Mini - thesis 803</td>
<td>STA803</td>
<td>120</td>
</tr>
<tr>
<td><strong>2nd Enrolment Code</strong></td>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>Electives (select 4 modules)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation 817</td>
<td>COF817</td>
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<tr>
<td>Theoretical Statistics 826</td>
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</tr>
<tr>
<td>Probability &amp; Stochastic Processes 828</td>
<td>COF828</td>
<td>15</td>
</tr>
<tr>
<td>Time Series Analysis 829</td>
<td>COF829</td>
<td>15</td>
</tr>
<tr>
<td>Data Mining 800</td>
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<td>15</td>
</tr>
<tr>
<td>Research Methodology 810</td>
<td>STA810</td>
<td>15</td>
</tr>
<tr>
<td>Capita Selecta 822</td>
<td>STA822</td>
<td>15</td>
</tr>
<tr>
<td>Multivariate Analysis 829</td>
<td>STA829</td>
<td>15</td>
</tr>
<tr>
<td>Experimental Design 830</td>
<td>STA830</td>
<td>15</td>
</tr>
<tr>
<td>Biostatistics 835</td>
<td>STA835</td>
<td>15</td>
</tr>
<tr>
<td>Statistical Genetics 837</td>
<td>STA837</td>
<td>15</td>
</tr>
<tr>
<td>Matrix Methods 853</td>
<td>STA853</td>
<td>15</td>
</tr>
</tbody>
</table>

| Risk Management                    | COF827     | 15   |
| **Sub-total**                      |            | 60   |
| **TOTAL**                          |            | 180  |

B.445.3  Mode 3 – Research Project & Coursework (Specialisation in Data Science)

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Research Project</td>
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</tr>
<tr>
<td><strong>Electives (select 6 modules)</strong></td>
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<td></td>
</tr>
<tr>
<td>Data Mining</td>
<td>STA800</td>
<td>15</td>
</tr>
<tr>
<td>Capita Selecta</td>
<td>STA822</td>
<td>15</td>
</tr>
<tr>
<td>Research Methodology</td>
<td>STA810</td>
<td>15</td>
</tr>
<tr>
<td>Risk Management</td>
<td>COF827</td>
<td>15</td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>STA841</td>
<td>15</td>
</tr>
<tr>
<td>Multicriteria Decision Making</td>
<td>STA843</td>
<td>15</td>
</tr>
<tr>
<td>Contemporary Business Analysis</td>
<td>STA842</td>
<td>15</td>
</tr>
</tbody>
</table>

| **Sub-total**                      |            | 90   |
| **TOTAL**                          |            | 180  |

B.446  ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.447 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.448 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.449 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.449.1 A thesis dealing with an original research topic must be presented.

B.449.2 Coursework may be included, as recommended by the Post-graduate Committee of the department, as a component of the programme when deemed necessary.

B.449.3 Modules may not be repeated at Masters Level if completed at Honours level.
MASTER OF CLINICAL PHARMACY (3852)

B.450 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.4, candidates will be required to meet the following criteria to be enrolled for the degree: Master of Clinical Pharmacy - M.Clin.Pharm

B.450.1 Candidates must have obtained a 4-year Pharmacy degree or diploma (e.g. BPharm, BSc (Pharm) or Dip.Pharm).

B.450.2 Applicants who do not have a South African qualification are required to send their results/qualifications to the South African Qualifications Authority in order to have them evaluated and equated to a South African qualification before admission can be considered.

B.450.3 The policy of UWC regarding Recognition of Prior Learning (RPL) will also apply.

B.451 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

The selection of candidates will be done in accordance with rules and regulations of the School of Pharmacy, Faculty and Senate Higher Degrees of the University of the Western Cape. Candidates should obtain at least 60% in the relevant subject(s) related to Clinical Pharmacy. In addition to the above candidates should:

B.451.1 Provide a portfolio of evidence of work done up to the time of application.

B.451.2 Be available for an interview with a panel selected by the School of Pharmacy.

B.451.3 Be employed at a facility appropriate to achieve the learning objectives, e.g. hospital.

B.452 DURATION

Unless Senate decides otherwise, the minimum duration of the curriculum for full-time students shall be three years and two years for part-time students.

B.453 CURRICULUM

B.453.1 Blended learning which include block lectures, online delivery and in service training and learning.

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td>Mini-thesis in Clinical Pharmacy 803</td>
<td>PHC803</td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td>Mini-thesis in Clinical Pharmacy 803</td>
<td>PHC804</td>
</tr>
<tr>
<td>Year level 1</td>
<td>Introduction to Clinical Pharmacy and Pharmaceutical Care Evidence Based Medicine, Rational Medicine Use and Pharmacopidemiology</td>
<td>PHC811</td>
</tr>
<tr>
<td></td>
<td>PHC812</td>
<td>30</td>
</tr>
</tbody>
</table>
Applied Pharmacokinetics PHC814 25
Pharmaceutical Care – Adult Medicine (1) PHC815 30

\textbf{Sub-Total} 110

\textbf{Year Level 2}

Mini thesis in Clinical Pharmacy PHC804 120
Pharmaceutical Care - Adult Medicine (2) PHC820 85
Pharceutical Care – Paediatrics PHC816 30

\textbf{Electives (select 1 module)}

Advanced Pharmaceutical Care – HIV PHC821 15
Advanced Pharmaceutical Care – Oncology PHC822 15
Advanced Pharmaceutical Care – Critical Care PHC823 15

\textbf{Sub Total} 250

\textbf{TOTAL} 360

\textbf{B.454 ASSESSMENT}

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

\textbf{B.455 PROGRESS RULES}

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

\textbf{B.456 RENEWAL OF REGISTRATION}

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

\textbf{B.457 SPECIAL REQUIREMENTS FOR THE PROGRAMME}

\textbf{B.457.1} A student should complete 50\% of the course work, which should include the component the research will be done in, before the student can proceed with the prescribed research.

\textbf{B.457.2} A thesis dealing with an original research topic must be presented. The student may be required to do extra module work if required by the supervisor which is not examinable.
DOCTOR OF PHARMACY (3951)

B.458 ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.5, candidates will be required to meet the following criteria to be enrolled for the degree: Doctor of Pharmacy - DPharm

A student shall have obtained an MPharm degree or an equivalent qualification in order to be admitted to the DPharm degree.

B.459 SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.460 DURATION

The duration of the degree is a minimum of two years with a maximum of five years subject to rule A.4.5 as per University Calendar Part 1.

B.461 CURRICULUM

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
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<tr>
<td>1st Enrolment Code</td>
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<tr>
<td>Pharmaceutical Doctoral Thesis 901</td>
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<td>2nd Enrolment Code</td>
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<tr>
<td>Pharmaceutical Doctoral Thesis 902</td>
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</table>

B.462 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.

B.463 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.464 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.465 SPECIAL REQUIREMENTS FOR THE PROGRAMME

A thesis dealing with an original research topic must be presented.
DOCTOR OF PHILOSOPHY (3961)

B.466  ADMISSION

Unless Senate decides otherwise and subject to Rule A.2.5, candidates will be required to meet the following criteria to be enrolled for the degree: Doctor of Philosophy – PhD (as indicated in B.469)

B.466.1 A student shall have obtained an MSc degree or an equivalent qualification in the relevant or related field of study in order to be admitted to the PhD degree.

B.466.2 proven research ability and acceptable research protocol in any of the specialisations.

B.466.3 departmental approval is subject to the availability of a suitable supervisor.

B.467  SELECTION

As only a limited number of students can be admitted to the programme, applicants will be subject to a selection procedure.

B.468  DURATION

The duration of the degree is a minimum of two years with a maximum of five years subject to Rule A.4.5 as per University Calendar Part 1.

B.469  CURRICULUM

The PhD programme is offered in the following specialisation areas and a thesis, on an approved original research topic, must be presented in one of the following disciplines:

B.469.1  Applied Geology

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Alpha Code</th>
<th>Cred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geology Doctoral Thesis 901</td>
<td>GEL901</td>
<td></td>
</tr>
<tr>
<td>2nd Enrolment Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geology Doctoral Thesis 902</td>
<td>GEL902</td>
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B.469.2  Biodiversity & Conservation Biology

<table>
<thead>
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<tbody>
<tr>
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</tr>
<tr>
<td>Biodiversity Doctoral Thesis 901</td>
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<tr>
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B.469.3  Bioinformatics

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<tr>
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<td>SAN901</td>
<td>360</td>
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<tr>
<td>Bioinformatics Doctoral Thesis 902</td>
<td>SAN902</td>
<td>360</td>
</tr>
<tr>
<td>TOTAL</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>Module Name</td>
<td>Alpha Code</td>
<td>Cred</td>
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<tr>
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<tr>
<td><strong>Biotechnology</strong></td>
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<tr>
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<td>BTY901</td>
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<td><strong>2nd Enrolment Code</strong></td>
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<tr>
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<td><strong>TOTAL</strong></td>
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<tr>
<td><strong>Chemical Science</strong></td>
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<td><strong>Environmental &amp; Water Science</strong></td>
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<tr>
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<td>360</td>
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<tr>
<td><strong>Herbal Science (Not offered in 2019)</strong></td>
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<tr>
<td>Compulsory</td>
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<td><strong>1st Enrolment Code</strong></td>
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<tr>
<td>Herbal Science Doctoral Thesis 901</td>
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<td><strong>TOTAL</strong></td>
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<td>360</td>
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<tr>
<td><strong>Mathematics / Computational Finance</strong></td>
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<td></td>
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<tr>
<td><strong>1st Enrolment Code</strong></td>
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<tr>
<td>Mathematics Doctoral Thesis 901</td>
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<td><strong>2nd Enrolment Code</strong></td>
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<tr>
<td>Mathematics Doctoral Thesis 902</td>
<td>MAM902</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<td>360</td>
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</table>
B.469.10 Mathematics Education
Module Name
Compulsory
1st Enrolment Code
Mathematics Doctoral Thesis 903
2nd Enrolment Code
Mathematics Doctoral Thesis 904

TOTAL 360

B.469.11 Statistics / Population Studies
Module Name
Compulsory
1st Enrolment Code
Statistics Doctoral Thesis 901
Population Studies Doctoral Thesis 901
2nd Enrolment Code
Statistics Doctoral Thesis 902
Population Studies Doctoral Thesis 902

TOTAL 360

B.469.12 Medical Bioscience
Module Name
Compulsory
1st Enrolment Code
Medical Bioscience Doctoral Thesis 901
2nd Enrolment Code
Medical Bioscience Doctoral Thesis 902

TOTAL 360

B.469.13 Pharmaceutical Sciences
Module Name
Compulsory
1st Enrolment Code
Pharmaceutical Sciences Doctoral thesis 901
2nd Enrolment Code
Pharmaceutical Sciences Doctoral Thesis 902

TOTAL 360

B.469.14 Physics
Module Name
Compulsory
1st Enrolment Code
Physics Doctoral Thesis 901
2nd Enrolment Code
Physics Doctoral Thesis 902

TOTAL 360

B.470 ASSESSMENT

Assessment is governed by Rule A.5 as stipulated in the University Calendar: General Information Part 1.
B.471 PROGRESS RULES

Registration for the following year of study will be recommended by the supervisor if in his/her opinion adequate progress has been made during the current year.

B.472 RENEWAL OF REGISTRATION

The renewal of registration will be governed by the Rule A.4, as stipulated in the University Calendar: General Information Part 1.

B.473 SPECIAL REQUIREMENTS FOR THE PROGRAMME

B.473.1 Statistics

In addition to the general admissions rules students must provide the Statistics and Population Studies department with a full Curriculum Vitae and at least 3 referee reports. Prior to the admission to the PhD, a student might be required to complete modules to prepare him/her for the selected field of research.
DOCTOR OF SCIENCE (3901)

B.474 The DSc degree is awarded upon application to candidates who are in possession of a doctorate.

B.475 The candidate is required to submit published work, which constitutes an original and important contribution to learning. The successful candidate must in the opinion of the examiners have proven to be an authority in the field of specialisation.

D.476 The Faculty’s Higher Degrees Committee shall recommend to Senate the names of referees, who are acknowledged authorities in the field(s) of the submitted papers for appointment as external examiners.
<table>
<thead>
<tr>
<th>UNDERGRADUATE MODULE DESCRIPTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Faculty</strong></td>
</tr>
<tr>
<td><strong>Home Department</strong></td>
</tr>
<tr>
<td><strong>Module Topic</strong></td>
</tr>
<tr>
<td><strong>Generic Module Name</strong></td>
</tr>
<tr>
<td><strong>Alpha-numeric Code</strong></td>
</tr>
<tr>
<td><strong>NQF Level</strong></td>
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<tr>
<td><strong>NQF Credit Value</strong></td>
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<tr>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td><strong>Proposed semester to be offered</strong></td>
</tr>
</tbody>
</table>

**Programmes in which the module will be offered**
BSc (Applied Geology) (3214, 3011); BSc (Environmental and Water Science) (3331,3027)

**Year level**
2

**Main Outcomes**
On completion of this module students should be able to:
- Know the principles of analysis and interpretation of aerial photography.
- Develop skills for acquisition and analysis of remotely sensed data, especially digital satellite image data.
- Have a conceptual understanding of map construction.
- Understand principles and analysis of rock deformation.
- Develop skills for the structural analysis of deformed rocks.
- Have a conceptual understanding of tectonic settings and rock mechanics.

**Main Content**
- Principles of Aerial Photography/ air photo- interpretation
- Principles of Satellite Imagery/Principles of electromagnetic radiation and their role in remote sensing
- Understand the physical basis of remote sensing and the different Image resolution types and their application in Earth science.
- Image correction, interpretations and classification
- Construction of Base Maps and Geological Maps.
- Projection Techniques and Conventions.
- Description and analysis of deformed rocks
- Stereographic projection methods and techniques in structural analysis.
- Concepts of stress, translation, rotation and strain.
- Rock mechanics and tectonic settings.

**Pre-requisite modules**
ESC111, ESC121 or equivalent

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>42</td>
<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
<td>60</td>
<td>Practical p.w.</td>
<td>2</td>
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<tr>
<td><strong>Practicals:</strong></td>
<td>84</td>
<td>Tutorials p.w.</td>
<td>0</td>
</tr>
</tbody>
</table>

196
<table>
<thead>
<tr>
<th>Tutorials:</th>
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</thead>
<tbody>
<tr>
<td>Tests &amp; Examinations:</td>
<td>30</td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>84</td>
</tr>
<tr>
<td>Other:</td>
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<td><strong>Total Learning Time</strong></td>
<td><strong>300</strong></td>
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<tr>
<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA): 50%</td>
</tr>
<tr>
<td></td>
<td>Final Assessment (FA): 50%</td>
</tr>
<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Earth Sciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Geochemistry, Mineralogy and Sedimentology</td>
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<tr>
<td>Generic Module Name</td>
<td>Geology 232</td>
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<td>APG232</td>
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<td>Duration</td>
<td>Semester</td>
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<td>Proposed semester to be offered</td>
<td>Second Semester</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc. (Applied Geology) (3214, 3011)</td>
</tr>
<tr>
<td></td>
<td>BSc. (Environmental and Water Science) (3027, 3331)</td>
</tr>
<tr>
<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>- Identify crystal forms and systems.</td>
</tr>
<tr>
<td></td>
<td>- Identify minerals based on their properties.</td>
</tr>
<tr>
<td></td>
<td>- Describe the principles of interaction between light and crystalline material and use it in the identification of minerals.</td>
</tr>
<tr>
<td></td>
<td>- Use a polarization microscope in the identification of minerals in thin section.</td>
</tr>
<tr>
<td></td>
<td>- Explain the basic principles of geochemistry as it relates to minerals and rocks.</td>
</tr>
<tr>
<td></td>
<td>- Explain the basic principles / processes of sediment deposition and depositional environment.</td>
</tr>
<tr>
<td></td>
<td>- Describe sedimentary rocks.</td>
</tr>
<tr>
<td></td>
<td>- Describe the classification of sedimentary rocks and associated textures.</td>
</tr>
</tbody>
</table>

| Main Content          | • Principles of crystallography |
|                       | • The formation of minerals and their identification |
|                       | • Atomic theory, electron configuration, periodic table |
|                       | • Bonding in minerals and element substitution |
|                       | • Theory of light interaction with crystalline material |
|                       | • Identification of rocks and minerals in hand specimen and under the polarization microscope |
|                       | • Geochemical principles – element substitution, geochemical analysis, major and trace elements, isotope systematics (stable and radiogenic), age dating of rocks |
|                       | • Classification of sedimentary rocks and associated textures. |

| Pre-requisite modules | ESC111 and ESC121 |
| Co-requisite modules  | None              |
| Prohibited module Combination | None |
### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
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</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>42</td>
<td>Lectures p.w. 3</td>
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<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
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<tr>
<td><strong>Practicals:</strong></td>
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<td>Tutorials p.w.</td>
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<tr>
<td><strong>Assessments:</strong></td>
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#### Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

#### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Earth Sciences

### Module Topic
- Field School – Introduction to Geological Mapping

### Generic Module Name
- Geology 233

### Alpha-numeric Code
- APG233

### NQF Level
- 6

### NQF Credit Value
- 20

### Duration
- Semester

### Proposed semester to be offered.
- Both Semesters

### Programmes in which the module will be offered
- BSc. (Applied Geology) (3214, 3011)

### Year level
- 2

### Main Outcomes
- On completion of this module students should be able to:
  - Observe and describe the occurrence and spatial arrangement of various types of rocks in the field.
  - Locate themselves in the field and record information collected in the field
  - Produce geological maps at various scales
  - Take geological measurements in the field
  - Write geological reports on field exercises

### Main Content
- Geological mapping techniques.
- Structural analysis of geological data
- Reporting geological data and report writing.

### Pre-requisite modules
- ESC111 and ESC121

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
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</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
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<td>Lectures p.w.</td>
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<td><strong>Assignments &amp; tasks:</strong></td>
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#### Method of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

#### Assessment Module type
- Continuous Assessment (CA)
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<tr>
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<td>Earth Sciences (Applied Geology)</td>
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<td>First Semester</td>
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<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Know the principles and applications of spatial and related techniques in geology.</td>
</tr>
<tr>
<td></td>
<td>• Develop skills for the construction of GIS raster and vector maps using geological data.</td>
</tr>
<tr>
<td></td>
<td>• Able to carry out data query and spatial data analysis.</td>
</tr>
<tr>
<td></td>
<td>• Have a conceptual understanding of data management, data querying and spatial analysis.</td>
</tr>
<tr>
<td></td>
<td>• Understand basic geological data analysis and interpretation.</td>
</tr>
<tr>
<td></td>
<td>• Develop knowledge on how to create geochemical element association and their application in rock identification, mineral exploration and environmental management.</td>
</tr>
<tr>
<td></td>
<td>• Understand principles of modelling geological processes and geological setting.</td>
</tr>
<tr>
<td></td>
<td>• Develop skills to integrate geological data into computer-based models; process and analyze and evaluate resulting images.</td>
</tr>
<tr>
<td></td>
<td>• Have a conceptual understanding of the application of geological models in the search for various Earth resources.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Database management, vector maps and raster maps</td>
</tr>
<tr>
<td></td>
<td>• Data query and Spatial data analysis</td>
</tr>
<tr>
<td></td>
<td>• Geological data and GIS</td>
</tr>
<tr>
<td></td>
<td>• Application of GIS to geological industry.</td>
</tr>
<tr>
<td></td>
<td>• Basic statistical data analysis, including mean, standard deviation, variance and their application in exploration</td>
</tr>
<tr>
<td></td>
<td>• Correlation and regression analysis</td>
</tr>
<tr>
<td></td>
<td>• Element association and their use in rock/environmental relation</td>
</tr>
<tr>
<td></td>
<td>• Basic elements in 2D and 3D geological models in geology.</td>
</tr>
<tr>
<td></td>
<td>• Introduction to computer modelling packages in applied geological industry.</td>
</tr>
<tr>
<td></td>
<td>• Construction of geological/geochemical/ maps and sections.</td>
</tr>
<tr>
<td></td>
<td>• Integration of geological maps and sections into 2D and 3D models related to element migration and hydrocarbon occurrence and flow dynamics.</td>
</tr>
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**Faculty**
- Natural Sciences

**Home Department**
- Earth Science

**Module Topic**
- Geology

**Generic Module Name**
- Geology 312

**Alpha-numeric Code**
- APG312

**NQF Level**
- 7

**NQF Credit Value**
- 30

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc. (Applied Geology) (3214, 3011)

**Year level**
- 3

**Main Outcomes**
- On completion of this module students should be able to:
  - Describe the history of petroleum evolution
  - Describe the conditions that must be fulfilled for commercial oil accumulation
  - Describe different depositional environments
  - Explain how natural sedimentary systems work and the extent of which it could be managed
  - Define facies, and explain facies associations and architectural elements
  - Explain the history of well logging and its applications
  - Describe the types of wireline logs and formats
  - Explain logging terminology
  - Describe the correlation of logs
  - Explain seismic reflectors
  - Explain parasequences and marine flooding surfaces
  - Explain sequence boundaries and system tracts
  - Explain what is meant by a reservoir

**Main Content**
- History of Petroleum evolution
- Depositional environments
- Facies Analysis
- Depositional Systems and System tracts
- Well logs and geological applications
- Well log correlation and recognition of bounding discontinuities
- Seismic exploration techniques
- Introduction to reservoir modeling techniques.

**Pre-requisite modules**
APG232 and APG233

**Co-requisite modules**
None

**Prohibited module Combination**
None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Total Learning Time**
300

**Method of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Earth Sciences (Applied Geology)

**Module Topic**
Igneous and Metamorphic Petrology, Economic Geology and Exploration Geochemistry

**Generic Module Name**
Geology 321

**Alpha-numeric Code**
APG321

**NQF Level**
7

**NQF Credit Value**
30

**Duration**
Semester

**Proposed semester to be offered.**
Second Semester

**Programmes in which the module will be offered**
BSc. (Applied Geology) (3214, 3011)

**Year level**
3

**Main Outcomes**
On completion of this module students should be able to:
- Recognize igneous and metamorphic rocks and associated textures in hand specimen and under the microscope.
- Relate the changes in the mineralogy of igneous rocks to the variation in the chemistry of the rocks.
- Describe the origin of igneous and metamorphic rocks and associated textures, as well as the various igneous and metamorphic rock-forming processes.
- Describe the principles of concentration of mineral deposits in the context of various geological processes.
- Explain the occurrence of various genetic types of ore deposits in relation to associated host rocks, mineralogy of ores, ore grade and geological setting.
- Explain ore deposit formation and various geological processes as well as ore deposit exploration and evaluation.
Describe the concepts in exploration geochemistry and their application to ore deposit exploration.
- Acquire, analyze and interpret geochemical data used in minerals exploration
- Describe element dispersion and isotopic fractionation and apply this knowledge to ore deposits studies.

Main Content
- Formation of igneous and metamorphic rocks
- Classification of igneous and metamorphic rocks
- Introduction to the genetic classification and formation of ore deposits.
- Magmatic, hydrothermal and sedimentary ore deposits and ore deposit models.
- Concepts of mineral exploration.
- Introduction to exploration geochemistry

Pre-requisite modules
- APG231 and APG232 and APG233

Co-requisite modules
- None

Prohibited module Combination
- None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type
- Continuous and Final Assessment (CFA)

Faculty
- Natural Sciences

Home Department
- Earth Sciences (Applied Geology)

Module Topic
- Geotectonics and field work

Generic Module Name
- Geology 322

Alpha-numeric Code
- APG322

NQF Level
- 7

NQF Credit Value
- 30

Duration
- Semester

Proposed semester to be offered.
- Second Semester

Programmes in which the module will be offered
- BSc. (Applied Geology) (3214, 3011)

Year level
- 3

Main Outcomes
- On completion of this module students should be able to:
  - Explain the concepts of global geodynamics, with focus on lithosphere dynamics, including the coupling of interior and surface processes.
  - Describe methods used for investigating large-scale tectonics.
  - Explain the impact of tectonic processes on human life (ore deposit formation, geohazards).
- Recognise geological processes on a range of scales and appreciate the close relationship between microscale processes and large-scale lithosphere dynamics.
- Identify and characterize igneous and metamorphic rocks in the field.
- Produce a detailed and comprehensive geological map of an area based on field observations and field measurements.
- Take appropriate and comprehensive observations and measurements of geological outcrops in the field.
- Produce a comprehensive report on observations and measurements, and interpretations thereof, of rocks mapped in the field.

Main Content

- Plate tectonics and related large-scale deformation processes affecting the Earth’s lithosphere such as compression, extension, strike-slip movements, and the characteristic geological features resulting from these, including orogens, rift zones, mid-ocean ridges, basins, faults or shear zones.
- Interaction between magmatism, metamorphism and lithosphere dynamics in plate boundary and plate interior settings.
- The observation of, characterization and mapping of igneous and metamorphic rocks in the field.
- Recording structural measurements of rocks in the field.
- Production of a geological report and geological maps of rock outcrops mapped in the field.

Pre-requisite modules
APG231 and APG232 and APG233

Co-requisite modules
None

Prohibited module
None

Breakdown of Learning Time

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Method of Student Assessment
Continuous Assessment (CA): 40%
Final Assessment (FA): 60%

Assessment Module type
Continuous and Final Assessment (CFA)
**Proposed semester to be offered.**  
First Semester

**Programmes in which the module will be offered**  
BSc Mathematical & Statistical Sciences (3227) (3031)  
BSc Physical Science (3233) (3120)

**Year level**  
1

**Main Outcomes**  
On completion of this module students should be able to:  
- Use notation and discuss basic concepts in the contexts of logic, set theory and elementary number theory  
- Analyse arguments in the above contexts in order to distinguish between logically valid and logically invalid arguments  
- Compare and contrast various methods of proof in the above contexts  
- Construct counter examples in the above contexts  
- Structure logically valid arguments in the above contexts

**Main Content**  
- The logic of Compound statements.  
- The logic of Quantitative Statements.  
- Elementary Number Theory and Methods of Proof.  
- Sequences and Mathematical Induction.  
- Set theory.

**Pre-requisite modules**  
None

**Co-requisite modules**  
MAT105 or MAT104 or MAM152

**Prohibited module Combination**  
None

**Breakdown of Learning Time**  

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**Method of Student Assessment**  
Continuous Assessment (CA): 50%  
Final Assessment (FA): 50%

**Assessment Module type**  
Continuous and Final Assessment (CFA)

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**Faculty**  
Natural Sciences

**Home Department**  
Mathematics and Applied Mathematics

**Module Topic**  
Mathematics

**Generic Module Name**  
Mathematics 122

**Alpha-numeric Code**  
APM122

**NQF Level**  
1

**NQF Credit Value**  
15

**Duration**  
Semester

**Proposed semester to be offered**  
Second Semester

**Programmes in which the module will be offered**  
BSc (Mathematical & Statistical Sciences) (3227,3031);  
BSc (Physical Science) (3233,3120)

**Year level**  
1

**Main Outcomes**  
On completion of this module students should be able to:  
- Apply graph theory to various problem situations.
| Main Content | • Appreciate the interdisciplinary nature of graphs.  
|              | • Transfer practical real life problems to a graph.  
|              | • Be able to apply various counting techniques in practical situations.  
|              | • Apply their knowledge of functions and relations in computer science of vectors and coordinate systems for three-dimensional space. |

| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |

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<th>Breakdown of Learning Time</th>
<th>Hours</th>
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| Total Learning Time | 150 |

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</table>
| Programmes in which the module will be offered | BSc Mathematical & Statistical Science (3227)  
| | BSc Physical Science (3233) |
| Year level | 1 |

| Main Outcomes | On completion of this module students should be able to:  
|               | • Use MATLAB to support their basic understanding of topics covered in first year mathematics.  
|               | • Understand how to simulate basic functions using MATLAB.  
|               | • Have an essential understanding of Ordinary Differential Equations (odes) and the physical applications thereof. |

| Main Content | Introduction to using MATLAB for numerical methods, simulations and modeling. |
• Solving 1st order Ordinary Differential Equations by using graphical and numerical approaches.
• Physical applications of 1st order Ordinary Differential Equations.

Pre-requisite modules: None
Co-requisite modules: MAT105 or MAT104 or MAM152
Prohibited module combination: None

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Method of Student Assessment: Continuous Assessment (CA): 60%
Final Assessment (FA): 40%
Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Biodiversity and Conservation Biology
Module Topic: Diversity of the Animal Kingdom
Generic Module Name: Animal Diversity
Alpha-numeric Code: BDC211
NQF Level: 6
NQF Credit Value: 20
Duration: Semester
Proposed semester to be offered: Second semester
Programmes in which the module will be offered: BSc (Biodiversity & Conservation Biology) (3217,3015); BSc (Environmental & Water Science) (3331, 3027)
Year level: 2

Main Outcomes:
On completion of this module students should be able to:
• Explain the evolutionary origins and relationships of animal Taxa and understand which major changes took place over evolutionary time.
• Identify and classify all major invertebrate and vertebrate taxa.
• List and compare the structure and function of at least three animal systems and understand how bodies of all major invertebrate and vertebrate groups work.
• Observe and dissect specimens to investigate the external and internal structure of animals.
• Curate and display invertebrate specimens.
• Read and conceptualise scientific ideas.
• Interpret and summarise information to write essays.

Main Content:
• Evolution, classification and identification of invertebrate and vertebrate animals; a comparative study of the structure and function of three of the following systems: skeletal, circulatory, reproductive, endocrine, digestive, respiratory and excretory.
Pre-requisite modules | LSC142 or LFS152
---|---
Co-requisite modules | None
Prohibited module Combination | None

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Methods of Student Assessment | Continuous Assessment (CA): 60% | Final Assessment (FA): 40%

Assessment Module type | Continuous and Final Assessment (CFA)

Faculty | Natural Sciences
Home Department | Biodiversity and Conservation Biology
Module Topic | Plant Ecophysiology
Generic Module Name | Plant Ecophysiology 212
Alpha-numeric Code | BDC212
NQF Level | 6
NQF Credit Value | 20
Duration | Semester
Proposed semester to be offered | Second Semester
Programmes in which the module will be offered | BSc (Biodiversity & Conservation Biology) (3015)
Year level | 2

Main Outcomes | On completion of this module students should be able to:
• Use plant growth substances to manipulate plant growth.
• Predict the effects of environmental change on plants with different photosynthetic pathways.
• Compare the roles of various nutrients.
• Understand and evaluate the role that key environmental conditions have on a plant’s physiology and the impact of this on its abundance and distribution.
• Defend their position on the above in discussion or in written format.

Main Content | • Plant growth and development, including an overview of selected plant hormones.
• Nutrient and mineral assimilation, with emphasis on nitrogen.
• Photosynthesis in C3 plants, with an exploration of alternative pathways.
• Plant mineral nutrition.
• Plant water relations.
• Environmental effects on plant growth and development.
• Plant stress physiology.

Pre-requisite modules | LSC141 or LFS151 AND CHE116 or CHM126 AND BDC221
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**Methods of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)

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<td><strong>Module Topic</strong></td>
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<td><strong>Year level</strong></td>
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**Main Outcomes**
On completion of this module students should be able to:
- Recall, classify and illustrate a suite of lower photosynthetic organisms.
- Explain the evolutionary relationship between lower photosynthetic organisms.
- Know how lower photosynthetic organisms are anatomically organized and what factors influence their growth and development.
- Distinguish between different lower photosynthetic organisms to the higher taxonomic levels.
- Compare reproduction and life cycles in various photosynthetic organisms.
- Recognize the diversity and functional significance of morphological and reproductive structure found amongst flowering plants.
- Identify and classify key fynbos plant families and genera.
- Explain critically how fynbos plants are grouped together.
- Apply plant cladistics methodology to trace phylogenetic histories of plant families and genera; and
- Construct plant identification keys.
| Main Content                                                                 | • The diversity of photosynthetic organisms and lower plants.          |
|                                                                             | • Evolutionary relationships among photosynthetic organisms and lower plants. |
|                                                                             | • The origin of organelles by endosymbiosis.                          |
|                                                                             | • Growth and organization; Life cycles and their environmental correlates. |
|                                                                             | • Identification and classification systems.                          |
|                                                                             | • Plant characters of use in cladistic methods.                       |
|                                                                             | • Sources of taxonomic information.                                 |
|                                                                             | • A review of flowering plant diversity in the fynbos, with special attention to the most species rich and endemic taxa. |
| Pre-requisite modules                                                        | LSC142 or LFS152                                                        |
| Co-requisite modules                                                        | None                                                                  |
| Prohibited module Combination                                               | None                                                                  |
| Breakdown of Learning Time                                                  | **Hours** | **Time-table Requirement per week** | **Other teaching modes that does not require time-table** |
| Contact with lecturer / tutor:                                              | 42         | Lectures p.w. 3                   |                                                        |
| Assignments & tasks:                                                       | 30         | Practicals p.w. 2X3               |                                                        |
| Practicals:                                                                | 84         | Tutorials p.w. 0                  |                                                        |
| Assessments                                                                | 14         |                                      |                                                        |
| Selfstudy                                                                  | 30         |                                      |                                                        |
| Other: Please specify                                                       | 0          |                                      |                                                        |
| **Total Learning Time**                                                     | **200**    |                                      |                                                        |
| Method of Student Assessment                                                | Continuous Assessment (CA): 60%                                      |
| Assessment Module type                                                      | Continuous and Final Assessment (CFA)                                 |
| Faculty                                                                    | Natural Sciences                                                     |
| Home Department                                                             | Biodiversity and Conservation Biology                                 |
| Module Topic                                                                | Population biology, and the evolution of biodiversity                  |
| Generic Module Name                                                        | Population Biology and Evolution 222                                  |
| Alpha-numeric Code                                                         | BDC222                                                              |
| NQF Level                                                                  | 6                                                                   |
| NQF Credit Value                                                           | 20                                                                  |
| Duration                                                                   | Semester                                                            |
| Proposed semester to be offered                                            | First Semester                                                      |
| Programmes in which the module will be offered                             | BSc (Biodiversity & Conservation Biology) (3217, 3015); BSc (Environmental & Water Science) (3331, 3027); |
| Year level                                                                 | 2                                                                   |
| Main Outcomes                                                              | On completion of this module students should be able to:          |
|                                                                             | • Describe methods used to collect field data and use them to estimate population sizes of different organisms. |
|                                                                             | • Identify and appraise the factors and processes that affect population size and growth rate. |
|                                                                             | • Develop simple computer models of populations and use them to determine the most appropriate method to manage populations sustainably. |
- Select and calculate appropriate statistics for summarizing simple biological data, and for evaluating phylogenetic trees.
- Evaluate the evidence for speciation and evolution.
- Demonstrate a detailed knowledge of the theory of evolution and phylogenetics.
- Apply cladistic methodology and software to various kinds of data in order to discover the historical relationships of organisms.
- Apply the rules of nomenclature.
- Create a new species description.
- Take responsibility for organising and managing their time and workload.
- Work effectively with others, for mutual benefit, when appropriate.
- Confidently present their work orally to an audience.
- Prepare and write scientific reports within the sphere of accepted norms, using rubrics.
- Use a personal computer for simple data analysis;

<table>
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<tr>
<th>Main Content</th>
<th>Pre-requisite modules</th>
<th>Co-requisite modules</th>
<th>Prohibited module Combination</th>
<th>Breakdown of Learning Time</th>
<th>Time Taught per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td></td>
<td>- Explain the exchange of energy, heat and water between animals and their environment.</td>
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<td></td>
<td>- Critically evaluate the role that physiology plays in influencing an animal’s survival in a changing environment.</td>
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<td></td>
<td>- Undertake basic physiological and behavioural experiments and apply appropriate concepts to analyse and interpret the data.</td>
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<td></td>
<td>- Use plant growth substances to manipulate plant growth.</td>
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<td></td>
<td>- Predict the effects of environmental change on plants with different photosynthetic pathways.</td>
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<td></td>
<td>- Compare the roles of various nutrients in plant growth and development.</td>
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<td></td>
<td>- Understand and evaluate the role that key environmental conditions have on a plant’s physiology and the impact of this on its abundance and distribution.</td>
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<td></td>
<td>- Defend their position on the above in discussion or in written format.</td>
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<td>Interaction of animals with the environment in selected ecosystems with reference to energy,</td>
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<td></td>
<td>- Thermal physiology and thermoregulation in animals</td>
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<td></td>
<td>- Water relations and osmoregulation</td>
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<td></td>
<td>- Basic experimental methods in animal physiology</td>
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<td></td>
<td>- Plant growth and development, including an overview of selected plant hormones.</td>
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<td></td>
<td>- Nutrient and mineral assimilation, with emphasis on nitrogen.</td>
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<td>- Photosynthesis in C3 plants, with an exploration of alternative pathways.</td>
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<td></td>
<td>- Plant mineral nutrition.</td>
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<td>- Plant water relations.</td>
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<td></td>
<td>- Environmental effects on plant growth and development.</td>
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<td></td>
<td>- Plant stress physiology.</td>
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### Breakdown of Learning Time

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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Biodiversity and Conservation Biology

### Module Topic
- Animal Ecophysiology and Behavioural Ecology

### Generic Module Name
- Animal Ecophysiology and Behavioural Ecology

### Alpha-numeric Code
- BDC311

### NQF Level
- 7

### NQF Credit Value
- 30

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- BSc (Biodiversity and Conservation Biology) (3217,3015)

### Year level
- 3

### Main Outcomes
- On completion of this module students should be able to:
  - Explain the exchange of energy, heat and water between animals and their environment.
  - Critically evaluate the role that physiology plays in influencing an animal’s survival in a changing environment.
  - Undertake basic physiological and behavioural experiments and apply appropriate concepts to analyse and interpret the data.
  - Explain and compare different types of behaviour in animals within an evolutionary and ecological context.
  - Apply knowledge of animals’ behaviour to conservation issues.

### Main Content
- Interaction of animals with the environment in selected ecosystems with reference to energy,
- Temperature and water relations
- Function and evolution of selected animal behaviours, including foraging, reproductive, aggressive, social and signaling behaviours.
- Experimental methods in animal physiology and behaviour.

### Pre-requisite modules
- BDC211 and BDC222 or equivalents

### Co-requisite modules
- None

### Prohibited module Combination
- None
### Breakdown of Learning Time

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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Biodiversity and Conservation Biology

### Module Topic
- Land-use and Conservation

### Generic Module Name
- Land-use and Conservation

### Alpha-numeric Code
- BDC332

### NQF Level
- 7

### NQF Credit Value
- 30

### Duration
- Semester

### Proposed semester to be offered
- Second Semester

### Programmes in which the module will be offered
- BSc (Biodiversity and Conservation Biology) (3217,3015)

### Year level
- 3

### Main Outcomes
- On completion of this module students should be able to:
  - Analyse and identify landscapes from photography and satellite imagery.
  - Interpret human impacts on landscapes.
  - Conceptualise a Bioregional plan built on an existing Systematic Biodiversity Plan and identified Critical Biodiversity Areas.
  - Appraise a Biosphere Reserve as a regionally-based planning tool.
  - Prepare management reports reflecting the required structures for a Bio-regional plan, a Biodiversity Impact Assessment, and a Biodiversity Offset alternative.
  - Use standard conventions to write and illustrate professional scientific reports.
  - Use a personal computer for data analysis; and
  - Confidently present their work orally to an audience.

### Main Content
- Biodiversity concepts such a South African vegetation types and biomes, Disturbance ecology, fragmentation and use of corridors for developing biodiversity networks;
- Non-equilibrium ecosystem dynamics (chaos models, state and transition models and tipping points);
- Biodiversity Impact Assessments; Bioregional Planning which is based on a Systematic Biodiversity Plan and Critical Biodiversity Areas;
- Restoration Ecology environmental monitoring.

### Pre-requisite modules
- BDC222 or (ESS212 and ESS221)
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<td></td>
<td>• Explain and compare different types of behaviour in animals within an evolutionary and ecological context.</td>
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<td></td>
<td>• Apply knowledge of an animal's behaviour to conservation issues.</td>
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<td></td>
<td>• Undertake basic behavioural experiments and apply appropriate concepts to analyse and interpret the data.</td>
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<tr>
<td></td>
<td>• Apply genetic data to systematics.</td>
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<td></td>
<td>• Explain the theory of laboratory procedure used to study molecular genetics.</td>
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<td></td>
<td>• Apply analytical methodology and software to various kinds of molecular data.</td>
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<td>• Present their work orally to an audience.</td>
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<td></td>
<td>• Use standard conventions to write and illustrate scientific reports.</td>
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<td>• Read, compare and contrast scientific papers.</td>
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<th>• Function and evolution of selected animal behaviours, including foraging, reproductive, aggressive, social and signaling behaviours.</th>
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<td>• Experimental methods in animal behaviour.</td>
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<td></td>
<td>• Traditional and molecular characters in molecular systematic studies, techniques for acquiring molecular data in laboratory and internet databases.</td>
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<td>• Interpretation of data derived from various DNA sources.</td>
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• Introduction to next-generation sequencing platforms and the application of genetic sequence data in population genetic studies and phylogenetic studies.
• Critical revision of different DNA sequence data analysis techniques and pitfalls.

Pre-requisite modules
BDC222 and BDC211

Co-requisite modules
None

Prohibited module
Combination
None

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<th>Hours</th>
<th>Time-table Requirement per week</th>
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<td>42</td>
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<tr>
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</table>

Total Learning Time 300

<table>
<thead>
<tr>
<th>Method of Student Assessment</th>
<th>Continuous Assessment (CA): 60% Final Assessment (FA): 40%</th>
</tr>
</thead>
</table>

Assessment Module type
Continuous and Final Assessment (CFA)

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Biodiversity and Conservation Biology</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Biogeography and Global Ecology</td>
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<tr>
<td>Generic Module Name</td>
<td>Biogeography and Global Ecology 334</td>
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<td>30</td>
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<td>Semester</td>
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<td>Second Semester</td>
</tr>
<tr>
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<td>BSc (Biodiversity and Conservation Biology) (3217, 3015)</td>
</tr>
<tr>
<td>Year level</td>
<td>3</td>
</tr>
</tbody>
</table>

Main Outcomes
On completion of this module the student should be able to:
• Discuss the past, present and projected future patterns of global biogeography.
• Examine the distribution of past floras, faunas and climate with respect to plate tectonics and compare them with current distributions.
• Explain the role that the major environmental drivers play in driving these biogeographical patterns.
• Understand the physical basis underpinning the components of global change.
• Recognise the central importance that humans play in bringing about global change.
• Understand the ecological, physiological and behavioural basis for biogeographical change.
• Contrast the fundamental differences between ecological biogeography and historical biogeography.
• Consider the biogeography of key extant plant and animal lineages.
Apply the appropriate concepts to collect, analyse and interpret multivariate environmental and ecological data. Present their position on the above in discussion or in written format.

**Main Content**
- Global biogeography: key principles and concepts.
- Continental drift and glaciation.
- Theories of biogeography and biogeographic reconstruction.
- Phylogeography
- Latitudinal gradients in diversity.
- Interactions of body and population size on diversity and distribution.
- Island biogeography theory and its applications for conservation.
- Earth as a system
- The physical nature of environmental drivers of biogeography.
- Global change: the distinction between natural variability and anthropogenically-driven change.
- Overview of the biological responses to global change.
- Basic data collection and analytical methods in biogeography.

**Pre-requisite modules**
BDC211 and BDC221 and BDC223

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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</table>

**Method of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)
Main Outcomes

On Completion of this module the student should be able to:

- Define and describe the attributes and composition of a community.
- Develop simple computer models to explore how key factors and processes influence the structure and development of biological communities.
- Explain central theories and discuss important ecological mechanisms that influence community ecological patterns in nature.
- Explain and illustrate the concept of ecosystems and the way they function.
- Differentiate between the characteristics of a suite of different ecosystems.
- Discuss critically the impacts of anthropogenic change on ecosystem integrity.
- Develop skill at reading and evaluating research reports;
- Prepare and write scientific reports within the sphere of accepted norms, using rubrics.
- Treat the Internet as a mainstream learning resource.

Main Content

- An overview of principles such as symbioses, pollination, inter-specific competition, herbivory, and succession that are used to describe community assemblages and regulation in ecological communities.
- Numeral analysis of field data will be undertaken to allow students to see the importance of these models in supporting the ecological management of biological communities.
- Conceptual overview of ecosystems, including their characteristics, components and drivers.
- Exploration of selected marine, estuarine and terrestrial ecosystems.
- Overview of anthropogenic and natural impacts on ecosystem integrity.

Pre-requisite modules: BDC222 and BDC211 and BDC221
Co-requisite modules: None
Prohibited module combination: None

Breakdown of Learning Time

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<td>Practicals p.w.</td>
<td>2X3</td>
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<tr>
<td>Tutorials p.w.</td>
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Contact with lecturer / tutor: 42
Assignments & tasks: 64
Practicals: 84
Assessments: 10
Selfstudy: 100
Other: 0

Total Learning Time: 300

Method of Student Assessment:
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

Assessment Module type: Continuous and Final Assessment (CFA)
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<tbody>
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<td>Biotechnology</td>
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<tr>
<td>Module Topic</td>
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<td>First Semester</td>
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</table>
| Programmes in which the module will be offered | BSc (Biodiversity and Conservation Biology) (3217, 3015)  
BSc (Chemical Sciences) (3220)  
BSc (Medical Biosciences) (3230, 3035)  
BSc (Biotechnology) (3211, 3007) |
| Year level             | 2                                     |

**Main Outcomes**

On completion of this module the student should be able to:

- Demonstrate an understanding of core concepts of microbiology, including the evolution and diversity of microbes; cell structure and function; metabolism; information flow and the role of microbes in ecosystems.
- Explain the dynamics of commensal, opportunistic, and pathological relationships particularly between microbes and humans.
- Carry out microbiological laboratory procedures in accordance with good laboratory practices.
- Communicate the fundamental concepts of microbiology in both written and oral format.

**Main Content**

- Introduction to microbiology, history and scope.
- Diversity of microorganisms in terms of nutrition, growth and genetics.
- Hands-on introduction to safe handling of microorganisms.
- Techniques for microbial culturing, identification, and genetic analysis.
- Use of molecular and classical methods for the classification of microorganisms.
- Role and significance of different groups of microorganisms in foods, plants, humans and animals.

**Pre-requisite modules**

(a) (CHE116 and CHE126) OR (CHE114 and CHE124); AND  
(b) (LSC141 and LSC142) OR (LFS151 and LFS152) OR (LSC141 and MBS111 and MBS121)

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

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<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td></td>
<td>Final Assessment (FA): 40%</td>
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<td>Continuous and Final Assessment (CFA)</td>
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<table>
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<th><strong>Faculty</strong></th>
<th>Natural Sciences</th>
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<tr>
<td><strong>Home Department</strong></td>
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<tr>
<td><strong>Module Topic</strong></td>
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<td>Second Semester</td>
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<table>
<thead>
<tr>
<th><strong>Programmes in which the module will be offered</strong></th>
<th>BS(B (Chemical Sciences) (3220)</th>
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<tbody>
<tr>
<td></td>
<td>BS(B (Medical Biosciences) (3230,3035)</td>
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<tr>
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<td>BS(B (Biotechnology) (3211, 3007)</td>
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<td><strong>Year level</strong></td>
<td>2</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>Main Outcomes</strong></th>
<th>On completion of this module the student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Characterize the importance of microorganisms in the environment</td>
</tr>
<tr>
<td></td>
<td>• Describe the main factors that will influence the growth of microorganisms in food</td>
</tr>
<tr>
<td></td>
<td>• Describe the characteristics and sources of predominant microorganisms in food</td>
</tr>
<tr>
<td></td>
<td>• Discuss the causative agents, suspect foods, signs and symptoms of some major foodborne diseases</td>
</tr>
<tr>
<td></td>
<td>• Discuss the methods used to isolate important spoilage microorganisms and food-borne pathogens and the role of food microbiologist in ensuring safe food products</td>
</tr>
<tr>
<td></td>
<td>• Interpret laboratory results and decide what actions need to be taken to control the growth of a particular organism</td>
</tr>
<tr>
<td></td>
<td>• Compare and contrast the pathological effects and detection methods for common food indicator microorganisms, foodborne pathogens</td>
</tr>
<tr>
<td></td>
<td>• Explain the size and complexity of food safety management</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Main Content</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Basic microbial genetics</td>
</tr>
<tr>
<td></td>
<td>• Key microbial groups in the environment</td>
</tr>
<tr>
<td></td>
<td>• Factors that influence microbes in food</td>
</tr>
<tr>
<td></td>
<td>• Food as substrate for microorganisms</td>
</tr>
<tr>
<td></td>
<td>• Microbial diversity in foods</td>
</tr>
<tr>
<td></td>
<td>• Microorganisms important in food</td>
</tr>
<tr>
<td></td>
<td>• Principles of food preservation</td>
</tr>
<tr>
<td></td>
<td>• Food Fermentations</td>
</tr>
<tr>
<td></td>
<td>• Food and public health</td>
</tr>
<tr>
<td></td>
<td>• Microbial criteria and sampling plans</td>
</tr>
<tr>
<td></td>
<td>• Food quality and safety</td>
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</table>
| **Pre-requisite modules** | (a) (CHE116 and CHE126) OR (CHE114 and CHE124) AND (LSC141 and LSC142) OR (LFS151 and LFS152)  
| | (b) OR (LSC141 and MBS111 and MBS121) |
| **Co-requisite modules** | None |
| **Prohibited module** | Combination |
| None |

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th><strong>Time</strong></th>
<th><strong>Hours</strong></th>
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<tbody>
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<td>Other:</td>
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**Total Learning Time**: 200

### Method of Student Assessment

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type

- Continuous and Final Assessment (CFA)

---

### Faculty

- Natural Science

### Home Department

- Biotechnology

### Module Topic

- Quantitative Methods in Biotechnology

### Generic Module Name

- Biotechnology 215

### Alpha-numeric Code

- BTN215

### NQF Level

- 6

### NQF Credit Value

- 20

### Duration

- Semester

### Proposed semester to be offered.

- First Semester

### Programmes in which the module will be offered

- BSc (Biodiversity and Conservation Biology) (3217, 3015)
- BSc (Chemical Sciences) (3019, 3220)
- BSc (Medical Biosciences) (3230, 3035)
- BSc (Biotechnology) (3211, 3007)

### Year level

- 2

### Main Outcomes

- On completion of this module students should be able to:
  - Correctly perform calculations commonly encountered in the biotechnology laboratory.
  - Quantify the degree of uncertainty associated with an experimentally-determined result.
  - Use software tools to graphically represent data.
  - Research a topic using scientific papers.

### Main Content

- Significant digits
- Units
- Molarity and molecular weight
- Calculate concentrations
- Calculations common in the molecular biology laboratory
- Calculations using the Michaelis Menten model of enzyme kinetics
- Graphs and straight-line equation, by hand and using MS Excel
- Introduction to statistics
- Cataloging and reading scientific papers

### Pre-requisite modules

(a) (CHE116 and CHE126) OR (CHE114 and CHE124)
   AND (LSC141 and LSC142) OR (LFS151 and LFS152)
(b) OR (LSC141 and MBS111 and MBS121)

### Co-requisite modules

None

### Co-requisite modules

None

### Prohibited module combination

None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
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### Method of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

### Assessment Module type

Continuous and Final Assessment (CFA)

### Faculty

Natural Sciences

### Home Department

Biotechnology

### Module Topic

Biomolecules

### Generic Module Name

Biomolecules 216

### Alpha-numeric Code

BTN216

### NQF Level

6

### NQF Credit Value

20

### Duration

Semester

### Proposed semester to be offered.

First Semester

### Programmes in which the module will be offered

- BSc (Medical Bioscience) (3230, 3035)
- BSc (Biodiversity and Conservation Biology) (3217, 3015)
- BSc (Dietetics) (8231)
- BSc (Sport and Exercise Science) (8051)
- BSc (Complementary Health Sciences) (8104, 8106)

### Year level

2

### Main Outcomes

On completion of this module the student should be able to:
- Demonstrate an understanding of core concepts of microbiology, including the evolution and diversity of microbes; cell structure and function; metabolism; information flow and the role of microbes in ecosystems.
- Explain the dynamics of commensal, opportunistic, and pathological relationships particularly between microbes and humans.
- Carry out microbiological laboratory procedures in accordance with good laboratory practices.
- Communicate the fundamental concepts of microbiology in both written and oral format.

### Main Content

- Introduction to microbiology, history and scope.
- Diversity of microorganisms in terms of nutrition, growth and genetics.
- Hands-on introduction to safe handling of microorganisms.
- Techniques for microbial culturing, identification, and genetic analysis.
- Use of molecular and classical methods for the classification of microorganisms.
- Role and significance of different groups of microorganisms in foods, plants, humans and animals.

### Pre-requisite modules
- (a) (CHE116 and CHE126) OR (CHE114 and CHE124) AND (LSC141 and LSC142) OR (LFS151 and LFS152)
- (b) OR (LSC141 and MBS111 and MBS121)

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<td>Lectures p.w.</td>
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<td>Assignments &amp; tasks:</td>
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<td>Selfstudy</td>
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### Method of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Biotechnology

### Module Topic
Biomolecules

### Generic Module Name
Biotechnology 217

### Alpha-numeric Code
BTN217

### NQF Level
6

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
First Semester

### Programmes in which the module will be offered
BPharmacy (3305)

### Year level
2

### Main Outcomes
On completion of this module the students should be able to:
- Identify the major classes of biological molecules and their interactions.
- Characterise the chemical and physical structure of DNA and RNA and how it stores and transfers genetic information.
- Explain the role of enzymes in regulating biological processes and analyse their effects quantitatively.
- Distinguish the major pathways by which carbohydrates are broken down to liberate energy for life.
### Main Content
- Introduction to different classes of biomolecules (nucleic acids, proteins, lipids, carbohydrates), and their interactions.
- The energetics of life
- DNA structure and function
- Enzymes as biocatalysts
- Carbohydrate metabolism

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
Combination

#### Breakdown of Learning Time

<table>
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<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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#### Method of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

#### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Biotechnology

### Module Topic
Plant and Agricultural Biotechnology

### Generic Module Name
Biotechnology 218

### Alpha-numeric Code
BTN218

### NQF Level
6

### NQF Credit Value
20

### Duration
Semester

### Proposed semester to be offered.
Second Semester

### Programmes in which the module will be offered
- BSc (Biotechnology) (3007)
- BSc (Biodiversity and Conservation Biology) (3217, 3015)

### Year level
2

### Main Outcomes
On completion of this module the student should be able to:
- Discuss and apply principles and concepts in plant and agricultural biotechnology for achieving food security, sustainable agriculture and environmental sustainability.
- Apply appropriate laboratory skills and protocols.
- Evaluate the importance of the latest developments in specific themes of plant and agricultural biotechnology.
- Retrieve relevant information from the internet and other sources.
- Communicate effectively about the issues relevant to plant biotechnology, both orally and in writing.

### Main Content
- Plant cell and tissue culture.
- Applications of plant cell and tissue culture in plant biotechnology.
• Conventional plant breeding.
• Molecular markers in plant breeding.
• Molecular diagnostics in agriculture.
• Genetic engineering of plants and animals.
• Production of therapeutics (proteins and vaccines) in plants and animals.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>(a) (CHE116 and CHE126) OR (CHE114 and CHE124); AND (LSC141 and LSC142) OR (LFS151 and LFS152)</th>
<th>(b) OR (LSC141 and MBS111 and MBS121)</th>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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<tr>
<td>Prohibited module combination</td>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
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<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
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<tr>
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| Method of Student Assessment | Continuous Assessment (CA): 60% | Final Assessment (FA): 40% |
| Assessment Module type      | Continuous and Final Assessment (CFA) |

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<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
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<tbody>
<tr>
<td>Home Department</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Molecular Biology I</td>
</tr>
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<td>Generic Module Name</td>
<td>Biotechnology 222</td>
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<td>Duration</td>
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<td>First Semester</td>
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<td>Year level</td>
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</table>

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module the student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Explain the chemical and physical structure of DNA and RNA and the implication of the latter for genetic information.</td>
</tr>
<tr>
<td></td>
<td>• Characterize the mechanisms required in converting genetic information to active proteins in prokaryotic organisms and how these mechanisms are regulated.</td>
</tr>
<tr>
<td></td>
<td>• Apply laboratory methods for isolating and manipulating DNA molecules and genes.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Molecular Biology</td>
</tr>
<tr>
<td></td>
<td>• Chemical and physical structure of DNA and RNA</td>
</tr>
<tr>
<td></td>
<td>• DNA replication, transcription and translation</td>
</tr>
</tbody>
</table>
**Mechanisms for regulation of gene expression in organisms**
- Recombinant DNA methods (theory and practice)

### Pre-requisite modules

- (a) (CHE116 and CHE126) OR (CHE114 and CHE124); AND (LSC141 and LSC142) OR (LFS151 and LFS152)
- (b) OR (LSC141 and MBS111 and MBS121)

### Co-requisite modules

None

### Prohibited module combination

None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Requirement per week</th>
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<tbody>
<tr>
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<td>Practicals p.w.</td>
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<td>Tutorials p.w.</td>
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### Total Learning Time

200

### Method of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

### Assessment Module type

Continuous and Final Assessment (CFA)

### Faculty

Natural Sciences

### Home Department

Biotechnology

### Module Topic

Biochemistry I

### Generic Module Name

Biotechnology 223

### Alpha-numeric Code

BTN223

### NQF Level

6

### NQF Credit Value

20

### Duration

Semester

### Proposed semester to be offered.

Second Semester

### Programmes in which the module will be offered

BSc (Biotechnology) (3007)

### Year level

2

### Main Outcomes

On completion of this module the student should be able to:
- Describe the main functions of proteins within the cell.
- Derive the chemical properties of amino acids and explain how these properties affect their roles in proteins.
- Characterise the structure of proteins in terms of primary, secondary, tertiary and quaternary levels of organization.
- Explain the role of enzymes in regulating biological processes and analyse their kinetic parameters quantitatively.
- Discuss the major pathways by which carbohydrates are broken down to liberate energy for life.

### Main Content

- Introduction to amino acids and proteins; protein structure and function.
- The importance of enzymes in cellular processes; the major classes of enzymes.
- Introduction to enzyme kinetics using the Michaelis-Menten model.
- Mechanisms of enzyme catalysis and regulation; thermodynamics, co-enzymes.
- Carbohydrate metabolism: glycolysis, citric acid cycle, gluconeogenesis, glycogen.

**Pre-requisite modules**
(a) (CHE116 and CHE126) OR (CHE114 and CHE124); AND (LSC141 and LSC142) OR (LFS151 and LFS152)
(b) OR (LSC141 and MBS111 and MBS121)

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

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**Total Learning Time**
200

**Method of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Biotechnology

**Module Topic**
Environmental and Industrial Microbiology

**Generic Module Name**
Environmental and Industrial Microbiology 312

**Alpha-numeric Code**
BTN312

**NQF Level**
6

**NQF Credit Value**
20

**Duration**
Semester

**Proposed semester to be offered**
Second Semester

**Programmes in which the module will be offered**
BSc (Biotechnology) (3211,3007)

**Year level**
3

**Main Outcomes**
On completion of this module students should be able to:
- Determine and assess the diversity of microorganisms in different environments.
- Compare different approaches and methods for gene discovery for biotechnological application.
- Describe various approaches to engineer enzymes and organisms in order to exploit them for industrial use.
- Design and build a microbial fuel cell for the synthesis of electricity.
- Conduct experiments to generate data which will be analysed to assess enzyme activity and organism performance.
- Use software tools to graphically present data, write essays and prepare oral and a poster presentation.
- Research a topic using the internet and use a reference manager to catalogue research papers.
### Main Content

The following topics will be covered:
- Diversity of microorganisms in different environments
- Methods for assessing (both quantitatively and qualitatively) microbial diversity and community structure (including phylogenetic markers, 16S library analysis, DGGE, ARISA etc)
- Methods for assessing microbial activity (including labeling technologies, transcriptomic analysis etc.)
- The use of microorganisms and their products in industry, (including first, second and third generation processes), in marine biotechnology and in environmental microbiology
- Fermentation processes
- Downstream processing
- Enzyme recovery, immobilization
- Biocatalysis and biotransformations

### Pre-requisite modules

BTN211, BTN215, BTN222 and BTN223

### Co-requisite modules

None

### Prohibited module combination

None

### Breakdown of Learning Time

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### Total Learning Time

300

### Methods of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

### Assessment Module type

Continuous and Final Assessment (CFA)

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### Faculty

Natural Sciences

### Home Department

Biotechnology

### Module Topic

Molecular Biology II

### Generic Module Name

Biochemistry 315

### Alpha-numeric Code

BTN315

### NQF Level

7

### NQF Credit Value

30

### Duration

Semester

### Proposed semester to be offered

First Semester

### Programmes in which the module will be offered

BSc (Biotechnology)(3211,3007)

### Year level

3

### Main Outcomes

On completion of the module students should be able to:
- Discuss and analyse the elements of the eukaryotic translation, transcriptional and splicing machinery
- Compare and contrast eukaryotic prokaryotic systems of gene regulation
- Apply advanced techniques for manipulating DNA in the laboratory
• Recognize and interrogate the structure and expression of genes and genomes
• Analyze genes and genomes using computational tools and database

**Main Content**

• Genes are DNA and code for proteins
• Methods in molecular biology and genetic engineering
• Eukaryotic gene structure
• The content of the genome
• Genome sequences and gene numbers
• Chromosome structure and function
• Mechanism and machinery of eukaryotic transcription
• Eukaryotic translation
• Eukaryotic transcription regulation
• Regulatory RNA
• Introduction to bioinformatics and databases
• Sequences alignment and BLAST
• Annotation of sequence data
• Computational tools for gene and genome analysis

**Pre-requisite modules**
BTN211, BTN215, BTN222 and BTN223

**Co-requisite modules**
None

**Prohibited module Combination**
None

<table>
<thead>
<tr>
<th>A. Breakdown of Learning Time</th>
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<tr>
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<td>Practicals p.w. 2</td>
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<tr>
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<td>Tutorials p.w. 1</td>
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</tr>
<tr>
<td>Practical’s:</td>
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<td>Self-study</td>
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**Method of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module Type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Biotechnology

**Module Topic**
Human Biotechnology

**Generic Module Name**
Biochemistry 316

**Alpha-numeric Code**
BTN316

**NQF Level**
7

**NQF Credit Value**
30

**Duration**
Semester

**Proposed semester to be offered**
Second Semester

**Programmes in which the module will be offered**
BSc (Biotechnology) (3211, 3007)

**Year level**
3

**Main Outcomes**
On completion of this module students should be able to:
• Calculate the probability of DNA profile matching and prepare the data suitable for presentation as evidence in court.
• Trace individual genealogies by using mitochondrial DNA and the Y-chromosomes.
• Analyses the importance of viruses as independent genetic elements and how they can be exploited for the treatment of disease.
• Use the principle of gene therapy to design viral and non-viral gene delivery systems.
• Apply and understanding of the mechanisms responsible for immunity to the development of diagnostic tests and vaccines.

<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
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<tbody>
<tr>
<td>• The genetic basis of identity</td>
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</tr>
<tr>
<td>• DNA typing system</td>
<td></td>
</tr>
<tr>
<td>• Probability matching and use of DNA evidence</td>
<td></td>
</tr>
<tr>
<td>• Tracing genealogies by mtDNA and the Y-chromosome</td>
<td></td>
</tr>
<tr>
<td>• General characterization of viruses</td>
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</tr>
<tr>
<td>• Viral infections and antiviral agents</td>
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</tr>
<tr>
<td>• Viral disease and vaccines</td>
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<tr>
<td>• AIDS and treatments</td>
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<tr>
<td>• Prions</td>
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<tr>
<td>• General principles of Gene Therapy</td>
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<tr>
<td>• Viral delivery systems in gene therapy</td>
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<tr>
<td>• Overview of immunity</td>
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</tr>
<tr>
<td>• Antibody diversity</td>
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<tr>
<td>• Monoclonal antibodies</td>
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<td>• Antibody engineering</td>
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<tr>
<td>• Immunological diagnostic tests</td>
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<td>• Immune memory and vaccination</td>
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<tr>
<td>• Creating a vaccine</td>
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<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>BTN211, BTN215, BTN222 and BTN223</th>
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<tr>
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<th>Continuous Assessment (CA): 60%</th>
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<tr>
<td>Assessment Module type</td>
<td>Final Assessment (FA): 40%</td>
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</table>

229
Programmes in which the module will be offered | BSc (Biotechnology) (3211,3007)
---|---
Year level | 3

**Main Outcomes**

On completion of this module, students should be able to:
- Express and purify proteins in the laboratory.
- Visualise protein structures on a computer.
- Explain the function of a number of proteins and cellular processes in terms of 3-dimensional structures.
- Illustrate the relationship between protein structure and function in a number of diseases.
- Conduct research using the library, the web and other sources of information.
- Use the internet, MS Word, MS Excel, MS Powerpoint to complete tasks.
- Present well-structured practical reports.

**Main Content**

- Protein expression
- Protein purification
- Mechanisms of catalysis
- Enzyme regulation and allostery; haemoglobin and oxygen transport; molecular motors
- Membranes, membrane proteins, channels and pumps
- Lipid biosynthesis
- Lipid metabolism
- Gene transcription
- Gene translation
- Protein turnover and the ubiquitin-proteasome system
- Protein folding and chaperones
- HIV protease and HIV reverse transcriptase
- Cancer, pRB and p53

**Pre-requisite modules**

BTN211, BTN215, BTN222 and BTN223

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

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**Methods of Student Assessment**

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**

Continuous and Final Assessment (CFA)

**Faculty**

Natural sciences

**Home Department**

Chemistry

**Module Topic**

General chemistry

**Generic Module Name**

Chemistry 114

**Alpha-numeric Code**

CHE114

**NQF Level**

5

**NQF Credit Value**

15
<table>
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<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Apply the following chemical concepts and principles to qualitatively engage with real-world phenomena or examples: accepted symbolic conventions; models for understanding structure and bonding; links between electronic structure and reactivity; and mass and energy balance in chemical reactions.</td>
</tr>
<tr>
<td></td>
<td>• Solve quantitative chemistry problems, both in familiar and novel contexts.</td>
</tr>
<tr>
<td></td>
<td>• Conduct simple scientific investigations, including the collection, handling and interpretation of experimental data.</td>
</tr>
<tr>
<td></td>
<td>• Conduct research using the library, the web and other sources of information.</td>
</tr>
<tr>
<td></td>
<td>• Reference sources of information correctly.</td>
</tr>
<tr>
<td></td>
<td>• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete selected tasks.</td>
</tr>
<tr>
<td></td>
<td>• Recognise the relationship of chemistry to society, technology and the environment.</td>
</tr>
<tr>
<td></td>
<td>• Begin to develop life-long learning capabilities and to see chemistry as discipline in a wider context.</td>
</tr>
<tr>
<td></td>
<td>• Present a clear, well-structured oral presentation and well-structured practical reports.</td>
</tr>
<tr>
<td></td>
<td>• Work productively in co-operative learning groups.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Basic concepts of chemistry</td>
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<tr>
<td></td>
<td>Atoms, molecules and ions</td>
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<td></td>
<td>Chemical reactions</td>
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<td>Energy and chemical reactions</td>
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<td>Bonding and molecular structure</td>
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<tr>
<td>Other:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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<tr>
<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA): 60%</td>
</tr>
<tr>
<td></td>
<td>Final Assessment (FA): 40%</td>
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<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Module Topic</td>
<td>General chemistry</td>
</tr>
<tr>
<td>Generic Module Name</td>
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<td>Alpha-numeric Code</td>
<td>CHE116</td>
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<td>First Semester</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc (Biodiversity &amp; Conservation Biology) (3217, 3015); BSc (Biotechnology) (3211, 3007); BSc (Environmental &amp; Water Science) (3331, 3027); BSc (Medical Bioscience) (3230, 3035); BSc (SRES) (8051); BSc (Complementary Health Sciences) (8104); BSc (Complementary Health Sciences-CMA) (8106); BSc (Dietetics) (8231)</td>
</tr>
<tr>
<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Apply the following chemical concepts and principles to qualitatively engage with real-world phenomena or examples: accepted symbolic conventions; models for understanding structure and bonding; links between electronic structure and reactivity; and mass and energy balance in chemical reactions.</td>
</tr>
<tr>
<td></td>
<td>• Solve quantitative chemistry problems, both in familiar and novel contexts.</td>
</tr>
<tr>
<td></td>
<td>• Conduct simple scientific investigations, including the collection, handling and interpretation of experimental data.</td>
</tr>
<tr>
<td></td>
<td>• Conduct research using the library, the web and other sources of information.</td>
</tr>
<tr>
<td></td>
<td>• Reference sources of information correctly.</td>
</tr>
<tr>
<td></td>
<td>• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete selected tasks.</td>
</tr>
<tr>
<td></td>
<td>• Recognise the relationship of chemistry to society, technology and the environment.</td>
</tr>
<tr>
<td></td>
<td>• Begin to develop life-long learning capabilities and to see chemistry as discipline in a wider context.</td>
</tr>
<tr>
<td></td>
<td>• Present a clear, well-structured oral presentation and well-structured practical reports.</td>
</tr>
<tr>
<td></td>
<td>• Work productively in co-operative learning groups.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Basic concepts of chemistry</td>
</tr>
<tr>
<td></td>
<td>• Atoms, molecules and ions</td>
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<tr>
<td>Pre-requisite modules</td>
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<td>Co-requisite modules</td>
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<tr>
<td>Prohibited module</td>
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<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>50</td>
<td>Lectures p.w.</td>
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<td>Assignments &amp; tasks:</td>
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<td>Practicals:</td>
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<td>Tutorials p.w.</td>
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</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
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<td></td>
<td></td>
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<tr>
<td>Other:</td>
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| Methods of Student Assessment | | |
|-------------------------------|------------------|
| Continuous Assessment (CA): 60% |
| Final Assessment (FA): 40% |

<table>
<thead>
<tr>
<th>Assessment Module type</th>
<th>Continuous and Final Assessment (CFA)</th>
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</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
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<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
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<tr>
<td>Module Topic</td>
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<td>Proposed semester to be offered</td>
<td>Second Semester</td>
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<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>BSc (Chemical Sciences) (3019, 3220); BPharm (3305); BSc (Applied Geology) (3011, 3214); BSc (Physical Sciences) (3120, 3233)</th>
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<table>
<thead>
<tr>
<th>Year level</th>
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</table>

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Apply the following chemical concepts and principles to qualitatively engage with real-world phenomena or examples: the accepted language and conventions for naming simple compounds and communicating about their chemical properties and behaviour; the forces acting between particles in matter that influence properties and behaviour; the factors that influence chemical stability; the forces that drive chemical change; and the factors that control the rate at which chemical change takes place.</td>
</tr>
</tbody>
</table>
- Solve quantitative chemistry problems, both in familiar and novel contexts.
- Conduct simple scientific investigations, including the collection, handling and interpretation of experimental data.
- Conduct research using the library, the web and other sources of information.
- Reference sources of information correctly.
- Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.
- Begin to recognise the relationship of chemistry to society, technology and the environment.
- Begin to develop life-long learning capabilities and to see learning about chemistry in a wider context.
- Present clear, well-structured arguments using the content of this module to describe and explain the properties and behaviour of matter.
- Work productively in co-operative learning groups.

Main Content

- Intermolecular forces, liquids and solids
- Solutions and their behaviour
- Chemical kinetics: The rates of chemical reactions
- Principles of reactivity: chemical equilibria, cqueous equilibria, including acid-base and solubility equilibria, and electron transfer reactions
- Introductory concepts in Organic Chemistry, including nomenclature, physical properties, and representation of structure of: alkanes, alkenes, alkynes, alkyl halides, alcohols, aldehydes and ketones, and carboxylic acids and their derivatives
- An introduction to reactivity with reference to substitution, addition, elimination and oxidation of organic substrates.
- An introduction to isomerism with reference to geometric, cis-trans, E,Z and R,S isomers/enantiomers.
- An introduction to stability with reference to ring strain, and the relative stabilities of alkenes and carboniumions.

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>50 Lectures p.w.</td>
<td>3</td>
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<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals:</td>
<td>30 Tutorials p.w.</td>
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<tr>
<td>Tests &amp; Examinations:</td>
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<tr>
<td>Selfstudy:</td>
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<td>Other:</td>
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</table>

Methods of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

Assessment Module type
Continuous and Final Assessment (CFA)
### Module 1: Chemistry for Nursing (Foundation)

**Faculty:** Natural Sciences  
**Home Department:** Chemistry  
**Module Topic:** Chemistry for Nursing (Foundation)  
**Generic Module Name:** Chemistry 114  
**Alpha-numeric Code:** CHM114  
**NQF Level:** 5  
**NQF Credit Value:** 15  
**Duration:** Year  
**Proposed semester to be offered:** Both Semesters  
**Programmes in which the module will be offered:** BNur (Foundation Program) (8310)  
**Year level:** 5

#### Main Outcomes

On completion of this module, students should be able to:
- To apply basics of inorganic and general chemistry and develop at the end of this module, the student is required to understand the fundamentals of organic chemistry.

#### Main Content

- Introduction to chemistry, periodic table, atoms, molecules, ions, chemical formulae, mole concept, chemical reactions, chemical bonds, redox reactions, gases, solutions, acids and bases, hydrocarbons, alcohols and ethers, aldehydes and ketones, carboxylic acids and esters, amines and amides, carbohydrates, proteins, lipids.

#### Pre-requisite modules

UWC requirements for admission to Community and Health Sciences.

#### Co-requisite modules

None

#### Prohibited modules

CHE128, CHE116

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
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<tr>
<td>Practical:</td>
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<td>Tutorials:</td>
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<td>Tests &amp; Examinations:</td>
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</tr>
<tr>
<td>Selfstudy:</td>
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</tr>
<tr>
<td>Other:</td>
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</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
<td>150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methods of Student Assessment**

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**

- Continuous and Final Assessment (CFA)

---

### Module 2: General Chemistry

**Faculty:** Natural Sciences  
**Home Department:** Chemistry  
**Module Topic:** General Chemistry  
**Generic Module Name:** Chemistry 126  
**Alpha-numeric Code:** CHM126  
**NQF Level:** 5  
**NQF Credit Value:** 15  
**Duration:** Semester  
**Proposed semester to be offered:** Second Semester

---

235
| Programmes in which the module will be offered | BSc (Biodiversity & Conservation Biology) (3217, 3015); BSc (Biotechnology) (3211, 3007); BSc (Environmental & Water Science) (3331, 3027); BSc (Medical Bioscience) (3230, 3035) |
| Year level | 1 |
| Main Outcomes | On completion of this module students should be able to:  
• Apply the following chemical concepts and principles to qualitatively engage with real-world phenomena for examples: links between different types of equilibria and calculation the different parameters related to the reaction kinetics.  
• Correlate between different organic function group and understanding the main differences between them.  
• Solve quantitative chemistry problems, both in familiar and novel contexts.  
• Conduct simple scientific investigations, including the collection, handling and interpretation of experimental data.  
• Conduct research using the library, the web and other sources of information.  
• Reference sources of information correctly.  
• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete selected tasks.  
• Recognise the relationship of chemistry to society, technology and the environment.  
• Begin to develop life-long learning capabilities and to see chemistry as discipline in a wider context.  
• Present a clear, well-structured oral presentation and well-structured practical reports.  
• Work productively in co-operative learning groups. |
| Main Content | • Reaction kinetics, equilibrium  
• Acids and bases acid ionization equilibria  
• Solubility and solutions,  
• Alkanes, alkenes, alkynes, alkyl halides, Alcohols, phenols, ethers, aldehydes and ketones, carboxylic acids and derivatives, carbohydrates, amines, amino acids and proteins, lipids and fats |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 50 | Lectures p.w. | 3 |
| Assignments & tasks: | 10 | Practicals p.w. | 1 |
| Practicals: | 30 | Tutorials p.w. | 1 |
| Tests & Examinations: | 15 | | |
| Selfstudy: | 45 | | |
| Other: | 0 | | |
| Total Learning Time | 150 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 60%  
Final Assessment (FA): 40% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
Faculty | Natural Sciences
--- | ---
Home Department | Chemistry
Module Topic | Chemistry for Dentistry
Generic Module Name | Chemistry 128
Alpha-numeric Code | CHM128
NQF Level | 5
NQF Credit Value | 15
Duration | Semester
Proposed semester to be offered | First Semester
Programmes in which the module will be offered | BDS (5101)
Year level | 1

Main Outcomes | On completion of this module students should be able to:
--- | ---
| • Apply the following chemical concepts and principles to qualitatively engage with real-world phenomena or examples: accepted symbolic conventions; models for understanding structure and bonding; links between electronic structure and reactivity; and mass and energy balance in chemical reactions.
| • Solve quantitative chemistry problems, both in familiar and novel contexts.
| • Conduct simple scientific investigations, including the collection, handling and interpretation of experimental data.
| • Conduct research using the library, the web and other sources of information.
| • Reference sources of information correctly.
| • Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete selected tasks.
| • Recognise the relationship of chemistry to society, technology and the environment.
| • Begin to develop life-long learning capabilities and to see chemistry as discipline in a wider context.
| • Present a clear, well-structured oral presentation and well-structured practical reports.
| • Work productively in co-operative learning groups.

Main Content | • Basic concepts of chemistry
--- | ---
| • Atoms, molecules and ions
| • Chemical reactions
| • Quantitative information about chemical reactions (Stoichiometry)
| • Atomic structure and periodic trends
| • Bonding and molecular structure
| • Gases and their properties
| • Electron transfer reactions
| • The chemistry of acid and bases
| • Hydrocarbons, Alcohols and Ethers, Aldehydes and Ketones,
| • Carboxylic Acids and Esters, Amines and Amides,
| • Carbohydrates, Proteins, Lipids

Pre-requisite modules | None
--- | ---
Co-requisite modules | None
<table>
<thead>
<tr>
<th>Prohibited module Combination</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown of Learning Time</td>
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</tr>
<tr>
<td><strong>Hours</strong></td>
<td><strong>Timetable Requirement per week</strong></td>
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<tr>
<td>Selfstudy:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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<td><strong>Methods of Student Assessment</strong></td>
<td>Continuous Assessment (CA): 60%</td>
</tr>
<tr>
<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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<td>Faculty</td>
<td>Natural Sciences</td>
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<tr>
<td>Home Department</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Organic and Inorganic Chemistry</td>
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<td>Proposed semester to be offered</td>
<td>First Semester</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc (Biotechnology) (3211, 3007); BSc (Chemical Science) (3220,3019); BSc (Physical Science) (3233, 3120)</td>
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<td>Year level</td>
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<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Define the main atomic properties of elements and explain the major periodic trends observed for these properties.</td>
</tr>
<tr>
<td></td>
<td>• Account for the major diagonal relationships in the periodic table.</td>
</tr>
<tr>
<td></td>
<td>• Understand the main descriptive chemistry of the major classes of main group elements.</td>
</tr>
<tr>
<td></td>
<td>• Describe the major physical properties of transition elements.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate an understanding of the basic principles of organometallic chemistry of transition metals.</td>
</tr>
<tr>
<td></td>
<td>• Identify and categorize the different reactions of aromatic compounds.</td>
</tr>
<tr>
<td></td>
<td>• Classify and execute stereochemical relationships.</td>
</tr>
<tr>
<td></td>
<td>• Recognize and recall the basics of organometallic chemistry.</td>
</tr>
<tr>
<td></td>
<td>• Distinguish the different reactions of organic and inorganic chemical compounds.</td>
</tr>
<tr>
<td><strong>Main Content</strong></td>
<td>Aromatic Chemistry, Stereochemistry, Bi-Functional Conjugated Systems.</td>
</tr>
<tr>
<td></td>
<td>Atomic properties of elements, diagonal relationships in the periodic table, descriptive chemistry of the important classes of main group elements, physical properties of transition metals, introduction to Organometallic chemistry.</td>
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</table>
Pre-requisite modules: CHE114 and CHM124 or CHE116 and CHM126

Co-requisite modules: None

Prohibited module Combination: None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
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<td>50</td>
<td>Lectures p.w.</td>
<td>3</td>
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<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
<td>1</td>
</tr>
<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
<td>1</td>
</tr>
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<td>Other:</td>
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Total Learning Time: 200

Methods of Student Assessment

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences

Home Department: Chemistry

Module Topic: Physical and Analytical Chemistry

Generic Module Name: Chemistry 212

Alpha-numeric Code: CHM212

NQF Level: 6

NQF Credit Value: 20

Duration: Semester

Proposed semester to be offered: Second Semester

Programmes in which the module will be offered

- BSc (Biotechnology) (3211, 3007); BSc (Chemical Science) (3019); BSc (Physical Science) (3233, 3120)

Year level: 6

Main Outcomes

On completion of this module students should be able to:
- Interpret and illustrate the practice of wet analytical techniques.
- Mathematically translate and explain the principle, theories and laws governing simple chemical systems.

Main Content

- Gravimetry, titrimetric methods for acids/bases, redox titrations, complexometric titrations, precipitation, pH measurements, kinetic molecular theory, van der waals equation for real gases, laws of thermodynamics, chemical kinetics, theory of elementary reactions.

Pre-requisite modules: CHE114 and CHM124 or CHE116 and CHM126.

Co-requisite modules: None

Prohibited module Combination: None

Breakdown of Learning Time

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<tr>
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
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<tr>
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### Faculty
- Natural Sciences

### Home Department
- Chemistry

### Module Topic
- Physical and Analytical Chemistry

### Generic Module Name
- Chemistry 212

### Alpha-numeric Code
- CHM212

### NQF Level
- 6

### NQF Credit Value
- 20

### Duration
- Semester

### Proposed semester to be offered
- Second Semester

### Programmes in which the module will be offered
- BSc (Biotechnology) (3211, 3007); BSc (Chemical Science) (3019,3019); BSc (Physical Science) (3233, 3120)

### Year level
- 6

### Main Outcomes
- On completion of this module students should be able to:
  - Interpret and illustrate the practice of wet analytical techniques.
  - Mathematically translate and explain the principle, theories and laws governing simple chemical systems.

### Main Content
- Gravimetry, titrimetric methods for acids/bases, redox titrations, complexometric titrations, precipitation, pH measurements, kinetic molecular theory, van der waals equation for real gases, laws of thermodynamics, chemical kinetics, theory of elementary reactions.

### Pre-requisite modules
- CHE114 and CHM124 or CHE116 and CHM126

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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<tr>
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<tr>
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</table>

### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
- Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Applied and Industrial Chemistry 3</td>
</tr>
<tr>
<td>Generic Module Name</td>
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<tr>
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<td>BSc. Chemical Science (3220) (3019)</td>
</tr>
<tr>
<td></td>
<td>BSc. Physical Science (3233) (3120)</td>
</tr>
<tr>
<td>Year level</td>
<td>2</td>
</tr>
</tbody>
</table>

**Main Outcomes**

- Use the principles, techniques, characteristics & applications of chemical processes and pharmaceutical industries and their products.
- Demonstrate the nature and control of corrosion phenomena; as well as the role of electrochemistry chemical industries and in energy generation; electrochemical sensors and environmental electrochemistry.

**Main Content**

- Characteristics and types of chemical industries.
- Basic principles of process design.
- Sources and properties of organic and inorganic raw materials.
- Industrial chemistry processes including cracking, desulphurization, distillation.
- Fischer Tropsch process, hydrogenation, liquefaction, and syn gas systems.
- Pharmaceutical industry; chloro-alkali process; fuel cells, batteries and capacitors; electrolysis; electroplating, electrocatalysis and electrosynthesis.
- Kinetics and technology of corrosion of metals and its prevention.
- Potentiometric sensors or ion selective electrodes; amperometric sensors; environmental electrochemistry.

**Pre-requisite modules**

CHM211 and CHM212

**Co-requisite modules**

None

**Prohibited module Combination**

None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Method of Student Assessment**

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**

Continuous and Final Assessment (CFA)
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<td>First Semester</td>
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<td>BSc Chemical Science (3220) (3019) BSc programmes where prerequisites are met</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module student should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Classify and tabulate the different organic rearrangements.</td>
</tr>
<tr>
<td></td>
<td>• Comprehend the relationships between confirmation and reactivity.</td>
</tr>
<tr>
<td></td>
<td>• Execute synthetic protocols of mono- and polysaccharides, heterocyclic aromatics and organometallic systems in organic chemistry.</td>
</tr>
<tr>
<td></td>
<td>• Explain the bonding in co-ordination and inorganic chemistry.</td>
</tr>
<tr>
<td></td>
<td>• Implement physical methods to characters co-ordination and organometallic compounds</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Molecular rearrangements,</td>
</tr>
<tr>
<td></td>
<td>• applications of organometallic chemistry to organic synthesis, advance synthetic methodologies,</td>
</tr>
<tr>
<td></td>
<td>• non-benzenoid aromatics, heterocyclic aromatic systems, carbohydrate chemistry;</td>
</tr>
<tr>
<td></td>
<td>• Bonding theories in inorganic chemistry, introduction to co-ordination chemistry, stability of complex ions, physical methods in inorganic chemistry</td>
</tr>
<tr>
<td></td>
<td>• (1H and multinuclear NMR, infrared mass spectrometry, ESR, Mossbauer, Thermal analysis).</td>
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<td>Pre-requisite modules</td>
<td>CHM211 and CHM212</td>
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<td>Selfstudy:</td>
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<td>Second Semester</td>
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<td>BSc Chemical Sciences (3019) (3220)</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Use various instrumental analysis techniques with respect to their principles, instrument components and applications.</td>
</tr>
<tr>
<td></td>
<td>• Apply these techniques to synthetic materials (organic and inorganic).</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Molecular spectroscopy (uv-visible and infrared spectroscopy, mass spectrometry, 1H-NMR and 13C-NMR).</td>
</tr>
<tr>
<td></td>
<td>• Atomic spectroscopy (atomic absorption, atomic emission spectroscopy).</td>
</tr>
<tr>
<td></td>
<td>• Separation science (principles of chromatography, gas chromatography, liquid chromatography).</td>
</tr>
<tr>
<td></td>
<td>• Electro analytical techniques (introduction to electro analytical chemistry, potentiometry, columeiry, voltammetry).</td>
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<tr>
<td>Pre-requisite modules</td>
<td>CHM211 and CHM212</td>
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<td>Continuous and Final Assessment (CFA)</td>
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<thead>
<tr>
<th>Faculty</th>
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<tbody>
<tr>
<td>Home Department</td>
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<td>Problem Solving, Algorithms, and Programming</td>
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<td>Duration</td>
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<td>Programmes in which the module will be offered</td>
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<td>Year level</td>
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</table>
| Main Outcomes | On completion of this module students should be able to:  
- Read, understand and solve problems.  
- Apply problem solving techniques.  
- Have acquired improve analytical thinking.  
- Understand sequence, selection, repetition and control structures.  
- Design an algorithm to solve a given problem.  
- Express an algorithm in pseudocode/structured diagram.  
- Implement algorithms in high-level programming language (e.g. Java).  
- Understand the Software Development Life cycle.  
- To pass parameters and use arrays.  
- Understand & implement the Object Oriented (OO) paradigm & inheritance.  
- Design and present a team project. |
| Main Content | Problem solving; algorithm design; trace tables; constructs.  
- Abstraction;  
- Pseudocode.  
- Structured diagramming techniques (top-down design).  
- Arrays and data structures.  
- Development and application of simple algorithms.  
- High level programming language fundamentals.  
- Basic data types & methods.  
- The Software Development Life Cycle.  
- Design tools and object oriented design.  
- Inter-modular communication: Parameter passing and variable scope.  
- Objects as parameters.  
- Introduction to inheritance.  
- Data modeling, File I/O and recursion. |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 112 | Lectures p.w. | 3 |
| Assignments & tasks: | 20 | Practicals p.w. | 1 |
| Practicals: | 84 | Tutorials p.w. | 1 |
| Tests & Examinations: | 20 | | |
| Selfstudy: | 64 | | |
| Other: | 0 | | |
| Total Learning Time | 300 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 60%  
Final Assessment (FA): 40% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
Faculty | Natural Sciences  
---|---  
Home Department | Computer Science  
Module Topic | Computer Science 114/124  
Generic Module Name | Computing Fundamentals  
Alpha-numeric Code | COS114  
NQF Level | 5  
NQF Credit Value | 15  
Duration | Semester  
Proposed semester to be offered | First Semester  
Programmes in which the module will be offered | BSc (Applied Geology) (3214); BSc (Biotechnology) (3211); BSc (Medical Bioscience) (3230); BSc (Computer Science) (3221); BSc (Mathematical & Statistical Sciences) (3227); BSc (Physical Science) (3233)  
Year level | 1  
Main Outcomes | On completion of this module students should be able to:  
• Use computers (including e-mail and Internet), Software and multimedia to create and edit documents.  
• Skillfully use of worksheets and databases.  
• Integrate different application software packages.  
• Understand programs, data, files and file organization on a computer system, computer architecture, the computer marketplace; local area networks, and e-mail; the Internet, data security and control.  
Main Content | Practical Concepts:  
• Introduction to an operating system, e-mail and the Internet.  
• Applications software including word processing and spreadsheets; introduction to database management; introduction to presentation graphics; and the integration of the above mentioned application programs.  
Theoretical Concepts:  
• System programs; data and data organization.  
• Files and records, file management.  
• Principles and usage of basic software.  
• Systems programs; data and data organization.  
• Computer architecture; The computer marketplace.  
• Local area networks and e-mail.  
• The Internet, data security and control.  
Pre-requisite modules | None  
Co-requisite modules | None  
Prohibited module combination | Computer Literacy modules offered by other faculties and departments.  
Breakdown of Learning Time |  
| Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |  
Contact with lecturer / tutor: | 32 | Lectures p.w. | 3 |  
Assignments & tasks: | 10 | Practicals p.w. | 3 |  
Practicals: | 32 | Tutorials p.w. | 1 |  
Tests & Examinations: | 10 | | |
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</table>
| **Methods of Student Assessment** | Continuous Assessment (CA): 100%  
Final Assessment (FA): 0% |
| **Assessment Module type** | Continuous Assessment (CA) |

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<tbody>
<tr>
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</tr>
<tr>
<td><strong>Module Topic</strong></td>
<td>Computer Science 114/124</td>
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<td><strong>Generic Module Name</strong></td>
<td>Computing Fundamentals</td>
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<tr>
<td><strong>Alpha-numeric Code</strong></td>
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<td>Semester</td>
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<td><strong>Proposed semester to be offered</strong></td>
<td>Second Semester</td>
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<tr>
<td><strong>Programmes in which the module will be offered</strong></td>
<td>BSc (Applied Geology) (3214); BSc (Biotechnology) (3211); BSc (Medical Bioscience) (3230); BSc (Computer Science) (3221); BSc (Mathematical &amp; Statistical Sciences) (3227); BSc (Physical Science) (3233)</td>
</tr>
<tr>
<td><strong>Year level</strong></td>
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</tbody>
</table>

### Main Outcomes

On completion of this module students should be able to:
- Use computers (including e-mail and Internet), Software and multimedia to create and edit documents.
- Skillfully use of worksheets and databases.
- Integrate different application software packages.
- Understand programs, data, files and file organization on a computer system, computer architecture, the computer marketplace; local area networks, and e-mail; the Internet, data security and control.

### Main Content

**Practical Concepts:**
- Introduction to an operating system, e-mail and the Internet.
- Applications software including word processing and spreadsheets; introduction to database management; introduction to presentation graphics; and the integration of the above mentioned application programs.

**Theoretical Concepts:**
- System programs; data and data organization.
- Files and records, file management.
- Principles and usage of basic software.
- Systems programs; data and data organization.
- Computer architecture; The computer marketplace.
- Local area networks and e-mail.
- The Internet, data security and control.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
Computer Literacy modules offered by other faculties and departments.
<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
<td>3</td>
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<td>Tutorials p.w.</td>
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<td>Selfstudy:</td>
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<td><strong>Total Learning Time</strong></td>
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| Methods of Student Assessment | | |
|-------------------------------|------------------|
| Continuous Assessment (CA): | 100% |
| Final Assessment (FA): | 0% |

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<tr>
<td>Year level</td>
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</tr>
</tbody>
</table>

**Main Outcomes**

- On completion of this module students should be able to:
  - Can implement many algorithms that run correctly on computing machinery.
  - Can derive and explain the time and space complexity of algorithms.
  - Is able to tackle software problems from a procedural, object-oriented approach.
  - Construct models and produce working products from tools that the student has produced ab initio.

**Main Content**

- Data structures.
- Implementation of algorithms for manipulation.
- The time and space complexity of the algorithms.
- Efficiency of algorithms.
- Correctness of algorithms by induction proofs.
- Loop invariants.
- Asymptotic bounds for algorithms.

<table>
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<tr>
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<th>COS101 and (COS114 or COS124)</th>
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<tr>
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<td>Prohibited module combination</td>
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## Breakdown of Learning Time

<table>
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<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td>Contact with lecturer / tutor:</td>
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247
<table>
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</tr>
<tr>
<td><strong>Other:</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
<td>200</td>
</tr>
</tbody>
</table>

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

<table>
<thead>
<tr>
<th><strong>Faculty</strong></th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home Department</strong></td>
<td>Computer Science</td>
</tr>
<tr>
<td><strong>Module Topic</strong></td>
<td>Algorithms and Architecture</td>
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<tr>
<td><strong>Generic Module Name</strong></td>
<td>Computer Science 212</td>
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<tr>
<td><strong>Alpha-numeric Code</strong></td>
<td>CSC212</td>
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<td><strong>Duration</strong></td>
<td>Semester</td>
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<td>Second Semester</td>
</tr>
<tr>
<td><strong>Programmes in which the module will be offered</strong></td>
<td>BSc (Computer Science) (3221, 3023); BSc (Mathematical &amp; Statistical Sciences) (3227); BSc (Physical Science) (3233, 3120)</td>
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<tr>
<td><strong>Year level</strong></td>
<td>2</td>
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</tbody>
</table>

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain standard algorithmic methods, algorithm efficiency, algorithm complexity and the ability to apply these.
  - Explain the nature of computationally intractable problems and the role of heuristics.
  - Demonstrate improved analytical thinking and problem solving skills.
  - Explain the interaction between low- and high-level software and hardware and knowledge of the architecture of a typical RISK processor at the conventional machine level.
  - Explain the limitations and bottlenecks in modern processors and how hardware components and their interconnection affect the performance of a computer.

**Main Content**
- Algorithms, and Complexity
  - Recursion, searches and traversal, divide and conquer, greedy algorithms, dynamic programming.
  - Program correctness; primitive recursive functions, mu-recursive functions, partial functions, Church-Turing thesis, time complexity of algorithms, average case complexity.
  - Classes P and NP, reducibility, NP-completeness, decidability, certificates.
  - Probabilistic algorithms.
- Architecture
  - System buses.
  - Internal memory and external storage.
  - Input/Output.
  - Instruction sets.
• Operands and operations.
• Addressing modes and formats.
• Processor and register organization.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
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<tbody>
<tr>
<td>Co-requisite modules</td>
<td>Computer Science - CSC211 or equivalent</td>
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<tr>
<td>Prohibited module Combination</td>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>42</td>
<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>28</td>
<td>Practicals p.w.</td>
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<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
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<thead>
<tr>
<th>Methods of Student Assessment</th>
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<tbody>
<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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<table>
<thead>
<tr>
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<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Capita Selecta Second Year</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
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<tr>
<td>Proposed semester to be offered</td>
<td>Second Semester</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc (Computer Science) (3023)</td>
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<tr>
<td>Year level</td>
<td>2</td>
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</table>

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Have the knowledge and skills pertaining to a topic in Computer Science that is not covered by or that is an extension to an existing Computer Science level 6 module.</td>
</tr>
</tbody>
</table>

| Main Content | Special topics as determined by the lecturer, visiting academic or industrial partner. |

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>COS101 and (COS114 or COS124)</th>
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<tr>
<td>Co-requisite modules</td>
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<td>Prohibited module Combination</td>
<td>Computer Literacy modules offered by other faculties and departments</td>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
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<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
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</table>
### Tests & Examinations:
- **Tests & Examinations:** 9
- **Selfstudy:** 37
- **Other:** 0
- **Total Learning Time:** 200

### Methods of Student Assessment
- **Continuous Assessment (CA):** 100%
- **Final Assessment (FA):** 0%

### Assessment Module type
- **Continuous Assessment (CA)**

### Faculty
- **Natural Sciences**

### Home Department
- **Computer Science**

### Module Topic
- **Operating Systems, Computer Networks, and Machine Learning**

### Generic Module Name
- **Computer Science 311**

### Alpha-numeric Code
- **CSC311**

### NQF Level
- **7**

### NQF Credit Value
- **30**

### Duration
- **Semester**

### Proposed semester to be offered.
- **Second Semester**

### Programmes in which the module will be offered
- **BSc Computer Science (3221) (3023)**
- **BSc Mathematical (3227) (3031)**
- **BSc Statistical Sciences (3227) (3031)**

### Year level
- **3**

### Main Outcomes
On completion of this module students should be able to:

**In Operating Systems:**
- Explain the fundamental tasks performed by a modern operating system.
- Implement fundamental operating systems tasks and algorithms.

**Computer Networks:**
- Build networks with current network topologies, protocols, operating systems, and applications.
- Develop an appreciation of standards and protocols.

**Machine Learning:**
- Apply linear, logistic regression and regularization to data.
- Implement neural networks and support vector machines.

### Main Content

#### Operating Systems:
- History of operating systems.
- Operating system concepts and structure.
- Emphasis on processes (communication and scheduling).
- Basic Input/Output.
- Concurrency.

#### Computer Networks:
- Communications media.
- Network standards and layers.
- Communications protocols.
- Network architectures.
- Client/server and peer-to-peer networks, Network design.
- Network operations and operating systems.
- Network administration.
- Construction and installation of networks.

#### Machine Learning:
- Linear and logistic regression.
- Regularization.
• Neural networks.
• Support Vector Machines.

Pre-requisite modules
CSC211 and CSC212

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
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<td>84</td>
<td>Tutorials p.w.</td>
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<tr>
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<tr>
<td>143</td>
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</tbody>
</table>

Total Learning Time
300

Method of Student Assessment
Continuous Assessment (CA): 100%
Final Assessment (FA): 0%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Computer Science

Module Topic
Human Computer Interaction, Software Engineering, and Database Systems

Generic Module Name
Computer Science 312

Alpha-numeric Code
CSC312

NQF Level
7

NQF Credit Value
30

Duration
Semester

Proposed semester to be offered
Second Semester

Programmes in which the module will be offered
BSc (Computer Science) (3221, 3023); BSc (Mathematics and Statistical Sciences) (3227); BSc (Physical Science) (3233, 3120)

Year level
3

Main Outcomes
On completion of this module, students should be able to:

In Software Engineering
• Interpret and implement principles, processes, methods and tools for quality software development.
• Use UML to specify, visualize, construct and document a software system.

In Database Systems
• Explain the Relational Model Concepts & Principles.
• Represent the Architecture for a Database System.
• Design a Relational Database.
• Implement a Relational Database.

In human Computer Interaction
• Analyse interface needs for interactive applications.
• Design and implement effective user interfaces with CLI, GUI, and API.
• Understand the importance of feedback and help systems.
### Main Content

<table>
<thead>
<tr>
<th>Software Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Definition of software engineering, principles, goals, process, methods and tools.</td>
</tr>
<tr>
<td>• The evolving role of software.</td>
</tr>
<tr>
<td>• SE paradigms / process models.</td>
</tr>
<tr>
<td>• Object-oriented analysis &amp; design.</td>
</tr>
<tr>
<td>• Introduction to formal specification.</td>
</tr>
<tr>
<td>• Verification and validation.</td>
</tr>
<tr>
<td>• Software quality assurance / reliability.</td>
</tr>
<tr>
<td>• Unified Modeling Language (UML).</td>
</tr>
</tbody>
</table>

### Database Systems

- File systems and databases.
- Modeling.
- Database design principles.
- Database models.
- Normalization.
- Structured Query Language.

### Human Computer Interaction

- Human factors of interactive software.
- Theories, principles and guidelines of HCI design including command line interface (CLI), graphical user interface (GUI) and application programmatic interface (API)
- Event-driven application design and development.
- Direct manipulation.
- Interaction devices.
- System and feedback messages.

### Pre-requisite modules

- CSC211 and CSC212

### Co-requisite modules

- None

### Prohibited module combination

- Database modules offered by other faculties and departments

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
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<td>Contact with lecturer: / tutor:</td>
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<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>28</td>
<td>Practicals p.w.</td>
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</tr>
<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
<td>2</td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>3</td>
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</tr>
<tr>
<td>Selfstudy:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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### Methods of Student Assessment

<table>
<thead>
<tr>
<th>Assessment Module type</th>
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<tbody>
<tr>
<td>Final Assessment (FA):</td>
<td>0%</td>
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</tbody>
</table>

### Faculty

- Natural Sciences

### Home Department

- Earth Science

### Module Topic

- Earth Materials

### Generic Module Name

- Earth Materials 111

### Alpha-numeric Code

- ESC111

### NQF Level

- 5

### NQF Credit Value

- 15

### Duration

- Semester

### Proposed semester to be offered

- First Semester

---

252
<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>BSc (Applied Geology) (3214, 3011); BSc (Biodiversity and Conservation Biology) (3217, 3015); BSc (Environmental &amp; Water Science) (3331, 3027); BSc (Physical Science) (3233)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
<td>1</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
• Explain basic Earth Materials and their formation.  
• Identify major rocks and minerals as products associated with these formation processes.  
• Grasp basic concepts of stratigraphy and Earth dynamics. |
| Main Content | • The Earth in the Universe  
• Structure of the Earth, Isostacy, Plate Tectonics, Paleomagnetism  
• Rock Cycle, Geologic Time,  
• Introduction to minerals and rocks, classification of minerals and rocks  
• Geology of Southern Africa, Earth Dynamics  
• Historical Geology of Southern Africa  
• Introduction to structural Geology and mapping techniques |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 56 | Lectures p.w. | 3 |
| Assignments & tasks: | 8 | Practicals p.w. | 3 |
| Practicals: | 42 | Tutorials p.w. | 1 |
| Tests & Examinations: | 10 | | |
| Selfstudy: | 34 | | |
| Other: | 0 | | |
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

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<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Earth Sciences</td>
</tr>
<tr>
<td>Module Topic</td>
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<td>Duration</td>
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<td>Proposed semester to be offered</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc (Applied Geology) (3214, 3011); BSc (Biodiversity and Conservation Biology) (3217, 3015); BSc (Environmental &amp; Water Science) (3331, 3027); BSc (Physical Science) (3233)</td>
</tr>
<tr>
<td>Year level</td>
<td>1</td>
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</tbody>
</table>
### Main Outcomes
On completion of this module students should be able to:
- Explain the main processes active in the atmosphere, hydrosphere, biosphere and lithosphere.

### Main Content
- The Earth’s atmosphere and radiation balance
- The Earth’s global wind circulation
- Atmospheric circulation and weather over South Africa
- The hydrological cycle
- Drainage basin characteristics
- Surface and subsurface water
- Fluvio-geomorphic processes and landforms
- Weathering and mass wasting
- Structural landforms and earthquakes

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
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</table>

### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Science

### Home Department
Biodiversity and Conservation Biology

### Module Topic
Environmental Sustainability Studies

### Generic Module Name
Environmental Economics

### Alpha-numeric Code
ESS211

### NQF Level
6

### NQF Credit Value
10

### Duration
Semester

### Proposed semester to be offered
First Semester

### Programmes in which the module will be offered
BSc (Biodiversity and Conservation Biology) (3217, 3015);
BA (2101)

### Year level
2

### Main Outcomes
On completion of this module students should be able to:
- Summarise the basics of environmental economics.
- Demonstrate the fundamental linkages between economic activities and the natural environment.
- Analyze underlying environmental problems using economic techniques learnt in class.
- Verbalise economic debates around climate change and its impact on natural environment, human habitat and environmental damage.
Main Content | Modeling environmental problems
---|---
| • The role of economics in environmental management
| • Modeling the market failure
| • Conventional solutions to environmental problems: command-and-control vs. market approach

**The case of:**

- Water
- Municipal solid waste
- Pesticides and toxic
- Chemical control

**Global Environmental Management**

- Problem of ozone depletion
- Economic analysis of ozone depletion
- The problem of climate change
- Economic analysis of climate change

| Pre-requisite modules | (ESS 131, ESS 121 and ESS 122) OR (LSC 142 or LFS152) or (EWP121 or ESC121) or Geography121 |
| Co-requisite modules | None |
| Prohibited module Combination | None |

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
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<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require timetable</th>
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**Methods of Student Assessment**

Continuous Assessment (CA): 60%

Final Assessment (FA): 40%

**Assessment Module type**

Continuous and Final Assessment (CFA)

---

**Faculty**

EMS

**Home Department**

School of Government (Undergraduate Programme)

**Module Topic**

Environmental Sustainability Studies

**Generic Module Name**

Local Area Case Study

**Alpha-numeric Code**

ESS212

**NQF Level**

6

**NQF Credit Value**

10

**Duration**

Semester

**Proposed semester to be offered**

Second Semester

**Programmes in which the module will be offered**

BSc (Biodiversity and Conservation Biology) (3015); BSc (Environmental & Water Science) (3331); BA (2101)

**Year level**

2

**Main Outcomes**

On completion of this module students should be able to:

- Interpret and apply environmental legislation within a local government framework
- Explain and apply theoretical frameworks to assess environmental issues within a local government area
- Identify and analyse the main local environmental challenges
- Develop an appropriate strategy to address the identified shortcoming.

**Main Content**

Constitutional Mandate of local government with reference to:
- Socio-economic rights and environmental management
- Developmental local government and environmental management
- Local Government Developmental Framework
- Applicable/relevant legislation, e.g. Land Use Planning Ordinance (LUPO) /National Environmental Management Act (NEMA)
- Capita selecta of Management principles and functions
- Monitoring and Evaluation of environmental management programmes

**Pre-requisite modules**

(ESS 131, ESS 121 and ESS 122) or (LSC 142 or LFS152) or (EWP121 or ESC121) or Geography121

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Category</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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<tr>
<td><strong>Total Learning Time</strong></td>
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</tbody>
</table>

**Methods of Student Assessment**

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**

Continuous and Final Assessment (CFA)

**Faculty**

Natural Sciences

**Home Department**

Biodiversity and Conservation Biology

**Module Topic**

Environmental Sustainability Studies

**Generic Module Name**

Climate Change Challenges

**Alpha-numeric Module Code**

ESS221

**NQF Level**

6

**NQF Credit Value**

10

**Duration**

Semester

**Proposed semester to be offered**

First Semester

**Programmes in which the module will be offered**

BSc (Biodiversity and Conservation Biology) (3217,3015); BA (2101)

**Year level**

2
Main Outcomes

On completion of this module students should be able to:

• Integrate Global Climate Models (CGMs) into predictions for regional climate changes.
• Predict, assess and ameliorate biodiversity response to climate change.
• Assess economic considerations of climate change and their implication for conservation planning.
• Synthesise and contrast various digital data sets to develop ecological niche models that evaluate the effects of climate change on a suite of species.

Main Content

• Review of the evidence for climate change, Explore GCM (Global Climate Models) as the starting blocks for generating future climate change scenarios, Climate Change Scenarios for South Africa, Biodiversity response to past climates,
• Adaptations of biodiversity to climate change, Methods of ecological niche modelling for developing species distributions and integrating these models into decision-making processes, Ecosystem function under climate-change,
• Implications of climate change for strategic land-use planning, and Economic considerations for conservation response options to climate change.
• Practical sessions that will involve use of various digital data derived from climate change facilities will be sourced together with biodiversity data for inputs into ecological niche models to evaluate the effects of climate change on a suite of species.

Pre-requisite modules

LSC142 or LFS152 or EWP121 or ESC121 or GES121

Co-requisite modules

None

Prohibited module Combination

None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer/ tutor:</td>
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<td>Tutorials p.w.</td>
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</tr>
<tr>
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<tr>
<td>Total Learning Time</td>
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</table>

Methods of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

Assessment Module type

Continuous and Final Assessment (CFA)

Faculty

Arts

Home Department

Geography

Module Topic

Environmental & Sustainability Studies

Generic Module Name

Changing Urban Ecologies

Alpha-numeric Code

ESS222

NQF Level

6

NQF Credit Value

10

Duration

Semester
<table>
<thead>
<tr>
<th>Proposed semester to be offered</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc (Biodiversity and Conservation Biology) (3217, 3015); BA (2101)</td>
</tr>
<tr>
<td>Year level</td>
<td>2</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
  • Analyse and be more appreciative of how built-up areas and cities can induce and constantly (re)shape different ecosystems.  
  • Locate urban ecological services concerns within the in the contexts of broader environmental management challenges and ecosystems discourses.  
  • Recommend contributions that urban service delivery, land-use distributions and morphology (can) make to urban metabolism.  
  • Demonstrate how changing urban ecologies can contribute to more sustainable and environmentally friendly mindsets and practices in diverse city spaces. |
| Main Content | Systems and ecological services approaches will underpin the presentation of content that will include: Cities/towns as engine rooms for new ecologies, ‘Ruralization’ of, and green agendas in urban spaces, ‘De-naturalization’ practices in urban spaces, Location and site specific environmental histories and conceptions of ‘urban nature’, Green and sustainable urban planning and construction, Environmental management guidelines and the fostering of ecosystems flourishing approaches and People, communities and their needs as catalysts for mainstreaming urban ecological concerns. |
| Pre-requisite modules | (ESS 131, ESS 121 and ESS 122) or (LSC 142 or LFS152) or (EWP121 or ESC121) or GES121 |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 28 | Lectures p.w. | 2 |
| Assignments & tasks: | 12 | Practicals p.w. | 0 |
| Practicals: | 14 | Tutorials p.w. | 1 |
| Tests & Examinations: | 6 | | |
| Selfstudy: | 32 | | |
| Other: | 8 | | |
| Total Learning Time | 100 | | |
| Methods of Student Assessment | Continuous Assessment (CA):60% |
| Final Assessment (FA): 40% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Biodiversity and Conservation Biology |
| Module Topic | Environmental and Sustainability Studies |
| Generic Module Name | Living Landscapes |
| Alpha-numeric Code | ESS333 |
| NQF Level | 7 |
| NQF Credit Value | 30 |
| Duration | Term |
| Proposed semester to be offered | Third Term |
| Programmes in which the module will be offered | BA (Environmental & Sustainability studies) (2101) |
| Year level | 3 |

**Main Outcomes**
On completion of this module students should be able to:
- Visually analyse landscapes from photography to satellite imagery.
- Interpret human impacts on landscapes.
- Employ standard conventions to write and illustrate professional scientific reports.

**Main Content**
- Biodiversity concepts such as South African vegetation types and biomes;
- Disturbance ecology;
- Fragmentation and use of corridors for developing biodiversity networks;
- Non-equilibrium ecosystem dynamics (chaos models, state and transition models and tipping points).

**Pre-requisite modules**
ESS212 and ESS221

**Co-requisite modules**
ESS334, ESS332

**Prohibited module Combination**
BDC332

**Breakdown of Learning Time**

| Contact with lecturer / tutor: | 21 | Lectures p.w. | 3 |
| Assignments & tasks: | 11 | Practical p.w. | 2 |
| Practicals: | 14 | Tutorials p.w. | 0 |
| Tests & Examinations: | 10 |
| Selfstudy: | 30 |
| Other: | 8 |
| Total Learning Time | **100** |

**Methods of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Earth Sciences

**Module Topic**
Physical Hydrology and Soil Science

**Generic Module Name**
Environmental and Water Science 211

**Alpha-numeric Code**
EWP211

**NQF Level**
6

**NQF Credit Value**
20

**Duration**
Semester

**Proposed semester to be offered**
First Semester
| Programmes in which the module will be offered | BSc (Applied Geology) (3214, 3011); BSc (Biodiversity and Conservation Biology) (3217, 3015); BSc (Environmental & Water Science) (3331, 3027) |
| Year level | 2 |
| Main Outcomes | On completion of this module, students should be able to:  
- Identify, describe and explain the main hydrological processes; precipitation, interception, evaporation, runoff and infiltration, and factors which influence these processes in space and time  
- Describe and estimate areal rainfall from point measurements.  
- Discuss the influence of human activities on catchment hydrology.  
- Identify, describe and explain the physical characteristics of a soil  
- Clarify the mineralogy of soils.  
- Explain the chemistry of soils in general and clay minerals in particular and apply them in different projects  
- Illustrate how a soil’s physical characteristics affect its susceptibility to erosion  
- Demonstrate their ability to apply the various techniques of physical soil analyses in given scenario  
- Interpret analytical results from experiments and present these through oral and written report |
| Main Content |  
- Hydrologic cycle, and drainage basin characteristics  
- Rainfall characteristics, their measurement and estimation  
- Evaporation processes and their measurement  
- Interception and Runoff formation and their analyses  
- The influence of human activities on catchment hydrology  
- General fluvial geomorphology, river health monitoring and river rehabilitation  
- The physical characteristics of soils and soil water  
- Soil mineralogy and chemistry  
- Analytical Soil Techniques |
| Pre-requisite modules | ESC111, ESC121 |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time |  
| Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 42 | Lectures p.w. | 3 |
| Assignments & tasks: | 30 | Practicals p.w. | 2 |
| Practicals: | 84 | Tutorials p.w. | 0 |
| Tests & Examinations: | 7 | | |
| Selfstudy: | 37 | | |
| Other: | 0 | | |
| Total Learning Time | 200 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
**Faculty** | Natural Sciences  
---|---  
**Home Department** | Earth Sciences  
**Module Topic** | Physical Hydrology and Soil Science  
**Generic Module Name** | Environmental and Water Science 221  
**Alpha-numeric Code** | EWP221  
**NQF Level** | 6  
**NQF Credit Value** | 20  
**Duration** | Semester  
**Proposed semester to be offered** | Second Semester  

**Programmes in which the module will be offered**
BSc (Applied Geology) (3214, 3011); BSc (Biodiversity and Conservation Biology) (3217, 3015); BSc (Environmental & Water Science) (3331, 3027)  

**Year level** | 2  

**Main Outcomes**
On completion of this module students should be able to:
- Describe the hydro-geologic system including value, role, key concepts & principles and the hydrologic cycle  
- Describe & illustrate groundwater occurrences including recharge mechanism & estimations methods  
- Explain groundwater hydraulics including basic principles of groundwater flow mechanisms  
- Discuss groundwater chemistry and pollution including water sampling & water quality analysis  
- Describe and explain groundwater development including drilling & logging of boreholes  
- Identify and justify groundwater-surface water interaction including examples of groundwater dependence ecosystems  
- Recognize geohydrology of mining environment including the concept of acid mine drainage (AMD)  

**Main Content**
- Hydro-geologic system  
- Groundwater occurrences including recharge mechanism & estimations methods  
- Groundwater hydraulics including basic principles of groundwater flow mechanisms  
- Groundwater development i.e drilling & logging of boreholes  
- Groundwater chemistry and pollution i.e water sampling & water quality analysis  
- Groundwater-surface water interaction i.e. groundwater dependent ecosystems  
- Geohydrology of the mining environment i.e. Acid Mine Drainage (AMD)  

**Pre-requisite modules**
(ESC111, ESC121)  
**Co-requisite modules**
None  
**Prohibited module combination**
None  

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>42</td>
<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
<td>2</td>
</tr>
<tr>
<td>Practicals:</td>
<td>84</td>
<td>Tutorials p.w.</td>
<td>0</td>
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</table>

261
### Tests & Examinations
- **Tests & Examinations:** 10
- **Selfstudy:** 34
- **Other:** 0
- **Total Learning Time:** 200

### Methods of Student Assessment
- **Continuous Assessment (CA):** 50%
- **Final Assessment (FA):** 50%

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time Table Requirement</th>
<th>Hours</th>
<th>Other Teaching Modes</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>42</td>
<td>Lectures p.w.</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>20</td>
<td>Practicals p.w.</td>
</tr>
<tr>
<td>Practicals:</td>
<td>84</td>
<td>Tutorials p.w.</td>
</tr>
</tbody>
</table>

50% of the course is conducted in the field outside the University.
<table>
<thead>
<tr>
<th>Assessments</th>
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<th>campus</th>
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<tbody>
<tr>
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<td><strong>Total Learning Time</strong></td>
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<table>
<thead>
<tr>
<th>Faculty</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Earth Sciences</td>
</tr>
<tr>
<td><strong>Module Topic</strong></td>
<td>Geographical Information Systems (GIS) for Water Resources and Environmental Management</td>
</tr>
<tr>
<td><strong>Generic Module Name</strong></td>
<td>Environmental &amp; Water Science 311</td>
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<tr>
<td><strong>Alpha-numeric Code</strong></td>
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<tr>
<td><strong>Duration</strong></td>
<td>Semester</td>
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<tr>
<td><strong>Proposed semester to be offered.</strong></td>
<td>First Semester</td>
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</table>

| **Programmes in which the module will be offered** | BSc Environmental and Water Sciences (3027, 3331)  
BSc Applied Geology (3214, 3011)  
BSc Biodiversity and Conservation Biology (3217, 3015)  |
| **Year level** | 3 |

<table>
<thead>
<tr>
<th><strong>Main Outcomes</strong></th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Describe GIS principles and apply spatial related techniques</td>
<td></td>
</tr>
<tr>
<td>• Develop, illustrate and apply skills to construct GIS raster and vector maps using environmental and water related data</td>
<td></td>
</tr>
<tr>
<td>• Demonstrate the use of data queries and spatial data analyses</td>
<td></td>
</tr>
<tr>
<td>• Develop, demonstrate and practice conceptual understanding of data management, data querying and water related data sets</td>
<td></td>
</tr>
<tr>
<td>• Describe and explain principles of modeling environmental and water related processes</td>
<td></td>
</tr>
<tr>
<td>• Develop and apply skills to integrate environmental and water data into computer-based models as well as processing, analyzing and evaluating resulting images</td>
<td></td>
</tr>
</tbody>
</table>

| **Main Content** | Database management, vector maps and raster maps  
Data query and spatial data analysis  
Environmental and water related data and GIS  
Application of GIS in natural resource studies  
Basic statistical data analysis  
Correlation and regression analysis  
Introduction to cartography: Maps, feature types, map symbolism, spatial relationships and scale concepts |

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>EWP211, EWP221</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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| **Prohibited module Combination** | APG311 |

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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Contact with lecturer / tutor:</td>
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| Method of Student Assessment              | Continuous Assessment (CA): 50% |
|                                          | Final Assessment (FA): 50%       |

| Assessment Module type                    | Continuous and Final Assessment (CFA) |

| Faculty                                  | Natural Sciences                  |
|                                          | Home Department: Earth Sciences   |
| Module Topic                             | Surface Water and Groundwater Processes |
| Generic Module Name                      | Environmental and Water Science 312 |
| Alpha-numeric Code                       | EWP312                             |
| NQF Level                                | 7                                  |
| NQF Credit Value                         | 30                                 |
| Duration                                 | Semester                           |
| Proposed semester to be offered          | First Semester                     |
| Programmes in which the module will be offered | BSc (Environmental and Water Sciences) (3331, 3027) |
| Year level                               | 3                                  |

| Main Outcomes                            | On completion of this module students should be able to: |
|                                          | • Understand the geomorphic processes operating in rivers |
|                                          | and on slopes with an emphasis on arid and semi-arid     |
|                                          | catchments.                                            |
|                                          | • Explain methods used for aquifer characterization.     |
|                                          | • Explain flow-dynamics of groundwater in three types of |
|                                          | boundary conditions.                                    |
|                                          | • Interpret numerical flow-simulations for groundwater.  |
|                                          | • Realize that water resources naturally interact with   |
|                                          | the environment and are affected by anthropogenic        |
|                                          | influences.                                            |

| Main Content                             | Processes in dry-land catchments |
|                                          | Runoff generation and sediment dynamics in ephemeral      |
|                                          | channels                                                  |
|                                          | Gully erosion and flooding in dry-land environments       |
|                                          | Design and interpretation of pumping tests for aquifer    |
|                                          | assessment                                               |
|                                          | Regional groundwater flow in geological formations       |
|                                          | Groundwater flow to wells                                |
|                                          | Interpretation of numerical flow-simulations for         |
|                                          | groundwater                                               |
|                                          | Mechanisms of dewatering processes                        |
|                                          | Basic concepts of isotope applications in hydrogeology    |
|                                          | Basics of mass transport and contaminant transport in     |
|                                          | aquifers                                                 |

| Pre-requisite modules                    | EWP211, EWP221                                  |
| Co-requisite modules                     | None                                            |

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<table>
<thead>
<tr>
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<tbody>
<tr>
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<td><strong>Hours</strong></td>
</tr>
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<tr>
<td>Assignments &amp; tasks:</td>
<td>30</td>
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<tr>
<td>Practicals:</td>
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</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>10</td>
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<td>Selfstudy:</td>
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</tr>
<tr>
<td>Other:</td>
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<tr>
<td><strong>Methods of Student Assessment</strong></td>
<td>Continuous Assessment (CA): 50%</td>
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<td>Final Assessment (FA): 50%</td>
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<tr>
<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
</tr>
</tbody>
</table>

**Faculty**
- Natural Sciences

**Home Department**
- Earth Sciences

**Module Topic**
- Environmental and Water Resource Management

**Generic Module Name**
- Environmental and Water Resource Management 321

**Alpha-numeric Code**
- EWP321

**NQF Level**
- 7

**NQF Credit Value**
- 30

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- BSc Environmental and Water Sciences (3027, 3331)
- BSc Biodiversity and Conservation Biology (3217, 3015)

**Year level**
- 3

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain the basic principles and practices of environmental management.
  - Identify the key documents in the South African environmental management policy and procedures.
  - Produce a basic Assessment process and a Scoping/Environmental Impact Assessment process.
  - Identify different scales of water resources and illustrate water resource development and utilization programmes.
  - Interpret groundwater functions as hydrological, ecological and environmental system components.
  - Illustrate methods of water resource protection.
  - Explain the concepts of sustainable development and means of achieving integrated management of water resources.

**Main Content**
- Theoretical overview of environmental management principles and practices.
- Case studies on the most common types of applications dealing with environmental impacts and technologies applied to solve environmental problems.
- Different scales of water resources.
- General characteristics of water resources in Africa, especially in South Africa.
- Water resource development programmes.
- Methods of utilization of water resources.
- Concepts of sustainable development, management and protection of water resources.
- Concept of Eco-hydrology.
- Integrated Water Resource Management (IWRM) concepts

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>EWP211, EWP221</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module</td>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor</td>
<td>42</td>
<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>30</td>
<td>Practicals p.w.</td>
<td>2X3</td>
</tr>
<tr>
<td>Practicals:</td>
<td>84</td>
<td>Tutorials p.w.</td>
<td>0</td>
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<tr>
<td>Assessments</td>
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</tr>
<tr>
<td>Selfstudy</td>
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</tr>
<tr>
<td>Other: Field work/ Excursions</td>
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</tr>
<tr>
<td>Total Learning Time</td>
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</tbody>
</table>

Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type
- Continuous and Final Assessment (CFA)

Faculty
- Natural Sciences

Home Department
- Earth Sciences

Module Topic
- Surface Water and Groundwater Quality Assessment

Generic Module Name
- Environmental & Water Science 322

Alpha-numeric Code
- EWP322

NQF Level
- 7

NQF Credit Value
- 30

Duration
- Semester

Proposed semester to be offered.
- Second Semester

Programmes in which the module will be offered
- BSc Environmental and Water Sciences (3027, 3331)

Year level
- 3

Main Outcomes
- On completion of this module students should be able to:
  - Describe water quality parameters including major processes that govern and modify water quality
  - Plan and conduct water quality analyses (sampling methods, determining numbers of samples, analyses methods, and selection of chemical species) on the basis of project objectives
  - Use guidelines to collect meaningful field water quality data through appropriate sampling techniques, including field equipment calibration and sample handling procedures
  - Develop expertise on field and laboratory data interpretation

266
Main Content

- Implement data quality assessment and data quality control procedures
- Explain the use of isotope hydrology in sampling, and analyzing and interpreting water quality data
- Compile scientific reports on the results, including research proposals with time plans

Pre-requisite modules
- EWP211, EWP221

Co-requisite modules
- None

Prohibited module
- None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>42 Lectures p.w.</td>
<td>3</td>
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<tr>
<td>Assignments &amp; tasks:</td>
<td>30 Practicals p.w.</td>
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</tr>
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<tr>
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</table>

Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type
- Continuous and Final Assessment (CFA)

Faculty
- Natural Sciences

Home Department
- Medical Biosciences

Module Topic
- Introduction to the Human Body I

Generic Module Name
- Human Biology for Pharmacy II

Alpha-numeric Code
- HUB113

NQF Level
- 5

NQF Credit Value
- 15

Duration
- Semester

Programmes in which the module will be offered
- BPharm (3305)

Main Outcomes
- On completion of this module students should be able to:
  - Describe and list the basic structure and general functions of proteins, carbohydrates, lipids, enzymes and nucleic acids.
  - Define and explain human nutrition and cell metabolism.
  - Describe and explain the basic anatomy and physiology of the digestive system.
- Define, Describe and explain protein synthesis, cell growth and cell division.
- Describe and explain the early development of the foetus
- Describe the histology of the main tissue types.
- Describe, explain and list the gross anatomy and functions of the skeletal and muscle systems, and the characteristics of joints types.
- Demonstrate selected laboratory techniques related to the evaluation of tissue types, the muscle and skeletal systems.
- Demonstrate appropriate habits and attitudes needed for a career in health sciences and health care promotions.

### Main Content
- The main chemical compounds, nutrition and cellular metabolism
- An introduction of the anatomy and physiology of the digestive system.
- Essentials of early human development.
- Essentials of the histology of tissue types.
- Gross anatomy and basic physiology of the skeletal and muscle systems.
- Articulations/joints and movement.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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#### Breakdown of Learning Time

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#### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**: Continuous and Final Assessment (CFA)
Students should be able to:  
On completion of this module students should be able to:  
• Classify and describe the organization of the human body, and the concepts of health, human diseases and disease causing agents.  
• Describe the various terms used to define the human anatomy.  
• Define and explain the functions of the skeletal and muscle systems, and the characteristics of different joint types.  
• Classify and describe the histology and function the main tissue types.  
• Define and describe the structure-function relationships of components of the generalized animal cells.  
• Classify and describe the basic structure and general functions of proteins, carbohydrates, lipids, enzymes and nucleic acids.  
• Explain the concept of human nutrition and cell metabolism.  
• Define and describe the principles of protein synthesis.  
• Demonstrate an ability to execute selected laboratory techniques related to the evaluation of the different tissue types, the muscles and bones.  
• Demonstrate the appropriate skills, habits and attitudes they need to develop for a career in health care promotion.

Main Content  
Organization and function from chemical to systemic level  
• The scope of human biology and functional organization of the body  
• Homeostasis, human diseases and disease forming organisms  
• The main chemical compounds, nutrition and cellular metabolism  
• Review of cellular organization and functions of cellular components  
• Essentials of early human development  
• Essentials of the histology of tissue types  

Systems of support and movement  
• Gross anatomy of the skeletal system  
• Gross anatomy of the muscle systems  
• Articulations and movement

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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<td>Prohibited module Combination</td>
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<table>
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<th>Hours</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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<thead>
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<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
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<tr>
<td>Module Topic</td>
<td>Introduction to the Human Body I</td>
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<td>Introduction to the Human Body 117</td>
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**Programmes in which the module will be offered**
- BSc (Physiotherapy) (8211); BSc (Occupational Therapy) (8111)

**Year level**
- 1

**Main Outcomes**
On completion of this module students should be able to:
- Explain the organisation of the human body and the concept of health, human disease and the disease-causing agents.
- Describe the gross anatomy and general functions of the skeletal and muscular systems and the characteristics of different joint types.
- Describe the components of the locomotor systems.
- Explain and apply basic biomechanical concepts.
- Explain the anatomy and physiology of movements.
- Identify and explain some of the effects of dysfunction of parts of neuromuscular system.
- Describe the early development of the foetus.
- Explain and classify the histology of the basic tissue types.

**Main Content**

**Organization and function**
- The scope of human biology and functional organization of the body.
- Essentials of early human development.
- Essentials of the histology of the basic tissue types.

**Systems of support and movement**
- Gross anatomy of the musculo-skeletal system.
- Gross anatomy of nerve supply to muscle groups.
- Articulations and movement of the upper limb with special reference to the functions of the hand.
- Movements of the lower limb in walking and running. Movements of the trunk.

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None
<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Medical Biosciences

Module Topic
Human Biology for Nursing I

Generic Module Name
Human Biology for Nursing I

Alpha-numeric Code
HUB118

NQF Level
5

NQF Credit Value
15

Duration
Semester

Proposed semester to be offered
First Semester

Programmes in which the module will be offered
B Nursing (8311)

Year level
1

Main Outcomes
On completion of this module students should be able to:
• Classify and describe the organization of the human body, and the concepts of health, human diseases and disease causing agents.
• Describe the various terms used to define the human anatomy.
• Define and explain the functions of the skeletal and muscle systems, and the characteristics of different joint types.
• Classify and describe the histology and function the main tissue types.
• Define and describe the structure-function relationships of components of the generalized animal cells.
• Classify and describe the basic structure and general functions of proteins, carbohydrates, lipids, enzymes and nucleic acids.
• Explain the concepts of human nutrition and cell metabolism.
• Define and describe the principles of protein synthesis.
• Demonstrate an ability to execute selected laboratory techniques related to the evaluation of the different tissue types, the muscle and bones.
• Demonstrate the appropriate skills habits and attitudes they need to develop for a career in health care promotion.
### Main Content

**Organization and function from chemical to systemic level**
- The scope of human biology and functional organization of the body
- Homeostasis, human diseases and disease forming organisms
- The main chemical compounds, nutrition and cellular metabolism
- Review of cellular organization and functions of cellular components
- Essentials of early human development
- Essentials of the histology of tissue types

**Systems of support and movement**
- Gross anatomy of the skeletal system
- Gross anatomy of the muscle systems
- Articulations and movement

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</table>

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

### Faculty

- Natural Sciences

### Home Department

- Medical Biosciences

### Module Topic

- Introduction to the Human Body II

### Generic Module Name

- Human Biology for Pharmacy I

### Alpha-numeric Code

- HUB123

### NQF Level

- 5

### NQF Credit Value

- 15

### Duration

- Semester

### Proposed semester to be offered

- First Semester

### Programmes in which the module will be offered

- BPharm (3305)

### Year level

- 1

### Main Outcomes

On completion of this module students should be able to:
- Describe the organization of human body, the concepts of health, human diseases and disease-causing agents.
- Describe and explain the structure-function relationships of components of the generalized body cell, and of example of specialized cells.
• Describe, list and explain the functional anatomy of the nervous systems and the major sensory and motor pathways.
• Classify, describe and explain the functioning of neurons, the transduction of sensory stimuli, how this information is processed and responded to by the CNS.
• Define, list, classify, describe and explain the anatomy and physiology of the various organ systems, viz. the cardiovascular, respiratory, urinary, digestive, endocrine and reproductive systems.
• Demonstrate proficiency in selected basic laboratory competencies.
• Demonstrate information processing skills, such as searching and evaluating information.
• Demonstrate appropriate habits and attitudes needed for a career in health care promotion.

Main Content
• The scope of human biology and functional organisation of the body.
• Homeostasis, human diseases and disease forming organisms.
• Review of cellular organisation and functions of cellular components.
• An introduction to the anatomy my and physiology of the nervous, cardiovascular, respiratory, urinary, endocrine and reproductive systems.

Pre-requisite modules
None
Co-requisite modules
None
Prohibited module
Combination
None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td>Contact with lecturer / tutor:</td>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)
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<tbody>
<tr>
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</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:
- Classify, describe and explain the functional anatomy of the nervous system and the major sensory and motor pathways.
- Classify, describe and explain the function of neurons, the transduction of sensory stimuli, how this information is processed and responded to by the CNS.
- Classify, describe and explain the anatomy and physiology of the various organ systems viz. the cardiovascular, immune, respiratory, urinary, digestive, endocrine and reproductive.
- Demonstrate selected basic laboratory competencies.
- Demonstrate appropriate habits and attitudes needed for a career in health care promotion.
- Demonstrate information processing skills, such as searching and evaluating information.

**Main Content**

- An introduction to the anatomy and physiology of the cardiovascular, immune, respiratory, urinary, digestive, endocrine, reproductive and nervous systems.

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
</tr>
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<tr>
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<tr>
<td>Tests &amp; Examinations:</td>
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<td><strong>Total Learning Time</strong></td>
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</tbody>
</table>

**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)

**Faculty**

Natural Sciences

**Home Department**

Medical Biosciences

**Module Topic**

Structure and Function of the Human Body II 127

**Generic Module Name**

Structure and Function of the Human Body II 127

**Alpha-numeric Code**

HUB127

**NQF Level**

5

**NQF Credit Value**

15

**Duration**

Semester

**Proposed semester to be offered**

First Semester
<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>BSc (Physiotherapy) (8211); BSc (Occupational Therapy) (8111)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain principles and components of control systems,</td>
</tr>
<tr>
<td></td>
<td>and examples thereof.</td>
</tr>
<tr>
<td></td>
<td>• Describe various membrane transport and communication</td>
</tr>
<tr>
<td></td>
<td>processes of the cell.</td>
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<td>• Describe functional anatomy of the central nervous</td>
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<td>system (CNS) and the major sensory and motor pathways.</td>
</tr>
<tr>
<td></td>
<td>• Explain functioning of neurons, the transduction of</td>
</tr>
<tr>
<td></td>
<td>sensory stimuli, how this information is processed and</td>
</tr>
<tr>
<td></td>
<td>responded to by the CNS.</td>
</tr>
<tr>
<td></td>
<td>• Describe the physiology of the muscular systems,</td>
</tr>
<tr>
<td></td>
<td>neuromuscular junction, blood and immune system.</td>
</tr>
<tr>
<td></td>
<td>• Recognize some effects of dysfunction of parts of the</td>
</tr>
<tr>
<td></td>
<td>neuromuscular system.</td>
</tr>
<tr>
<td></td>
<td>• Develop information processing skills, such as searching</td>
</tr>
<tr>
<td></td>
<td>for and evaluating information.</td>
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<td>Main Content</td>
<td>• Principles and components of control systems.</td>
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<tr>
<td></td>
<td>• Membranes: general functions, composition, and specific</td>
</tr>
<tr>
<td></td>
<td>membrane transport processes.</td>
</tr>
<tr>
<td></td>
<td>• Intercellular signalling: receptors and chemical</td>
</tr>
<tr>
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<td>signals.</td>
</tr>
<tr>
<td></td>
<td>• An understanding of the anatomy and physiology of the</td>
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<tr>
<td></td>
<td>central nervous system (CNS), the physiology of the</td>
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<td>muscular system, blood and immunology.</td>
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<tr>
<td>Pre-requisite modules</td>
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<tr>
<td>Prohibited module Combination</td>
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<tr>
<td>Breakdown of Learning Time</td>
<td>Hours</td>
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<td>Tests &amp; Examinations:</td>
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<td>Human Biology for Nursing II</td>
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## Duration
Semester

## Proposed semester to be offered
Second Semester

## Programmes in which the module will be offered
B Nursing (8311)

## Year level
1

### Main Outcomes
On completion of this module students should be able to:
- Define, list, classify, describe and explain the anatomy and physiology of the various organ systems viz. the cardiovascular, immune, respiratory, urinary, digestive, endocrine and reproductive.
- Define, list, classify, describe and explain the functional anatomy of the nervous system and the major sensory and motor pathways.
- Classify, describe and explain the function of neurons, the transduction of sensory stimuli, how this information is processed and responded to by the CNS.
- Demonstrate selected basic laboratory competencies.
- Demonstrate appropriate habits and attitudes needed for a career in health care promotion.
- Demonstrate information processing skills, such as searching and evaluating information.

### Main Content
- An introduction to the anatomy and physiology of the nervous, cardiovascular, respiratory, urinary, digestive, endocrine and reproductive systems.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)
<table>
<thead>
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<th>Duration</th>
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<tr>
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<tr>
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</tr>
<tr>
<td>Year level</td>
<td>2</td>
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<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module, students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain and differentiate between the various membrane transport and communication processes of the cell.</td>
</tr>
<tr>
<td></td>
<td>• Explain how genetic information is transferred from DNA to proteins.</td>
</tr>
<tr>
<td></td>
<td>• Describe the phases and changes cells undergo during their life cycle and the regulation thereof.</td>
</tr>
<tr>
<td></td>
<td>• Discuss homeostasis with regards to the nervous and endocrine systems.</td>
</tr>
<tr>
<td></td>
<td>• Describe the anatomical and functional organization of the nervous system.</td>
</tr>
<tr>
<td></td>
<td>• Explain basic neurophysiology and neural integration.</td>
</tr>
<tr>
<td></td>
<td>• Describe the components, organization and function of the sensory and motor pathways.</td>
</tr>
<tr>
<td></td>
<td>• Explain the autonomic nervous system at a basic level.</td>
</tr>
<tr>
<td></td>
<td>• Explain the basic higher brain functions.</td>
</tr>
<tr>
<td></td>
<td>• Describe the structure and function of the endocrine system.</td>
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<tr>
<td></td>
<td>• Interpret the body systems' structure and physiology and consequences of dysfunction in the various body systems – selected examples.</td>
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<tr>
<td></td>
<td>• Demonstrate laboratory competencies related to the investigation of the form and function of the specified systems.</td>
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<td>• Demonstrate basic competencies in executing investigative experiments, and reporting it in an acceptable scientific style and format</td>
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<tr>
<td><strong>Main Content</strong></td>
<td>• Membranes: general functions, composition, and specific membrane transport processes</td>
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<td></td>
<td>• Genes and gene expression</td>
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<tr>
<td></td>
<td>• Clinical applications and consequences of cellular dysfunction</td>
</tr>
<tr>
<td></td>
<td>• Cell cycle, somatic and reproductive cell division</td>
</tr>
<tr>
<td></td>
<td>• Cellular metabolic processes.</td>
</tr>
<tr>
<td></td>
<td>• Signaling in the nervous system</td>
</tr>
<tr>
<td></td>
<td>• Brain, spinal cord, cranial and spinal nerves</td>
</tr>
<tr>
<td></td>
<td>• General and special senses</td>
</tr>
<tr>
<td></td>
<td>• Anatomy, physiology and regulation of autonomic nervous system</td>
</tr>
<tr>
<td></td>
<td>• Higher brain function: memory</td>
</tr>
<tr>
<td></td>
<td>• Macro- and microscopic structure and coordinated functions of the endocrine system</td>
</tr>
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</table>

**Pre-requisite modules**

HUB114 and HUB124; or HUB118 and HUB128

**Co-requisite modules**

None

**Prohibited module Combination**

None
<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Medical Biosciences

**Module Topic**
- Human Biology for Nursing IV

**Generic Module Name**
- Human Biology

**Alpha-numeric Code**
- HUB228

**NQF Level**
- 6

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered**
- Second Semester

**Programmes in which the module will be offered**
- BNursing (8311)

**Year level**
- 2

**Main Outcomes**
- On completion of this module students should be able to:
  - Describe the components and organization of the cardiovascular, lymphatic, urinary, digestive and reproductive systems.
  - Explain the functioning of the cardiovascular, lymphatic, urinary, digestive and reproductive systems.
  - Explain the metabolism of macromolecules.
  - Explain the anatomy and physiology of muscle at a basic level.
  - Discuss muscular systems of the body at a basic level.
  - Interpret the body systems’ structure and physiology and consequences of dysfunction in the various systems – selected examples.
  - Demonstrate laboratory competencies related to the investigation of the form and function of the specified systems.

**Main Content**
- Macro- and microscopic structure and functions of the cardiovascular, respiratory, urinary, digestive and reproductive systems
- Topographical (surface) anatomy of these organ systems and vessels
- Metabolism of carbohydrates, lipids and proteins
- Macro-and microscopic structure and coordinated functions of the reproductive system
- Surface anatomy, skeleton, joints, muscles, nerves and movements of the head and neck, upper limb, back, thorax, abdomen, pelvis, perineum and lower limb

**Pre-requisite modules**
HUB114 and HUB124 or HUB118 and HUB128

**Co-requisite modules**
None

**Prohibited module Combination**
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Selfstudy:</td>
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<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Biodiversity and Conservation Biology

**Module Topic**
Introduction to Science

**Generic Module Name**
Introduction to Science 153

**Alpha-numeric Code**
ISC153

**NQF Level**
5

**NQF Credit Value**
30

**Duration**
Year

**Proposed semester to be offered.**
Both Semester

**Programmes in which the module will be offered**
Applied Geology (3011), Biodiversity and Conservation Biology (3015), Biotechnology (3007), Chemical Sciences (3019), Computer Science (3023), Environmental and Water Science (3027), Mathematical and Statistical Sciences (3031), Medical Bioscience (3035) and Physical Science (3120)

**Year level**
1

**Main Outcomes**
- On completion of this module students should be able to:
  - Engage actively in the processes of reading and writing to learn.
  - Identify and use appropriately some of the specialist language of your fields of study.
  - Read a range of texts effectively, purposefully, critically, and with comprehension.
  - Extract and categorise information to facilitate effective learning strategies.
  - Summarise and paraphrase texts effectively.
  - Collect information efficiently for research and writing purposes.
**Main Content**
- Reading and writing scientific texts
- Giving oral presentations.
- Improving quantitative literacy, logic, approaches to problem-solving, linking these to other modules.
- Using a computer operating system, email and the Internet, applications software and the integration of these application programmes.
- Applying the principles of co-operative learning and team work, time-management, diversity, career-planning.

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
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**Method of Student Assessment**
- Continuous Assessment (CA): 70%
- Final Assessment (FA): 30%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Biodiversity and Conservation Biology

**Module Topic**
Cell Biology and Genetics

**Generic Module Name**
Life Science 151

**Alpha-numeric Code**
LFS151

**NQF Level**
5

**NQF Credit Value**
15

**Duration**
Year

**Proposed semester to be offered**
Both Semesters

**Programmes in which the module will be offered**
- BSc (Biodiversity & Conservation Biology) (3015)
- BSc (Biotechnology) (3007)
- BSc (Environmental & Water Science) (3027)
- BSc (Medical Bioscience) (3035)

**Year level**
1

**Main Outcomes**
On completion of this module students should be able to:
- Demonstrate scientific methodology by recording observations, formulating hypotheses, collecting and critically analyzing data and compiling a scientific report.
- Link the importance of basic inorganic and organic chemistry to cell organization.
- Explain interactions between major cell organelles, the cell membrane, the role of enzymes in metabolic pathways and protein synthesis.
- Identify genetic components related to the inheritance of genetic traits.
- Explain the different forms of cell division.
- Demonstrate skills in: scientific measurements, operating light microscopes, preparation of slides, scientific drawing and conducting small experiments.
- Present information orally in class and in written and typed form using MS Word and MS Excel.
- Read, interpret, paraphrase, compare and synthesize information in the form of literature, figures, graphs and tables.
- Demonstrate basic information literacy skills.

### Main Content
- Overview of the process of science and classification of living things.
- Cell structure and function of cellular organelles.
- Photosynthesis.
- Cellular respiration.
- DNA replication.
- Mitosis, meiosis and control of protein synthesis.
- Mendelian genetics.
- Modern genetics.
- Introduction to biotechnology
- Basic principles of evolution.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
None

<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Biodiversity and Conservation Biology

### Module Topic
Biodiversity and Ecology

### Generic Module Name
Life Science 152

### Alpha-numeric Code
LFS152

### NQF Level
5

### NQF Credit Value
15

### Duration
Year
<table>
<thead>
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| Programmes in which the module will be offered | BSc Biodiversity and Conservation Biology (3015)  
BSc Biotechnology (3007)  
BSc Chemical Sciences (3019)  
BSc Environmental and Water Science (3027) |
| Year level | 1 |
| Main Outcomes | On completion of this module students should be able to:  
• Describe the nature of science by using as examples the changes made to classification systems to illustrate science as dynamic.  
• Use the basic rules of classification to classify, describe and identify life forms.  
• Compare the major characteristics of biological taxa.  
• Discuss the evolutionary relationships between biological taxa.  
• Define ecological terminology and explain, with the use of examples, the basic principles of ecology.  
• Explain the importance of biodiversity in ecological systems.  
• Identify the value of and threats to biodiversity.  
• Observe and make scientific drawings of organisms with the aid of microscopes.  
• Practice dissection skills.  
• Follow the scientific method to design and conduct a simple experimental data from the laboratory and field.  
• Organize and interpret simple experimental data from the laboratory and field.  
• Write scientific abstracts and reports.  
• Write comparative essays.  
• Use basic computer programmes such as MS Excel, MS Word and MS Power point.  
• Present researched material to an audience orally with the use of a Power Point presentation and in the form of a scientific poster; and  
• Apply basic information literacy skills. |
| Main Content |  
• Brief description of the origin of living cells and evolution of higher life forms.  
• Basic rules of classification, the diversity of life including: Viruses, monera.  
• Protista, fungi, plants, invertebrates and vertebrates. Biotic and abiotic components of the unifying role of ecology in biology.  
• Population dynamics, community ecology and ecosystem functioning.  
• The impact of humans on the environment. The nature and process of science and basic statistics. |
<p>| Pre-requisite modules | None |
| Co-requisite modules | None |</p>
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<thead>
<tr>
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<td></td>
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<tr>
<td>Home Department</td>
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</tr>
<tr>
<td>Year level</td>
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</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:
- Link the importance of basic inorganic chemistry to cell organization.
- Know the maintenance of life as controlled by the major organic (bio-) molecules.
- Explain the interaction between the major cell organelles, the structure and role of cell membranes, the role of enzymes to the various metabolic pathways in cells, the link between protein synthesis and genetic traits, how genetic information can be manipulated in the laboratory.
- Identify the various genetic components as related to the inheritance of genetic traits.
- Know the different forms of cell division.
- Apply practical skills in microscopy.
- Assimilate information from various sources.
- Interpret and present information in written form.

**Main Content**

- Cell structure and organelles and an introduction to processes taking place in them. DNA replication; DNA control of protein synthesis and thereby biochemical processes, mitosis, meiosis, chromosomes and genes, Mendelian and biochemical genetics, evolution.

**Pre-requisite modules**

None

**Co-requisite modules**

None
<table>
<thead>
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<th>Prohibited module Combination</th>
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<td><strong>Hours</strong></td>
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<tr>
<td><strong>Assessment Module type</strong></td>
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</table>

**Faculty**  
Natural Sciences

**Home Department**  
Biodiversity & Conservation Biology

**Module Topic**  
Biodiversity and Ecology

**Generic Module Name**  
Biodiversity and Ecology 142

**Alpha-numeric Code**  
LSC142

**NQF Level**  
5

**NQF Credit Value**  
15

**Duration**  
Semester

**Proposed semester to be offered**  
Second Semester

**Programmes in which the module will be offered**  
BSc (Biodiversity & Conservation Biology) (3217); BSc (Biotechnology) (3214); BSc (Chemical Science) (3220); BSc (Environmental & Water Science) (3331)

**Year level**  
1

**Main Outcomes**  
On completion of this module students should be able to:
- Use the basic rules of classification to classify, describe and identify life forms.
- Compare the major characteristics of biological taxa.
- Discuss the evolutionary relationships between biological taxa.
- Define ecological terminology and explain with the use of examples, the basic principles of ecology.
- Identify the values of and threats to biodiversity.
- Observe and make scientific drawings of organisms with the aid of microscopes.
- Practice dissection skills.
- Follow the scientific method to design and conduct a simple experiment.
- Organize and interpret simple experimental data from the laboratory and field.
- Write basic scientific reports.

**Main Content**  

**Pre-requisite modules**  
None
Co-requisite modules
None

Prohibited module combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Category</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Mathematics and Applied Mathematics

### Module Topic
Mathematics for Life Sciences and Pharmacy

### Generic Module Name
Mathematics 115

### Alpha-numeric Code
MAM115

### NQF Level
5

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered
First Semester

### Programmes in which the module will be offered
- BSc Applied Geology (3214) (3011)
- BSc Biotechnology (3211) (3007)
- BSc Chemical Sciences (3019) (3220)
- BPharmacy (3305)

### Year level
1

### Main outcomes:
On completion of this module students should be able to:
- Implement mathematical methods and techniques of Differential and Integral calculus in the Life Sciences and Pharmacy.

### Main content:
- Functions and limits
- Differentiation
- Curve sketching and applications of differentiation
- Integration

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Category</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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Selfstudy: 50
Other: 13
Total Learning Time 150

Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type
- Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Department of Mathematics and Applied Mathematics

Module Topic
Mathematics for Economic and Management Science

Generic Module Name
MAM126/MAM127

Alpha-numeric Code
MAM126/MAM127

NQF Level
5

NQF Credit Value
10

Duration
Semester

Proposed semester to be offered
- First Semester - MAM126
- Second Semester - MAM 127

Programmes in which the module will be offered
- BCom (1008) (1101)
- BCom (Accounting) (1021)
- BCom (Accounting ECP) (1753)
- BCom (Financial Accounting) (1175)

Year level
1

Main outcomes:
On completion of this module students should be able to:
- Mathematical and computational skills useful in the Economics and Management environment.
- Skills to read mathematical text in Economics
- Skills to write mathematical text in Economics
- Skills to interpret correctly literature pertaining to Managerial Sciences that require knowledge of mathematics.

Main content:
Mathematics of Finance
1. Simple & Compound interest
   - Definitions and Applications
   - Nominal and Effective rates
   - Continuous compounding
   - Discounting
2. Simple and Complex Annuities
   - Present & Future Values
   - Simple and Compound depreciation & amortization
   - Sinking funds with deduction
3. Introduction to Differential Calculus
   - Functional notation; functions and limits
   - Graphs of polynomials, exponential functions
   - Break-even & Market equilibrium
   - Definition of derivative
   - Rules of differentiation for polynomial, exponential and Logarithmic functions
4. Applications of Differentiation
   - Increasing & decreasing functions
   - Relative maxima & minima
   - Maximization applied to commercial type problems
5. Introduction to Integral Calculus
   - Definite & indefinite integral
- Integration of polynomial, exponential & logarithmic functions
- Integration by substitution & parts
- Applications to Managerial Sciences
- Consumers' and suppliers' surplus

Business Application

<table>
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<tr>
<th>Pre-requisite modules</th>
<th>QSC131 or QSC132 or QSA131</th>
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<tr>
<td>Prohibited module</td>
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<th>Hours</th>
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<tr>
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Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type

- Continuous and Final Assessment (CFA)

Faculty

- Natural Sciences

Home Department

- Mathematics and Applied Mathematics

Module Topic

- Mathematics for life Sciences with Academic Support Infused

Generic Module Name

- Introduction to Mathematics 150

Alpha-numeric Code

- MAM150

NQF Level

- 5

NQF Credit Value

- 15

Duration

- Year

Proposed semester to be offered

- Both semesters

Programmes in which the module will be offered

- Extended Curriculum Programmes in Life Sciences in the Faculty of Natural Sciences (3027) (3007) (3015) (3035)

Year level

- 1

Main outcomes:

- On completion of this module students should be able to:
  - Implement mathematical methods and techniques of Differential and Integral calculus in the Life Sciences and Pharmacy.

Main content:

- An introduction to the language of Mathematics including bracket pairs in Mathematics, the use of brackets in expressions and formulae. Equations versus inequalities. Absolute value.
- Functions-
  - Simple polynomial-, power-, and rational functions, their graphs and their sum, difference, product and quotient. The composite function.
- Trigonometric functions.
- Exponential and logarithmic functions-infusing the exponential and logarithmic laws and surds. Exponential growth and decay.
- Log-log and semi-log plots.
- Limits and continuity of simple functions. The natural logarithm.
- Rates of change, definitions of derivative, rules for finding derivative-including logarithmic differentiation. Higher order derivatives.
- Application of derivatives –curve sketching, maxima and minima, applications of maxima and minima –infusing volume and surface area, Newton’s Method.
- Implicit differentiation.
- Integration, the anti-derivative and indefinite integral, including standard integrals, method of substitution and integration by parts.
- The definite integral, including areas under curves and areas between curves.
- Improper integrals.

Pre-requisite modules: None
Co-requisite modules: None
Prohibited module: None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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Methods of Student Assessment: Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Mathematics and Applied Mathematics
Module Topic: Differential Calculus
Generic Module Name: MAM151
Alpha-numeric Code: MAM151
NQF Level: 5
NQF Credit Value: 15
Duration: Year
Proposed semester to be offered: Both semesters
<table>
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<th><strong>Programmes in which the module will be offered</strong></th>
<th>Extended Curriculum Programmes in Physical and Mathematical Sciences in the Faculty of Natural Sciences (3011) (3019) (3023) (3031) (3120)</th>
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<tbody>
<tr>
<td><strong>Year level</strong></td>
<td>1</td>
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<tr>
<td><strong>Main outcomes:</strong></td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain the basic ideas concerning functions and ways of transforming and combining them</td>
</tr>
<tr>
<td></td>
<td>• Carry out the basics operations of the number system, including complex numbers.</td>
</tr>
<tr>
<td></td>
<td>• Explain the limit concept, continuity and the definition of the derivative, with an emphasis on meanings in different mathematical contexts.</td>
</tr>
<tr>
<td></td>
<td>• Implement various differentiation techniques.</td>
</tr>
<tr>
<td></td>
<td>• Use the derivative in solving real world problems.</td>
</tr>
<tr>
<td><strong>Main content:</strong></td>
<td>• Set and real numbers</td>
</tr>
<tr>
<td></td>
<td>• Trigonometry</td>
</tr>
<tr>
<td></td>
<td>• Complex variables</td>
</tr>
<tr>
<td></td>
<td>• The coordinate system and straight lines</td>
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<tr>
<td></td>
<td>• Function characteristics and representation</td>
</tr>
<tr>
<td></td>
<td>• Main types of functions that occur in calculus</td>
</tr>
<tr>
<td></td>
<td>• Vectors</td>
</tr>
<tr>
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<td>• Limits and continuity</td>
</tr>
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<td></td>
<td>• The derivative of a function</td>
</tr>
<tr>
<td></td>
<td>• Differentiation rules covering all functions</td>
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<td>• Implicit differentiation</td>
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<td></td>
<td>• Curve sketching</td>
</tr>
<tr>
<td></td>
<td>• Related rates and optimization</td>
</tr>
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<td>• While introducing new concepts, emphasis is on the integration and infusion of concepts and techniques learnt at a lower level.</td>
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<tr>
<td><strong>Pre-requisite modules</strong></td>
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<td><strong>Prohibited module Combination</strong></td>
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<td><strong>Breakdown of Learning Time</strong></td>
<td><strong>Hours</strong></td>
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<td>Assignments &amp; tasks:</td>
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<td>Assessment:</td>
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<td>Practicals:</td>
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<td></td>
<td>Selfstudy:</td>
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<td><strong>Total Learning Time</strong></td>
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<td><strong>Methods of Student Assessment</strong></td>
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<td>Final Assessment (FA): 50%</td>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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<td>Mathematics and Applied Mathematics</td>
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<tr>
<td>Module Topic</td>
<td>Integral Calculus and Linear Algebra</td>
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<tr>
<td>Duration</td>
<td>Year</td>
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<td>Proposed semester to be offered</td>
<td>Both Semesters</td>
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<td>Programmes in which the module will be offered</td>
<td>Extended Curriculum Programmes in Physical and Mathematical Sciences in the Faculty of Natural Sciences (3011) (3019) (3023) (3031) (3120)</td>
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<tr>
<td>Year level</td>
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<tr>
<td>Main outcomes:</td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Explain the definite integral as a limit of Riemann sums, and the connection between the derivative and the definite integral brought out by the fundamental theory of calculus.</td>
</tr>
<tr>
<td></td>
<td>• Use the basic methods of integration in various contexts.</td>
</tr>
<tr>
<td></td>
<td>• Use systems of linear equations as matrix equations.</td>
</tr>
<tr>
<td></td>
<td>• Use systematic methods for solving matrix equations.</td>
</tr>
<tr>
<td>Main content:</td>
<td>• Area and the definite integral, properties of the definite integral, the fundamental theorem of calculus, techniques of integration and the table of integrals, numerical methods and improper integrals</td>
</tr>
<tr>
<td></td>
<td>• Area under a curve, volume, arc length and the average value of a function</td>
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<tr>
<td></td>
<td>• Row-reduced echelon forms and Gauss-Jordan elimination</td>
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<tr>
<td></td>
<td>• Solutions of a system of linear equations using determinants (Cramer’s rule), and the inverse of a matrix</td>
</tr>
<tr>
<td></td>
<td>• Vectors, dot product, cross product, and equations of lines and planes in three-dimensional space</td>
</tr>
<tr>
<td></td>
<td>• First order differential equations (variables separable, homogeneous, and linear) and its applications</td>
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<td>While introducing new concepts, emphasis is on the integration and infusion of Pre-Calculus concepts and techniques</td>
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<td>Breakdown of Learning Time</td>
<td>Hours</td>
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**Faculty:** Natural Sciences  
**Home Department:** Mathematics and Applied Mathematics  
**Module Topic:** Differential Calculus  
**Generic Module Name:** Differential Calculus 103  
**Alpha-numeric Code:** MAT103  
**NQF Level:** 5  
**NQF Credit Value:** 15  
**Duration:** Year  
**Proposed semester to be offered:** Both semesters  
**Programmes in which the module will be offered:**  
- BSc (Mathematical and Statistical Sciences) (3227)  
- BSc (Chemical Sciences) (3220)  
- BSc (Physics Sciences) (3233)  
- BSc (Computer Science) (3221)  
**Year level:** 1  
**Main outcomes:**  
- On completion of this module students should be able to:  
  - Understand the basic ideas concerning functions, their graphs, and ways of transforming and combining them  
  - Appreciate the basic ideas of the number system, including complex numbers.  
  - Understand the limit concept, continuity and the definition of the derivative, with an emphasis on meanings in different mathematical contexts.  
  - Apply differentiation techniques.  
  - Use the derivative in solving real world problems.  
  **NOTE:** Students who require additional assistance are placed onto MAT103 from MAT105 midway through the first semester. Placement is based on performance in MAT105; it is not possible to register for MAT103 at the start of the academic year.  
**Main content:**  
- Sets and real numbers  
- Trigonometry  
- Complex variables  
- The coordinate system and straight lines  
- Function characteristics and representation  
- Main types of functions that occur in calculus  
- Vectors  
- Limits and continuity  
- The derivative of a function  
- Differentiation rules covering all functions  
- Implicit differentiation  
- Curve sketching  
- Related rates and optimization  
While introducing new concepts, emphasis is on the integration and infusion of concepts and techniques learnt at a lower level.  
**Pre-requisite modules:** None
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<thead>
<tr>
<th>Co-requisite modules</th>
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<tr>
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

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**Faculty**
Natural Sciences

**Home Department**
Mathematics and Applied Mathematics

**Module Topic**
Integral Calculus and Linear Algebra

**Generic Module Name**
Integral Calculus and Linear Algebra 104

**Alpha-numeric Code**
MAT104

**NQF Level**
5

**NQF Credit Value**
15

**Duration**
Year

**Proposed semester to be offered**
Both semesters

**Programmes in which the module will be offered**
BSc (Mathematical and Statistical Sciences) (3227)
BSc (Chemical Sciences) (3220)
BSc (Physics Sciences) (3233)
BSc (Computer Science) (3221)

**Year level**
1

**Main outcomes:**
On completion of this module students should be able to:
- Understand the definite integral as a limit of Riemann sums, and the connection between the derivative and the definite integral brought out by the fundamental theorem of calculus.
- Apply basic methods of integration.
- Use techniques of integration to solve problems.
- Understand systems of linear equations as matrix equations and systematic methods for solving matrix equations

**Main content:**
- Area and the definite integral, properties of the definite integral, the fundamental theorem of calculus, techniques of integration, numerical methods and improper integrals
- Areas under a curve, volumes, arc length and average value of a function
- Row-reduced echelon forms and Gauss-Jordan elimination
- Solutions of a system of linear equations using determinants (Cramer’s rule), and the inverse of a matrix
• Vectors, dot product, cross product
• Equations of lines and planes in three-dimensional space.
• First order Differential equations (variables separable; homogeneous, and linear) and its applications.
• While introducing new concepts, emphasis is on the integration and infusion of Pre-Calculus concepts and techniques.

<table>
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<th>MAT103</th>
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<tr>
<td>Selfstudy:</td>
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</tr>
<tr>
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| Methods of Student Assessment | Continuous Assessment (CA): 50% |
| Assessment Module type       | Final Assessment (FA): 50%      |

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<th>Faculty</th>
<th>Natural Sciences</th>
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<tr>
<td>Home Department</td>
<td>Mathematics and Applied Mathematics</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Differential and Integral Calculus and Linear Algebra</td>
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<tr>
<td>Generic Module Name</td>
<td>Differential and Integral Calculus and Linear Algebra 105</td>
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<td>Duration</td>
<td>Year</td>
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<td>Proposed semester to be offered</td>
<td>Both semesters</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Mathematical and Statistical Sciences (3227)</td>
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<table>
<thead>
<tr>
<th>Year level</th>
<th>1</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Main outcomes:</th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Use the basic properties of functions (understand compositions, transformations, combinations and graphs in different contexts).</td>
</tr>
<tr>
<td></td>
<td>• Use mathematical induction to prove a statement involving a positive integer.</td>
</tr>
<tr>
<td></td>
<td>• Use the basic properties of numbers including complex numbers in different contexts.</td>
</tr>
<tr>
<td></td>
<td>• Use the concepts of limits, continuity and derivative with an emphasis on meanings in different mathematical contexts.</td>
</tr>
<tr>
<td></td>
<td>• Use rates of change, relates rates and differentiation correctly in solving real-world problems.</td>
</tr>
</tbody>
</table>
- Use different methods to determine the definite integral as a limit of Riemann sums.
- Use the basic methods of integration correctly to solve problems.
- Use basic methods for solving matrix equations.
- Use vectors and coordinate systems to solve problems in 3-dimensional space.

**Main content:**
- Sets, real and complex numbers, the coordinate system.
- Mathematical Induction.
- Main types of functions that occur in calculus.
- The Binomial Theorem.
- Limits, continuity and the derivative of a function.
- Differentiation rules and implicit differentiation.
- Curve sketching, related rates and optimization.
- Properties of the definite integral, the Fundamental Theorem of Calculus, techniques of integration and improper integrals.
- Areas under curves, volumes, arc length and average value of a function.
- Row-reduced echelon forms and Gauss-Jordan elimination.
- Solutions of systems of linear equations using determinants (Cramer’s rule) and inverses of matrices. Vectors, dot product, cross product and equations of lines and planes in 3-dimensional space.

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module combination**
None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Mathematics and Applied Mathematics

**Module Topic**
Advanced Calculus and Linear Algebra

**Generic Module Name**
Mathematics 211

**Alpha-numeric Code**
MAT211

**NQF Level**
6

**NQF Credit Value**
20

**Duration**
Semester

**Proposed semester to be offered**
First semester
| Programmes in which the module will be offered | BSc (Mathematical and Statistical Sciences) (3227) (3031)  
|                                               | BSc (Chemical Sciences) (3220) (3019)  
|                                               | BSc (Physics Sciences) (3233) (3120)  
|                                               | BSc (Computer Science) (3221) (3023) |
| Year level | 2 |
| Main outcomes: | On completion of this module students should be able to:  
|               | Advanced Calculus  
|               | • Know how to use the Principle of Mathematical Induction to prove statements.  
|               | • Understand infinite sequences and series; be familiar with different tests for convergence of sequences and series.  
|               | • Perform power series expansion of functions and find its interval and radius of convergence.  
|               | • Use functions of several variables, surfaces and coordinate transformations, contours, level surfaces and traces.  
|               | • Determine tangent planes and linear approximations, partial differentiation, implicit differentiation, limits, continuity and differentiability of functions of several variables.  
|               | • Use Lagrange multipliers, maxima and minima, Second derivative test for functions of several variables, chain rule for functions of several variables.  
|               | • Perform double and triple integrals, iterated integrals, surface integrals, the Jacobian, change of variables for double and triple integrals.  
| Linear Algebra | • Comprehend basic concepts associated with vectors, linear equations, matrices, linear transformations and eigenvectors and eigenvalues.  
|               | • Analyse arguments in the above contexts.  
|               | • Construct counter-examples in the above contexts.  
|               | • Structure logically valid arguments in the above contexts.  
| Main content: | Paper 1 (Advanced Calculus)  
|               | • Induction, Sequences.  
|               | • Infinite series (convergence tests, alternating series, conditional convergence, power series, Taylor & Maclaurin Series).  
|               | • Limits, continuity and differentiability of functions of several variables.  
|               | • Quadric surfaces, polar coordinates and parametric equations, spherical and cylindrical coordinates.  
|               | • Partial derivative (chain rule, maxima and minima of functions of two variables, Lagrange Multipliers).  
|               | • Multiple Integrals, surface integrals, multiple integrals in polar, spherical and cylindrical coordinates.  
| Paper 2 (Linear Algebra) | • Homogeneous and non-homogeneous systems of linear equations.  
|               | • Matrices and their inverses.  
|               | • Vector spaces and subspaces.  
|               | • Determinants.  
|               | • Linear transformations.  
<p>|               | Eigenvectors and eigenvalues |</p>
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<tr>
<th>Pre-requisite modules</th>
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<td>Breakdown of Learning Time</td>
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<td>Hours</td>
<td>Timetable Requirement per week</td>
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<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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Faculty: Natural Sciences  
Home Department: Mathematics and Applied Mathematics  
Module Topic: Differential Equations and Numerical Methods  
Generic Module Name: Mathematics 212  
Alpha-numeric Code: MAT212  
NQF Level: 6  
NQF Credit Value: 20  
Duration: Semester  
Proposed semester to be offered: Second Semester  
Programmes in which the module will be offered:  
- BSc (Mathematical and Statistical Sciences) (3227) (3031)  
- BSc (Chemical Sciences) (3220) (3019)  
- BSc (Physics Sciences) (3233) (3120)  
- BSc (Computer Science) (3221) (3023)  
Year level: 2  
Main outcomes: On completion of this module students should be able to:  
- Formulate Differential Equations from given physical situations.  
- Solve linear Ordinary Differential Equations.  
- Interpret the solutions in the given physical context.  
- Solve linear systems of Differential Equations.  
- Use Newton’s method to solve systems of nonlinear equations.  
- Use different methods for polynomial interpolation.  
- Use different methods for numerical differentiation and numerical integration with error estimates.  
Main content:  
- First-Order equations.  
- Homogeneous linear differential equations with constant coefficients.  
- Nonhomogeneous linear differential equations.  
- Numerical solutions of nonlinear algebraic equations.  
- Newton’s method for systems of nonlinear equations.
• Polynomial Interpolation.
• Numerical differentiation and numerical integration.
• Iterative methods for linear systems.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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### Breakdown of Learning Time

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<th>Hours</th>
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### Methods of Student Assessment

- **Continuous Assessment (CA): 50%**
- **Final Assessment (FA): 50%**

### Assessment Module type

- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Mathematics and Applied Mathematics

### Module Topic
- Advanced Calculus and Linear Algebra

### Generic Module Name
- Mathematics 221

### Alpha-numeric Code
- MAT221

### NQF Level
- 6

### NQF Credit Value
- 20

### Duration
- Semester

### Proposed semester to be offered
- Second Semester

### Programmes in which the module will be offered
- BSc (Mathematical and Statistical Sciences) (3227) (3031)

### Year level
- 2

### Main outcomes:

On completion of this module students should be able to:

- Vector Calculus
  - Perform basic operations in Vector Algebra.
  - Determine vector function, tangent vector, acceleration, TNB-frame and osculating plane.
  - Evaluate and interpret line integrals.
  - Understand Independence of Path.
  - Be familiar with the properties of vector fields, as well as grad, div and curl differential operators.
  - Use Green's Theorem to evaluate line integrals and double integrals.
  - Apply Stokes’ Theorem to vector fields.
  - Understand Surface Independence.
  - Use the Divergence Theorem to evaluate surface integrals, volume integrals and the flux of a vector field across a surface.
  - Solve integral problems in mechanics.
### Algebraic Structures
- Comprehend basic concepts associated with sets, relations, functions, groups, rings, and fields.
- Analyse arguments in the above contexts.
- Construct counter-examples in the above contexts.
- Structure logically valid arguments in the above contexts.

### Main content:

**Paper 1 (Vector Calculus)**
- Vector Algebra and vector function of curves and surfaces
- TNB – frame and osculating plane
- Vector fields
- Line integrals and independence of path
- Green’s Theorem
- Grad div and curl
- Surface integrals and flux
- Stokes’ Theorem
- Divergence theorem
- Applications to gravity, electromagnetism, fluid flow and heat

**Paper 2 (Algebraic Structures)**
- Sets, relations and functions
- Integers, rational numbers, and real numbers
- Introduction to groups, rings and fields

### Pre-requisite modules
None

### Co-requisite modules
MAT211

### Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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<td>Selfstudy</td>
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<td><strong>Total Learning Time</strong></td>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Mathematics and Applied Mathematics

### Module Topic
Discrete Mathematics

### Generic Module Name
Discrete Mathematics 232

### Alpha-numeric Code
MAT232

### NQF Level
6

### NQF Credit Value
20

### Duration
Semester

### Proposed semester to be offered
First Semester
| Programmes in which the module will be offered | BSc (Mathematical and Statistical Science) (3227) (3031)  
|  | BSc (Physical Science) (3233) (3120) |
| Year level | 2 |
| Main outcomes: | On completion of this module students should be able to:  
|  | • Solve problems in elementary set theory and logic.  
|  | • Use combinatorial techniques to solve various enumerative combinatorial problems.  
|  | • Formulate and solve counting problems in algebra and graph theory. |
| Main content: |  
|  | • Introduction to axiomatic set theory and logic.  
|  | • Enumerative combinatorics.  
|  | • Introductory graph theory. |
| Pre-requisite modules | APM112 and (MAT105 or MAT103) |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 39 | Lectures p.w. | 3 |
| Assignments & tasks: | 24 | Practicals p.w. | 2 |
| Assessment | 25 | Tutorials p.w. | |
| Practicals: | 52 | | |
| Selfstudy | 60 | | |
| Other: Tutorials | 0 | | |
| Total Learning Time | 200 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
|  | Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Mathematics and Applied Mathematics |
| Module Topic | Real Analysis and Modern Algebra |
| Generic Module Name | Real Analysis and Modern Algebra 311 |
| Alpha-numeric Code | MAT311 |
| NQF Level | 7 |
| NQF Credit Value | 30 |
| Duration | Semester |
| Proposed semester to be offered | First Semester |
| Programmes in which the module will be offered | Mathematical and Statistical Sciences, Physical Science,  
|  | Computer Science |
| Year Level | 3 |
| Main Outcomes | On completion of this module students should be able to:  
|  | • Explain the notions of open subset, boundedness and finiteness, connectedness and compactness in Euclidean space.  
|  | • Explain the notions of continuity and uniform continuity of functions between subspaces of Euclidean space, and in relation to sequences, compactness and connectedness.  
|  | • Use their knowledge of the basic theory of groups to provide examples and counter-examples of various concepts. |
### Main Content

- Carry out proofs of mathematical statements.
- Use new knowledge in unfamiliar but similar situations.

<table>
<thead>
<tr>
<th>Paper 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bounded subsets of real numbers</strong></td>
</tr>
<tr>
<td><strong>Suprema, Supremum property, Existence of irrational roots</strong></td>
</tr>
<tr>
<td><strong>Inner product and normed spaces</strong></td>
</tr>
<tr>
<td><strong>Open sets, Nested cells theorem, Cluster point</strong></td>
</tr>
<tr>
<td><strong>Bolzano-Weierstrass theorem (for sets), Compactness</strong></td>
</tr>
<tr>
<td><strong>Heine-Borel theorem, Connectedness</strong></td>
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<tr>
<td><strong>Sequences, Convergence and subsequences, Monotone convergence theorem, Bolzano-Weierstrass theorem for sequences, Cauchy sequences, global continuity theorem</strong></td>
</tr>
<tr>
<td><strong>Preservation of compactness and connectedness</strong></td>
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<tr>
<td><strong>Uniform continuity, Fixed point theorems</strong></td>
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<table>
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<tr>
<th>Paper 2</th>
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<tr>
<td><strong>Operations, Groups &amp; subgroups, Normal subgroups and factor groups, Cyclic groups, Homomorphisms &amp; fundamental homomorphism theorem, Permutation groups, Cayley’s theorem</strong></td>
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### Pre-requisite modules

- MAT211 and MAT221

### Co-requisite modules

- None

### Prohibited module Combination

- None

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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Total learning time:** 300

### Method of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module Type

- Continuous and Final Assessment (CFA)

### Faculty

- Natural Sciences

### Home Department

- Mathematics and Applied Mathematics

### Module Topic

- Real Analysis and Modern Algebra

### Generic Module Name

- Real Analysis and Modern Algebra 311

### Alpha-numeric Code

- MAT311

### NQF Level

- 7

### NQF Credit Value

- 30

### Duration

- Semester

### Proposed semester to be offered

- First Semester

### Programmes in which the module will be offered

- Mathematical and Statistical Sciences, Physical Science, Computer Science
### Main Outcomes
On completion of this module students should be able to:
- Explain the notions of open subset, boundedness and finiteness, connectedness and compactness in Euclidean space.
- Explain the notions of continuity and uniform continuity of functions between subspaces of Euclidean space, and in relation to sequences, compactness and connectedness.
- Use their knowledge of the basic theory of groups to provide examples and counter-examples of various concepts.
- Carry out proofs of mathematical statements.
- Use new knowledge in unfamiliar but similar situations.

### Main Content

#### Paper 1
- Bounded subsets of real numbers
- Suprema, Supremum property, Existence of irrational roots
- Inner product and normed spaces
- Open sets, Nested cells theorem, Cluster point
- Bolzano-Weierstrass theorem (for sets), Compactness
- Heine-Borel theorem, Connectedness
- Sequences, Convergence and subsequences, Monotone convergence theorem, Bolzano-Weierstrass theorem for sequences, Cauchy sequences, global continuity theorem
- Preservation of compactness and connectedness
- Uniform continuity, Fixed point theorems

#### Paper 2
- Operations, Groups & subgroups, Normal subgroups and factor groups, Cyclic groups, Homomorphisms & fundamental homomorphism theorem, Permutation groups, Cayley’s theorem

### Pre-requisite modules
MAT211 and MAT221

### Co-requisite modules
None

### Prohibited module Combination
None

### Breakdown of Learning Time

<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
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</table>

### Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module Type
Continuous and Final Assessment (CFA)
Faculty | Natural Sciences  
---|---  
Home Department | Mathematics and Applied Mathematics  
Module Topic | Mathematical Modeling  
Generic Module Name | Mathematics 312  
Alpha-numeric Code | MAT312  
NQF Level | 7  
NQF Credit Value | 30  
Duration | Semester  
Proposed semester to be offered | First Semester  
Programmes in which the module will be offered | BSc. Mathematical and Statistical Sciences (3227) (3031)  
BSc. Physical Science (3233) (3120)  
BSc. Computer Science (3221) (3023)  
Year Level | 3  
Main Outcomes | On completion of this module students should be able to:  
• Analyse and simulate mathematical models for dynamical population systems.  
• Understand the basics in epidemiology  
• Understand how to formulate and solve optimal control problems.  
Main Content | • Population models: Equilibrium solutions, stability, direction fields, phase portraits;  
• Epidemic models, predator-prey models, competing species models, co-operating species models, food chains.  
• Dynamic optimization in discrete and continuous time.  
• Optimization in environmental management (eg. fisheries, harvesting, hunting etc.)  
• Numerical methods to solve differential equations arising from the topics mentioned above.  
Pre-requisite modules | MAT211 and (MAT212 or MAT221)  
Co-requisite modules | None  
Prohibited module | None  
Combination | None  
Breakdown of Learning Time |  
<table>
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<tr>
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</table>
| Contact with lecturer / tutor: | 39 | Lectures p.w. | 3  
| Assignments & tasks: | 23 | Practicals p.w. | 3  
| Practicals: | 23 | Tutorials p.w. | 2  
| Assessments: | 39 |  |  
| Self-study: | 150 |  |  
| Other: Tutorials | 26 |  |  
| Total learning time: | 300 |  |  
Method of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA):  50%  
Assessment Module Type | Continuous and Final Assessment (CFA)  

Faculty | Natural Sciences  
---|---  
Home Department | Mathematics and Applied Mathematics  
Module Topic | Complex Analysis and Modern Algebra  
Generic Module Name | Complex Analysis and Modern Algebra 321  
Alpha-numeric Code | MAT321  
NQF Level | 7  

302
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<td>Second Semester</td>
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| Programmes in which the module will be offered | BSc. Mathematical and Statistical Sciences (3227, 3031)  
BSc. Physical Science (3233, 3120)  
BSc. Computer Science (3221, 3023) |
| Year Level | 3 |
| Main Outcomes | On completion of this module students should be able to:  
• Use properties of complex numbers and complex functions in problem solving.  
• Use the properties of analytic functions to solve problems.  
• Use contour integrals in various situations.  
• Use Taylor and Laurent series to solve problems.  
• Use Residue theory to solve problems.  
• Generalize concepts from Groups to Rings.  
• Use different methods to test for irreducibility of polynomials.  
• Use the theory to construct finite fields.  
• Use their knowledge of field extensions to prove the impossibility of certain geometric constructions using ruler and compass. |
| Main Content | Paper 1  
• Complex numbers and properties  
• Elementary complex functions and properties  
• Analytic functions  
• Contour integral and properties  
• Taylor and Laurent series  
• Residue theory  
Paper 2  
• Rings, subrings, integral domains, fields, field of quotients.  
• Quotient rings, prime ideals, maximal ideals.  
• Polynomial rings, factorization, irreducibility tests.  
• Field extensions.  
• Finite field construction.  
• Constructability by ruler and compass. |
| Pre-requisite modules | MAT211 and MAT221 |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Time-table Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 39 | Lectures p.w. |
| Assignments & tasks: | 33 | Practical p.w. 3 |
| Practicals: | 30 | Tutorials p.w. |
| Assessments: | 78 | |
| Self-study: | 120 | |
| Total learning time: | 300 | |
| Method of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
<p>| Assessment Module Type | Continuous and Final Assessment (CFA) |</p>
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<td>Second semester</td>
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<td>BSc. Mathematical and Statistical Sciences (3227, 3031)</td>
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<td>BSc. Physical Science (3233, 3120)</td>
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<td>BSc. Computer Science (3221, 3023)</td>
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<tr>
<td></td>
<td>• Implement the basic tools of the geometric Brownian motion of stock prices.</td>
</tr>
<tr>
<td></td>
<td>• Use their knowledge of elementary cases of pricing via arbitrage of options to solve problems.</td>
</tr>
<tr>
<td></td>
<td>• Use their knowledge of vanilla and exotic options and their valuation to solve problems.</td>
</tr>
<tr>
<td></td>
<td>• Use the Black-Scholes formula to solve option pricing problems.</td>
</tr>
<tr>
<td></td>
<td>• Use the n-period binomial model method to solve problems.</td>
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<td></td>
<td>• Use Monte Carlo simulation approach to solve option pricing problems.</td>
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<tr>
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<td>• Elementary probability theory</td>
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<td>• Normal random variables</td>
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<td>• Geometric Brownian motion</td>
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<td>• Present value analysis</td>
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<td>• Introduction to derivatives</td>
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<td></td>
<td>• Pricing contract via arbitrage, The arbitrage theorem</td>
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<td></td>
<td>• The Black-Scholes formula</td>
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<tr>
<td></td>
<td>• Vanilla options</td>
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<tr>
<td></td>
<td>• Multi-period binomial model method</td>
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<td></td>
<td>• Option valuations by expected utility</td>
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<td>• Exotic options</td>
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<td>• Portfolio optimization</td>
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<td></td>
<td>• Autoregressive models and mean reversion</td>
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<td>• Simulations-random walk, Monte Carlo methods</td>
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<td>Self-study:</td>
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<td>-----------------------------</td>
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| **Method of Student Assessment** | Continuous Assessment (CA): 50%  
                                      Final Assessment (FA): 50% |
| **Assessment Module Type**  | Continuous and Final Assessment (CFA) |

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<th><strong>Faculty</strong></th>
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<tbody>
<tr>
<td><strong>Home Department</strong></td>
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<tr>
<td><strong>Module Topic</strong></td>
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<td>BSc (Medical Biosciences) (3230, 3035); BSc (Dietetics) (8231); BSc (SRES) (8051); BSc (CHS) (8104)</td>
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<tr>
<td><strong>Year level</strong></td>
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</table>

**Main Outcomes:**

On completing of this module, students should be able to:
- Explain the organization of the human body, and the concepts of homeostasis, health, human diseases and disease causing agents.
- Describe the early development of the fetus.
- Identify and discuss the histology of the main tissue types.
- Explain the gross anatomy and general functions of the skeletal and muscle systems, and the characteristics of joints types.
- Demonstrate competencies in selected laboratory techniques related to the evaluation of tissue types, the muscle and skeletal systems.

**Main Content**

**Organization and function from chemical to systemic level:**
- The scope of human biology and functional organization of the body.
- Homeostasis, human disease, disease causing agents.
- Essentials of early human development.
- Essentials of the histology of tissue types

**Systems of support and movement:**
- Gross anatomy of the skeletal system
- Gross anatomy of the muscular system
- Articulations and movement Application of knowledge in writing a literature review on a chosen topic and a power point presentation.

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None
## Breakdown of Learning Time

<table>
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<tr>
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### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

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### Faculty

- Natural Sciences

### Home Department

- Medical Biosciences

### Module Topic

- Introduction to the Human Body

### Generic Module Name

- Introduction to the Human Body II 121

### Alpha-numerics Code

- MBS121

### NQF Level

- 5

### NQF Credit Value

- 15

### Duration

- Semester

### Proposed semester to be offered

- Second Semester

### Programmes in which the module will be offered

- BSc (Medical Biosciences) (3230,3035); BSc (Dietetics) (8231); BSc (SRES) (8051); BSc (CHS) (8104)

### Year level

- 1

### Main Outcomes

On completing of this module, students should be able to:

- Demonstrate a good knowledge of the function of neurons, the transduction of sensory stimuli, and how this information is processed and transduced by the CNS.
- Describe the functional anatomy of the nervous system and discuss the major sensory and motor pathways.
- Explain the basic anatomy and physiology of selected organ systems, for example, blood, immunity and the lymphatic system, structure and function of muscles, and the vital role of the cardiovascular system in maintaining homeostasis.
- Demonstrate selected basic laboratory competencies.
- Illustrate competency in experimentally-based data handling basic statistical analyses.
- Demonstrate information processing skills such as searching for and evaluating information.

### Main Content

- Overview of the neuron and the major neural pathways of the CNS:
  - The macro- and microscopic characteristics of blood and the lymphatic system, muscles and cardiovascular system.
  - The control mechanisms that help regulate and integrate the diverse functions and component parts of the systems referred to above.

### Pre-requisite modules

- None

### Co-requisite modules

- None
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<thead>
<tr>
<th>Prohibited module Combination</th>
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| Faculty                       | Natural Sciences |
| Home Department               | Medical Biosciences |
| Module Topic                  | Structure and Function of the Human Body IV |
| Generic Module Name           | Structure and Function of the Human Body IV |
| Alpha-numeric Code            | MBS214 |
| NQF Level                     | 5 |
| NQF Credit Value              | 15 |
| Duration                      | Semester |
| Proposed semester to be offered | First Semester |
| Programmes in which the module will be offered | BSc (Occupational Therapy) (8111) |
| Year level                    | 2 |

**Main Outcomes**

On completion of this module students should be able to:
- Explain the macro-and microscopic structure of the specified systems.
- Discuss the mechanisms whereby the specified organs systems, individually and collectively, contribute to body homeostasis.
- Describe how functions of these systems are regulated and coordinated.
- Describe the functional organization of the nervous system and respiratory system.
- Relate the consequences of dysfunction in the various body systems- selected examples.
- Demonstrate laboratory competencies related to the investigation of the structure and function of the specified systems.
- Demonstrate basic competencies in executing investigate experiments, and report it in an acceptable scientific style and format.

**Main Content**

- Organization and function of the central and peripheral nervous systems.
- Macro-and microscopic structure and coordinated functions of the respiratory system.

**Pre-requisite modules**

None

**Co-requisite modules**

None
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<td><strong>Programmes in which the module will be offered</strong></td>
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<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Explain the macro-microscopic structure of the specified systems.</td>
</tr>
<tr>
<td></td>
<td>• Explain the mechanisms whereby the specified organs systems, individually and collectively, contribute to body homestatis.</td>
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<tr>
<td></td>
<td>• Describe how the functions of these systems are regulated and coordinated.</td>
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<tr>
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<td>• Describe the Functional organization of the nervous system.</td>
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<td>• Relate the consequences of dysfunction in the various body systems – selected examples.</td>
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<td>• Demonstrate laboratory competencies related to the investigation of the structure and function of specified systems.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate basic competencies in executing investigative experiments, and report it in an acceptable scientific style and format.</td>
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<td><strong>Main Content</strong></td>
<td>Macro- and microscopic structure and coordinated functions of the respiratory system</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Medical Biosciences

**Module Topic**
- Structure and Function of the Human Body V

**Generic Module Name**
- Structure and Function of the Human Body V

**Alpha-numeric Code**
- MBS218

**NQF Level**
- 6

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered**
- Second Semester

**Programmes in which the module will be offered**
- BSc (Physiotherapy) (8211); BSc (Occupational Therapy) (8111)

**Year level**
- 2

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain the macro-microscopic structure of the specified systems.
  - Explain the mechanisms whereby the specified organs systems, individually and collectively, contribute to body homestasis.
  - Describe how the functions of these systems are regulated and coordinated.
  - Relate the consequences of dysfunction in the various body systems – selected examples.
  - Demonstrate laboratory competencies related to the investigation of the structure and function of specified systems.
  - Demonstrate basic competencies in executing investigative experiments, and report it in an acceptable scientific style and format.

**Main Content**
- Embryology macro- and microscopic structure and coordinated functions of the cardiovascular and urinary systems, including acid base regulation.
- Embryology, macro- and microscopic structure and coordinated functions of the endocrine and reproductive systems.

**Pre-requisite modules**
- HUB117 and HUB127 or equivalent prior knowledge

**Co-requisite modules**
- None

**Prohibited module Combination**
- None
### Breakdown of Learning Time

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<th>Hours</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Medical Biosciences

### Module Topic
- Introduction to the Human Body III

### Generic Module Name
- Introduction to the Human Body III

### Alpha-numeric Code
- MBS231

### NQF Level
- 6

### NQF Credit Value
- 20

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- BSc (Medical Biosciences) (3230, 3035); BSc (Natural Medicine) (8344); BSc (Chinese Medicine) (8106); BSc (Sport Science) (8051); BSc (Dietetics) (8281)

### Year level
- 2

### Main Outcomes
- On completion of this module students should be able to:
  - Explain the functional organization of the nervous system
  - Explain the physiology of special senses.
  - Explain the control of movement.
  - Explain some of the effects of loss of function of parts of the neuromuscular system
  - Explain the macro- and microscopic structure of the specified systems
  - Demonstrate knowledge of how the functions of these systems are regulated and coordinated
  - Explain the consequences of dysfunction in the various body systems – selected examples
  - Carry out experimental work
  - Write an experimental report in an acceptable scientific style

### Main Content
- Organization and function of the central and peripheral nervous systems
- Macro- and microscopic structure and coordinated functions of the endocrine system.
- Basic concepts of thermoregulation.

### Pre-requisite modules
- LSC141 or MBS111 and MBS121

### Co-requisite modules
- None

### Prohibited module Combination
- None
### Breakdown of Learning Time

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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

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<tr>
<td>Home Department</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc (Medical Biosciences) (3230, 3035); BSc (Natural Medicine) (8344); BSc (Chinese Medicine) (8106); BSc (Sport Science) (8051); BSc (Dietetics) (8281)</td>
</tr>
<tr>
<td>Year level</td>
<td>2</td>
</tr>
</tbody>
</table>

### Main Outcomes
- On completion of this module students should be able to:
  - Have a detailed knowledge of the macro- and microscopic structure of the specified systems.
  - Have a detailed knowledge of the mechanisms whereby the specified organs systems, individually and collectively, contribute to body homeostasis.
  - Explain of how the functions of these systems are regulated and coordinated.
  - Explain intercellular signalling: receptors and chemical signals (local, neurological and hormonal).
  - Explain the consequences of dysfunction in the various body systems – selected examples.
  - Master laboratory competencies related to the investigation of the form and function of the specified systems.
  - Master basic competencies in executing investigative experiments, and reporting it in an acceptable scientific style and format.
  - Explain the metabolism of carbohydrates, lipids and proteins.

### Main Content
- Macro- and microscopic structure and coordinated functions of the endocrine, reproductive, urinary and digestive systems.
- Cellular metabolic processes.

### Pre-requisite modules
- LSC141 or MBS111; and MBS121

### Co-requisite modules
- None
<table>
<thead>
<tr>
<th>Prohibited module Combination</th>
<th>None</th>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor</td>
<td>42</td>
<td>Lectures p.w.</td>
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<tr>
<td>Assignments &amp; tasks:</td>
<td>10</td>
<td>Practical p.w.</td>
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<th>Methods of Student Assessment</th>
<th>Continuous Assessment (CA): 50%</th>
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<tbody>
<tr>
<td></td>
<td>Final Assessment (FA): 50%</td>
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<table>
<thead>
<tr>
<th>Assessment Module type</th>
<th>Continuous and Final Assessment (CFA)</th>
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<table>
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<tr>
<th>Faculty</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Oral Manifestations of Infectious Diseases</td>
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<tr>
<td>Generic Module Name</td>
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<tr>
<td>Alpha-numeric Code</td>
<td>MBS323</td>
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<td>Duration</td>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
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<tbody>
<tr>
<td></td>
<td>• Understand the oral environment and the role played by the normal oral flora and the dental plaque in health and disease.</td>
</tr>
<tr>
<td></td>
<td>• Be familiar with the oral manifestations of hiv and other infectious diseases.</td>
</tr>
<tr>
<td></td>
<td>• Interpret microbiological tests used in clinical diagnosis of oral infections.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Content</th>
<th>• Oral ecosystem and dental plaque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Microbiology of dental caries</td>
</tr>
<tr>
<td></td>
<td>• Microbiology of periodontal disease (prepubertal, juvenile, adult, pregnancy and HIV –associated)</td>
</tr>
<tr>
<td></td>
<td>• Dentoalveolar infections (dentoalveolar abscess, Ludwig’s angina, periodontal abscess, suppurative osteomyelitis of the jaws, cervicofacial actinomycosis)</td>
</tr>
<tr>
<td></td>
<td>• Oral mucosal infections (candidiasis, herpetic stomatitis, varicella-zoster infection, coxsackie A virus infection, measles)</td>
</tr>
<tr>
<td></td>
<td>• Oral manifestations of important bacterial infections (syphilis, tuberculosis, leprosy, gonorrhoea)</td>
</tr>
<tr>
<td></td>
<td>• Salivary gland infections (viral and bacterial parotitis, sialadenitis)</td>
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</table>

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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<td>Prohibited module Combination</td>
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<td>Continuous and Final Assessment (CFA)</td>
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<tr>
<th>Faculty</th>
<th>Natural Science</th>
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<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Anatomical and Molecular Systems Biology</td>
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<tr>
<td>Generic module name</td>
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<td>Alpha-numeric code</td>
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<td>First Semester</td>
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<td>Programmes in which the module will be offered.</td>
<td>BSc (Medical Biosciences) (3230, 3035); BSc (SRES) (8051)</td>
</tr>
<tr>
<td>Year Level</td>
<td>3</td>
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</tbody>
</table>

Main Outcomes

- Explain and evaluate advanced cellular and molecular control mechanisms and the molecular basis of selected diseases, e.g. cancer, cystic fibrosis, Alzheimer’s and malaria.
- Explain communication in the nervous system.
- Explain macro - and micro-anatomy of the male and female reproductive health including fertility/infertility, family planning and STD’s.
- Demonstrate competencies in basic laboratory principles (laboratory mathematics, buffer systems, pH, preparation of solutions, pipetting techniques, use of weighing instruments, etc.) and scientific research methodology (literature search, description of data with the aid of statistical methods).
- Demonstrate competency in basic information management.
- Find, summarize and interpret scientific literature.
- Quantify and interpret scientific data.

Main Content

Control mechanisms:

- Normal and abnormal cell growth with special reference to program cell death (apoptosis) cancer
Cell communication and signal transduction pathways and their relation to disease states.
Application of neuro regulators with receptors and mediation of function through these receptors.

**Applied Reproduction:**
- Macro- and micro-anatomy of female and male reproductive systems with special reference to humans.
- Advanced comparative aspects of gamete production, transport, function and control of gestation and parturition.
- Fertility and infertility.
- Artificial control of reproduction and reproductive health, including family planning and contraception.
- Pathophysiology of the reproductive system

**Research methodology 1:**
- Selection of and planning of a research project; Budget, Funding and proposal writing and Protocol writing
- Execution of research: Various hands on laboratory techniques; Generation and capturing of data
- Data collection and analysis: Methods in collection of different categories of scientific data; Quantification and interpretation of scientific data
- Literature research and interpretation: Overview of all methods of literature retrieval and organization.
- Application of knowledge in writing a literature review on a chosen topic and a powerpoint presentation

### Pre-requisite modules
MBS 231 and 232

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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<td>Tutorials p.w.</td>
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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Medical Biosciences

### Module Topic
Impact of lifestyle on cardiopulmonary systems & Metabolism

### Generic module name
Impact of lifestyle on cardiopulmonary systems & Metabolism

### Alpha-numeric code
MBS332

### NQF Level
5

### NQF Credit Value
15
<table>
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<td>Second Semester</td>
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<td>Programmes in which the module will be offered.</td>
<td>BSc (Medical Biosciences) (3230, 3035); BSc (SRES) (8051)</td>
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<tr>
<td>Year Level</td>
<td>3</td>
</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate the physiological basis of the lung development and selected cardiovascular and lung diseases.</td>
</tr>
<tr>
<td></td>
<td>• Explain the principles that underpin selected techniques used in heart and lung research. Students should also be able to interpret the data.</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate the nutrition and metabolism in maintenance of health and the consequences of obesity and anorexia nervosa.</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate the role of exercise in health maintenance.</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate the role of exercise in maintaining energy balance and reducing/preventing obesity.</td>
</tr>
<tr>
<td></td>
<td>• Describe changes to muscle histology during exercise.</td>
</tr>
<tr>
<td></td>
<td>• The student should be competent in the planning, execution and presentation of the research project.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Anatomical, Molecular &amp; Systems Biology Lifestyle and health:</td>
</tr>
<tr>
<td></td>
<td>• The physiological basis of: selected cardiac, lung and vascular diseases.</td>
</tr>
<tr>
<td></td>
<td>• Role of lifestyle on development and health</td>
</tr>
<tr>
<td></td>
<td>• Histopathology/pathophysiology of the respiratory system with reference to emphysema, AIDS and tuberculosis</td>
</tr>
<tr>
<td></td>
<td>• Muscle adaptations to endurance and resistance training.</td>
</tr>
<tr>
<td></td>
<td>• Muscle structure adaptations to a decreased physical activity.</td>
</tr>
<tr>
<td></td>
<td>• Controlling food intake and factors that control hunger and satiety with regards to energy expenditure and its effects on obesity.</td>
</tr>
<tr>
<td></td>
<td>Research Methodology - Project management.</td>
</tr>
<tr>
<td></td>
<td>• Application of skills gained in the first semester</td>
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<tr>
<td></td>
<td>• Research methodology lectures requantification and interpretation of scientific data.</td>
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<tr>
<td></td>
<td>Data collection and analysis</td>
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<tr>
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<td>• Methods in collection of different categories of scientific data</td>
</tr>
<tr>
<td></td>
<td>• Quantification and interpretation of scientific data</td>
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<td></td>
<td>Execution of research</td>
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<tr>
<td></td>
<td>• Conduct laboratory research</td>
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<tr>
<td></td>
<td>• Generation of data</td>
</tr>
<tr>
<td></td>
<td>Writing of a scientific report on the research project.</td>
</tr>
<tr>
<td></td>
<td>• Application of knowledge in writing a report on the research project and presentation of a seminar</td>
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<td>MBS231, MBS232 and MBS331 or a CAM of 40% in these modules</td>
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Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table
--- | --- | --- | ---
Contact with lecturer / tutor: | 100 | Lectures p.w. | 3
Assignments & tasks: | 45 | Practicals p.w. | 3
Practicals: | 112 | Tutorials p.w. | 2
Tests & Examinations: | 3 | | |
Selfstudy: | 70 | | |
Other: | 0 | | |
Total Learning Time | 330 | | |

Methods of Student Assessment |
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type |
Continuous and Final Assessment (CFA)

Faculty |
Natural Sciences

Home Department |
Medical Biosciences

Module Topic |
Medical Microbiology

Generic Module Name |
Medical Microbiology 251

Alpha-numeric Code |
MIC251

NQF Level |
6

NQF Credit Value |
20

Duration |
Semester

Proposed semester to be offered |
First semester

Programmes in which the module will be offered |
BSc Medical Biosciences (3230) (3035)
As service module to HSC programmes

Year Level |
2

Main Outcomes |
On completion of this module students should be able to:
• Explain the history and philosophy of medical microbiology and the microorganisms of medical importance.
• Grasp host-parasite relationships, thus explaining why some microbes live in symbiosis with the host and others cause infection.
• Understand the basic principles of immunity
• Understand infection control and its application in clinical medicine

Main Content |
The history and philosophy of medical microbiology;
Microbes as parasites (micro-and macroparasites, intracellular and extracellular life, systems of classification); Eukaryotes (disease-causing fungi, protozoa, helminthes, arthropods); Prokaryotes (structure, nutrition, growth and survival, gene expression); Host-parasite interactions (characteristics and evolution of parasitism, the infectious process, parasite and host adaptations, basic immunity); Hospital acquired infections (predisposing factors, types and dynamics); Infection control (use of antimicrobials, sterilisation, disinfection and decontamination procedures, laboratory safety rules, protective clothing, adequate waste disposal, diminishing reservoirs, social and environmental factors, health education, vector control, immunisation).

Pre-requisite modules |
LSC141
<table>
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<td><strong>Assessment Module Type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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**Faculty**
- Natural Sciences

**Home Department**
- Medical Biosciences

**Module Topic**
- Medical Microbiology 252

**Generic Module Name**
- Medical Microbiology 252

**Alpha-numeric Code**
- MIC252

**NQF Level**
- 5

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered**
- First Semester

**Programmes in which the module will be offered**
- BSc (Medical Biosciences) (3230, 3035); BSc (Natural Medicine) (8106)

**Year level**
- 1

**Main Outcomes**
- On completion of this module students should be able to:
  - Classify and explain normal human microflora and discuss the role they play in disease prevention.
  - Explain the scope of immunology.
  - Classify and explain the pathogenic mechanisms of medically important parasites
  - Classify and explain the features of surface and systemic infections and discuss the human host responds to these infections.

**Main Content**
- Immunology: Normal flora of the human body; characteristics and evolution of parasitism; parasite and host adaptions; cells and organs of the immune systems; innate; alternative complement pathway;
- Major Histocompatibility complex; humoral immunity; classic complement pathway; cell-mediated immunity; immunoregulatory mechanisms; pathologic consequences of the immune response.
- The host community: Classes of host populations; Co-evaluation of host and parasite; herd immunity; cycles of disease.
- Emergence factors for infectious disease: human population shifts and behaviour; microbial adaptions and change; breakdown of public health measures; emerging
infectious diseases; factors favouring global eradication of an infectious disease.

- The infectious process: An overview of bacterial, viral fungal and protozoal pathogenesis; features of surface and systemic infections; mechanisms of spread through the body; Genetic determinants of spread and replication.
- Microbial pathogenic mechanisms: The role of bacterial biofilms; parasite survival; interactions of Human cancer viruses with their hosts.

Pre-requisite modules: MIC251
Co-requisite modules: None
Prohibited module combination: None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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Methods of Student Assessment:
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Medical Biosciences
Module Topic: Infections caused by Prokaryotic and Obligatory Intracellular Pathogens
Generic Module Name: Infections caused by Prokaryotic and Obligatory Intracellular Pathogens
Alpha-numeric Code: MIC353
NQF Level: 7
NQF Credit Value: 30
Duration: Semester
Proposed semester to be offered: First Semester
Programmes in which the module will be offered: BSc (Medical Biosciences)(3023,3035)
Year level: 3
Main Outcomes: On completion of this module students should be able to:
- Identify the signs and symptoms of system-based bacterial, viral and obligatory intracellular infections.
- Explain the aetiology, pathogenesis and control of these microorganisms.
- Explain and evaluate the replication cycles of viruses causing infections in humans.
- Explain the collection and transport of biological specimens for laboratory diagnosis.
• Explain the laboratory diagnostic and research methodology for the detention and characterization of these prokaryotic, viral and other intracellular pathogens.
• Explain and evaluate the molecular biology techniques used in the detention and characterization of these prokaryotic, viral and obligatory intracellular pathogens.

Main Content
• The language of clinical microbiology
• Transmission, aetiology, pathogenesis, treatment and prevention of bacterial and viral system-based infections
• Detention and characterization of the bacterial and viral pathogens in clinical specimens
• Diagnostic and research methodology including molecular biology and molecular epidemiology

Pre-requisite modules
MIC251 and MIC252

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time
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<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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Total Learning Time 300

Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Medical Biosciences

Module Topic
Infections caused by Prokaryotic Parasites

Generic Module Name
Infections caused by Prokaryotic Parasites 354

Alpha-numeric Code
MIC354

NQF Level
7

NQF Credit Value
30

Duration
Semester

Proposed semester to be offered
Second Semester

Programmes in which the module will be offered
BSc (Medical Biosciences) (3230,3035)

Year level
3

Main Outcomes
On completion of this module students should be able to:
• Explain and evaluate the value of basic entomology.
• Design the characteristics and life cycle of fungal, helminthic and protozoan parasites.
• Argue the aetiology, pathogenesis and control of systems-based parasitic infections.
• Design proper collection and transport systems of biological diagnosis and characterization of medically important parasites.
### Main Content
- The principles of parasitology; the role of arthropods as vectors for human infections
- The characteristics of the major groups of medically important fungi, helminthes and protozoa and the diseases they cause
- Laboratory detection and characterization of eukaryotic pathogens
- Aspects of Mycotoxicology and Immunotoxicology

### Pre-requisite modules
MIC251 and MIC252

### Co-requisite modules
None

### Prohibited module Combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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<tbody>
<tr>
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<td>Tests &amp; Examinations:</td>
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<td>Selfstudy:</td>
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<td><strong>Total Learning Time</strong></td>
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</table>

### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)
- oral endogenous infections and their effect on distant body sites (e.g. cardiovascular, pregnancy, Alzheimers etc);
- salivary gland infections and cervicofacial actinomycosis
- infections of the digestive system and food intoxication
- infections of the genito-urinary tract, the cardiovascular and lymphatic systems and the central nervous system
- common childhood infections and fever of unknown origin
- antimicrobial stewardship, sterilization and infection control

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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<tbody>
<tr>
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<td>Prohibited module</td>
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**Breakdown of Learning Time**

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**Methods of Student Assessment**

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**

- Continuous and Final Assessment (CFA)

**Faculty**

- Natural Sciences

**Home Department**

- School of Pharmacy

**Module Topic**

- Physicochemical Properties in Pharmaceutics

**Generic Module Name**

- Pharmaceutics 231

**Alpha-numeric Code**

- PCE231

**NQF Level**

- 6

**NQF Credit Value**

- 15

**Duration**

- Semester

**Proposed semester to be offered**

- First semester

**Programmes in which the module will be offered**

- BPharm (3305)

**Year level**

- 2

**Main Outcomes**

- On completion of this module students should be able to:
  - Explain the principles of Good Manufacturing Practice and the relevant legislation affecting manufacturing processes.
  - Identify the various dosage forms and the appropriate use of reference material.
  - Describe the various properties of chemicals to identify and select those which will result in quality pharmaceutical products.
Know how to change particle sizes through the appropriate use of machinery and how this changes physicochemical properties.
Identify, analyse and solve pharmaceutical problems using calculations.
Be capable of the extemporaneous preparation and appropriate labelling of various dosage forms.

Main Content
- The language of Pharmaceutics:
  - Introduction
  - Reference usage
  - Manufacturing legislation
  - Physicochemical properties
    - Liquid state:
    - Solutions and solubility
    - Surface and interfacial phenomena
  - Solid state:
    - Polymorphism
    - Unit processes:
    - Communition
    - Compounding

Pre-requisite modules
MAM115, PHC123, PHY112

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time
<table>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences
Home Department
School of Pharmacy
Module Topic
Pharmaceutical Formulation
Generic Module Name
Pharmaceutics 232
Alpha-numeric Code
PCE232
NQF Level
6
NQF Credit Value
15
Duration
Semester
Proposed semester to be offered
Second Semester
Programmes in which the module will be offered
BPharm (3305)
Year level
2
**Main Outcomes**

On completion of this module students should be able to:

- Explain the dynamic and relevance of disperse systems and how various physicochemical properties of these can be manipulated to achieve stable systems as pharmaceutical products.
- Explain the rheological properties of liquids and semi solids and how these can be altered for improved stability of products where these are used.
- Explain the concepts of particle size analysis, mixing and granulation.
- Be able to identify, analyse and solve pharmaceutical problems using calculations.
- Be capable of the extemporaneous preparation and appropriate packaging of various dosage forms.

**Main Content**

- Disperse systems:
  - Colloidal
  - Suspensions
  - Emulsions
  - Rheology and Viscosity
  - Particle size analysis
  - Unit processes:
    - Mixing
    - Granulation and formulation for tableting
    - Compounding

**Pre-requisite modules**

MAM115, PHC123, PHY112

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
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**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)

**Faculty**

Natural Sciences

**Home Department**

School of Pharmacy

**Module Topic**

Pharmaceutical Technology

**Generic Module Name**

Pharmaceutics 331

**Alpha-numeric Code**

PCE331

**NQF Level**

7

**NQF Credit Value**

15

**Duration**

Semester

**Proposed semester to be offered**

First Semester

**Programmes in which the module will be offered**

BPharm (3305)
<table>
<thead>
<tr>
<th>Year level</th>
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<tbody>
<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain formulation techniques and the technology required in the production of pharmaceuticals.</td>
</tr>
<tr>
<td></td>
<td>• Describe Good Manufacturing Practices and their application in the production of quality pharmaceutical products.</td>
</tr>
<tr>
<td></td>
<td>• Describe the medicines registration process.</td>
</tr>
<tr>
<td></td>
<td>• Plan and execute the production of laboratory scale samples of various dosage forms.</td>
</tr>
<tr>
<td><strong>Main Content</strong></td>
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</tr>
<tr>
<td></td>
<td>• Introduction to pharmaceutical technology</td>
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<tr>
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<td>• Tablets and tableting</td>
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<tr>
<td></td>
<td>• Filtration and extractions</td>
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<td>• Heat transfer, evaporation and drying</td>
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<td>• Distillation</td>
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<td>• Medicine registration</td>
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<td></td>
<td>• Principles of Good Manufacturing Practices</td>
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</table>

| Pre-requisite modules | PCE231 and PCE232 |
| Co-requisite modules | None |
| Prohibited module Combination | None |

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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
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| Methods of Student Assessment | Continuous Assessment (CA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Final Assessment (FA): 50% |

| Faculty | Natural Sciences |
| Home Department | School of Pharmacy |
| Module Topic | Applied Pharmaceutical Microbiology |
| Generic module name | Pharmaceutics 333 |
| Alpha-numeric code | PCE333 |
| NQF Level | 7 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | Second Semester |
| Programmes in which the module will be offered. | BPharm (3305) |
| Year Level | 3 |
| **Main Outcomes** | On completion of this module students should be able to: |
|  | • Describe the requirements for sterilization & sterility testing. |
|  | • Explain anti-microbial limitation and testing: preservatives, antiseptic and disinfectants. |
|  | • Describe pyrogen free formulations. |
Discuss the processes involved in antibiotic manufacture.
Implement the appropriate use of surgical dressings.
Evaluate medical waste disposal and the impact on environmental health care.
Plan and execute the preparation of extemporaneous sterile products.
Apply kinetics in the determination of expiry dates.

| Main Content                           | Sterilisation & Sterility testing |
|                                      | Anti-microbial limitation or destruction- preservatives antiseptics and disinfectants |
|                                      | Sources of microbial contamination |
|                                      | Selection and use of antimicrobials |
|                                      | Pharmaceutical application of microbiological techniques |
|                                      | Pyrogens |
|                                      | Antibiotic manufacture |
|                                      | Biological assays |
|                                      | Kinetics |
|                                      | Surgical dressings |
|                                      | Waste disposal and environmental health care |
|                                      | Practical work |

| Pre-requisite modules                  | PHC123, PCE231 & PCE232 |
| Co-requisite modules                   | None |
| Prohibited module Combination          | None |
| Breakdown of Learning Time             | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor:         | 42    | Lectures p.w. | 3 |
| Assignments & tasks:                   | 15    | Practicals p.w. | 1 |
| Practicals:                            | 9     | Tutorials p.w. |
| Tests & Examinations:                  | 42    |                  |
| Selfstudy:                             | 42    |                  |
| Other:                                 | 0     |                  |
| Total Learning Time                    | 150   |                  |

| Methods of Student Assessment          | Continuous Assessment (CA): 50% |
|                                      | Final Assessment (FA): 50% |
| Assessment Module type                | Continuous and Final Assessment (CFA) |

| Faculty                                | Natural Sciences |
| Home Department                        | School of Pharmacy |
| Module Topic                           | Advances in Pharmaceutical Sciences – Elective |
| Generic Module Name                    | Pharmaceutics 401 |
| Alpha-numeric Code                     | PCE401 |
| NQF Level                              | 8 |
| NQF Credit Value                       | 15 |
| Duration                               | Year |
| Proposed semester to be offered        | Both Semesters |
| Programmes in which the module will be offered | BPharm (3305) |
| Year level                             | 4 |
| Main Outcomes                          | On completion of this module students should be able to: |
|                                         | Describe advances in drug delivery systems and areas of specialization. |
**Main Content**
- Apply such methods to formulate and manufacture pharmaceuticals.
- Critically evaluate the value of such developments for drug delivery.
- Recent developments in pre-formulation, formulation, and manufacture from currently published pharmaceutics literature.

**Pre-requisite modules**
PCE331 & PCE333

**Co-requisite modules**
None

**Prohibited module Combination**
PPR404, PCH402 & PHC403

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Total Learning Time**: 160

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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**Facility**
Natural Sciences

**Home Department**
School of Pharmacy

**Module Topic**
Drug Delivery Systems

**Generic Module Name**
Pharmacy 431

**Alpha-numeric Code**
PCE431

**NQF Level**
8

**NQF Credit Value**
15

**Duration**
Semester

**Proposed semester to be offered**
First Semester

**Programmes in which the module will be offered**
BPharm (3305)

**Year level**
4

**Main Outcomes**
On completion of this module students should be able to:
- Apply the principles of pre-formulation and formulation to manufacture and package quality, safe and effective drug delivery systems for standard, modified and novel dosage forms and apply this information to solve delivery problems.

**Main Content**
- Pharmaceutical Preformation
- Drug delivery systems:
  - Immediate, modified and novel dosage forms
  - Packages and packaging
  - Veterinary pharmaceutical delivery systems

**Pre-requisite modules**
PCE331 & PCE323

**Co-requisite modules**
None

**Prohibited module Combination**
None
### Breakdown of Learning Time

<table>
<thead>
<tr>
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</table>

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

### Faculty

- Natural Sciences

### Home Department

- School of Pharmacy

### Module Topic

- Phytochemistry and Stereochemistry

### Generic Module Name

- Pharmaceutical Chemistry 232

### Alpha-numeric Code

- PCH232

### NQF Level

- 6

### NQF Credit Value

- 15

### Duration

- Semester

### Proposed semester to be offered

- Second Semester

### Programmes in which the module will be offered

- BPharm (3305)

### Year level

- 2

### Main Outcomes

- On completion of this module students should be able to:
  - Describe the therapeutic or medicinal value of plants and methods of identifying and evaluating medicinal plants, or crude drugs derived from such plants.
  - Demonstrate acquired skills in performing the isolation, chemical and physical analysis and quality assurance of phytochemicals.
  - Explain the influence of the three-dimensional properties and behaviour of molecules and drugs on their biological activity.

### Main Content

- Plants of pharmaceutical importance: Evaluation and quality assurance of herbal medicines, selected chromatographic techniques and phytochemicals.
- Stereochemistry: The study of the three-dimensional structure of molecules and drugs.

### Pre-requisite modules

- CHE114, CHE124 and PCH233 or a minimum of 40% final mark in PCH233

### Co-requisite modules

- None

### Prohibited module Combination

- None
<table>
<thead>
<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- School of Pharmacy

**Module Topic**
- Quality Control and Pharmaceutical Analysis

**Generic Module Name**
- Pharmaceutical Chemistry 233

**Alpha-numeric Code**
- PCH233

**NQF Level**
- 6

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered**
- First Semester

**Programmes in which the module will be offered**
- BPharm (3305)

**Year level**
- 2

**Main Outcomes**
- On completion of this module students should be able to:
  - Have an understanding of the theoretical and practical principles involved in the analysis and quality control of drugs.
  - Be able to apply chemical and physicochemical methods as well as instrumental methods of analysis of pharmaceutical substances.
  - Be able to interpret spectra obtained from spectroscopic techniques to deduce and/or identify the chemical structure of organic compounds.
  - Be able to apply the principles of quality assurance in the registration and control of medicines.
  - Be able to perform validation of experimental methods and their results.

**Main Content**
- Theory and principles of quality control.
- Methods of quality control, including: Complexometric titrations and Spectrophotometric techniques (Ultra violet-, Infra-red- and Atomic spectroscopy).
- Advanced analytical methods, including: Gas chromatography; High-performance liquid chromatography; Nuclear magnetic resonance spectroscopy and Mass spectroscopy
- Practical work: Laboratory techniques; methods of analysis.

**Pre-requisite modules**
- CHE114 and CHE124

**Co-requisite modules**
- PCH232
Prohibited module combination: None

<table>
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<tr>
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<th>Timetable Requirement per week</th>
<th>Other teaching modes that do not require time-table</th>
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Methods of Student Assessment:
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: School of Pharmacy
Module Topic: Drug Design and Medicinal Chemistry
Generic Module Name: Pharmaceutical Chemistry 312
Alpha-numeric Code: PCH312
NQF Level: 7
NQF Credit Value: 15
Duration: Semester
Proposed semester to be offered: First Semester
Programmes in which the module will be offered: BPharm (3305)
Year level: 3

Main Outcomes:
- Be able to explain drugs as organic chemicals whose biological activities derive from their chemical structures and physico-chemical properties.
- Have an understanding of the chemistry of certain drugs, which includes their discovery, design, synthesis, structure activity relationships and molecular mechanism of action.

Main Content:
- Drug discovery and design of molecules that may exert an effect on the function and survival of living cells.
- Organic chemistry of drug receptor-, drug enzyme interactions and metabolic reactions.
- Prodrugs and drug delivery systems.
- Synthesis, design, molecular mechanism of action, physico-chemical properties and structure-activity relationships of selected drugs, including:
  - Anesthetics; Sedative-hypnotics; Antiseizure agents; Antipsychotic agents; Opioid Analgesics; Antiparkinsonian agents and Radiopharmaceuticals.

Practical work:
- Synthesis and characterisation of selected drugs. Case studies and tutorials
### Pre-requisite modules
PCH232, PCH233 and BTN216

### Co-requisite modules
None

### Prohibited module Combination
None

### Breakdown of Learning Time

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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
School of Pharmacy

### Module Topic
Medicinal Chemistry

### Generic Module Name
Pharmaceutical Chemistry 322

### Alpha-numeric Code
PCH322

### NQF Level
7

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered
Second Semester

### Programmes in which the module will be offered
BPharm (3305)

### Year level
3

### Main Outcomes
On completion of this module students should be able to:
- Explain the chemistry of certain drugs, which includes their synthesis, structure activity relationships, molecular mechanism of action and design.
- Describe drugs as organic chemicals whose biological activities derive from their chemical structures and physicochemical properties.
- Apply the main medicinal chemistry principles to commonly encountered drugs.

### Main Content
- Synthesis, design, physicochemical properties, structure-activity relationships and molecular mechanism of action of selected drugs, including: Antihistamines; Steroidal drugs and Chemotherapeutic agents.
- Case studies and tutorials

### Pre-requisite modules
PCH232, PCH233 and PCH312 or a minimum of 40% final mark in PCH312

### Co-requisite modules
None

### Prohibited module Combination
None
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- School of Pharmacy

**Module Topic**
- Advanced Drug Design - Elective

**Generic Module Name**
- Pharmaceutical Chemistry 402

**Alpha-numeric Code**
- PCH402

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Year

**Proposed semester to be offered**
- Both Semesters

**Programmes in which the module will be offered**
- BPharm (3305)

**Year level**
- 4

**Main Outcomes**
- On completion of this module students should be able to:
  - Have a comprehensive understanding of the process of drug discovery and development from the identification of novel drug targets to the introduction of new drugs into clinical practice.
  - Be able to identify and validate novel and existing drug targets.
  - Be able to explain advances in the use of computational, combinatorial-, microwave- and green chemistry.
  - Be able to apply advanced drug design principles in order to design and synthesise novel therapeutically active compounds/drugs and elucidate the respective structures.

**Main Content**
- Advanced Drug Design principles including:
  - New approaches to drug discovery.
  - Drug target identification, validation and assay development.
  - Advanced QSAR and ADME prediction models
  - Computer-aided drug design.
  - Drug synthesis and reactions.
  - Advanced structural elucidation utilizing sophisticated analytical techniques, including: NMR; MS; IR and HPLC.
  - Combinational-, microwave- and green chemistry.

**Pre-requisite modules**
- PCH312 & PCH322

**Co-requisite modules**
- None
### Prohibited module Combination

PCE401, PPR404 & PHC403

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### Faculty
Natural Sciences

### Home Department
School of Pharmacy

### Module Topic
Pharmacology for Dietetics

### Generic Module Name
Pharmacology for Dietetics

### Alpha-numeric Code
PCL315

### NQF Level
7

### NQF Credit Value
10

### Duration
Semester

### Proposed semester to be offered
First Semester

### Programmes in which the module will be offered
BSc (Dietetics) (8281)

### Year level
3

### Main Outcomes
On completion of this module students should be able to:

- Explain the basic principles of pharmacology and medicine classification.
- Describe the principles associated with medicine administration.
- Explain and apply basic pharmacokinetic and pharmacodynamic principles.
- Explain basic pharmacotherapeutic principles.
- Apply pharmacotherapeutic approaches recommended for gastro-intestinal tract disorders, endocrine system, and nutrition related diseases.

### Main Content
- Concepts and principles of pharmacology
- Routes and processes of medicine administration
- Medicine absorption, distribution, metabolism and excretion
- Receptors and mechanism of action of medicines
- Factors influencing variability of medicine responses
- Adverse reactions to medicines
- Medicines used in the treatment of gastro-intestinal disorders, liver, bladder, endocrine system, nutrition-related diseases
- Important food-drug interactions
- Pharmacotherapy of diseases where nutrition plays a role

### Pre-requisite modules
None

### Co-requisite modules
DIE316, DIE326
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<td>School of Pharmacy</td>
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<tr>
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<td>Year level</td>
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**Main Outcomes**

- On completion of this module students should be able to:
  - Describe the role of the pharmacist across the different healthcare settings and comment on specific skills important for that setting, focusing on the primary health care (PHC) setting.
  - Explain what professionalism is within the current Legislative framework.
  - Discuss the structure of the South African health system.
  - Describe the main features of the Primary Health Care approach.
  - Describe Pharmacy as a discipline.
  - Explain the relevance of basic sciences in pharmacy. Explain the 7-star concept of a pharmacist.
  - Explain medical terms by identifying the word components.
  - Effectively communicate and evaluate information from various media findings in the form of word documents, spreadsheets, and/or slide presentation.

**Main Content**

- Introduction to the Pharmacy profession in the South African context.
- Primary Health Care.
- Role of the pharmacist in terms of the 7 star concept.
- Medical & Pharmaceutical terminology.
- Basic computer and information literacy.

**Pre-requisite modules**

- None
### Co-requisite modules
None

### Prohibited module Combination
None

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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
School of Pharmacy (Pharmacology)

### Module Topic
Pharmacy

### Generic Module Name
Pharmacy 204

### Alpha-numeric Code
PHA204

### NQF Level
6

### NQF Credit Value
20

### Duration
Year

### Proposed semester to be offered
Both Semesters

### Programmes in which the module will be offered
BPharm (3305)

### Year level
2

### Main Outcomes
- On completion of this module students should be able to:
  - Have a clear understanding of the basic principles of the action and uses of drugs.
  - Have a good knowledge of drugs in general use.
  - Be able to apply the knowledge of pharmacology in the practice of nursing.

### Main Content
- General terms used in Pharmacology
- Basic pharmacodynamics
- Qualitative pharmacokinetics
- Pharmacy Regulation and the role of the nurse in the management of drugs
- Aspects of pharmacotherapeutics (including adverse drug reactions, drug-drug & drug-herbal medicine interactions, and toxicity)
- Chemical transmission and the autonomic nervous system
- Muscle relaxants used in anaesthesia
- NSAIDs
- Analgesics
- Drugs used in Gout
- Drugs affecting the cardiovascular system
- Drugs affecting the endocrine system: Antidiabetics
- Drugs used in gynaecology
- Hormonal preparations: corticosteroids
Drugs affecting the respiratory system  
Drugs affecting the gastrointestinal tract  
Antimicrobial chemotherapy including antiretrovirals  
Antiepileptic drugs  
Review of the pharmacotherapy of selected disease states

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<th>Pre-requisite modules</th>
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| Prohibited module Combination | None |

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| Total Learning Time | 200 |

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<tr>
<td></td>
<td>• Have a broad understanding of research methods and the principles involved in the research.</td>
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<td>• Be able to plan and conduct a research project.</td>
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<td>• Be able to write up the results of a research project and perform an oral presentation on the research project.</td>
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<td>• Have an understanding of the need for and the appropriate procedures involved in all research.</td>
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### Faculty
- Natural Sciences

### Home Department
- School of Pharmacy

### Module Topic
- Biopharmaceutics and Pharmaceutical Biotechnology

### Generic Module Name
- Pharmacy 426

### Alpha-numeric Code
- PHA426

### NQF Level
- 8

### NQF Credit Value
- 15

### Duration
- Year

### Proposed semester to be offered
- Both Semesters

### Programmes in which the module will be offered
- BPharm (3305)

### Year level
- 4

### Main Outcomes
- On completion of this module students should be able to:
  - Understand what pharmaceutical biotechnology entails and its impact on disease management.
  - Describe the manufacturing process of a biopharmaceutical including in-process control.
  - Discuss the process of generating monoclonal antibodies.
  - Understand the concepts of antisense therapy, gene therapy and stem cell therapy.
  - Apply biopharmaceutics principles in the development of drug delivery systems.

### Main Content
- Principles of pharmaceutical biotechnology, including:
  - Recombinant DNA Technology and Therapeutic Agents
  - Polymerase Chain Reaction
  - Gene Therapy
  - Antisense Therapeutic Agents
  - Monoclonal Antibodies and Therapeutic Agents
  - Protein and Peptide Drugs
  - Principles of biopharmaceuticals, including:
    - Concepts and definitions of biopharmaceutics.
    - GIT physiology and drug absorption: Physiological factors influencing oral drug absorption, transit of medicines in the GIT and barriers to absorption.
  - Bioavailability: physicochemical, physiological, drug and
dosage form factors.
- Biopharmaceutical property assessment.
- Biopharmaceutics Classification System (BCS).
- Dosage regimens.
- Bioavailability considerations of modified release & targeted delivery.

**Pre-requisite modules**
PCH312 & PCH322, PCE331 & PCH333

**Co-requisite modules**
None

**Prohibited module Combination**
None

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**Total Learning Time**
150

**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
School of Pharmacy

**Module Topic**
Community Engagement

**Generic Module Name**
Pharmacy 427

**Alpha-numeric Code**
PHA427

**NQF Level**
8

**NQF Credit Value**
15

**Duration**
Year

**Proposed semester to be offered**
Both Semesters

**Programmes in which the module will be offered**
BPharm (3305)

**Year level**
4

**Main Outcomes**
On completion of this module students should be able to:
- Monitor and evaluate experiential learning programmes using social accountability criteria.
- Analyse organizational structure and culture of pharmacy role-players.
- Synthesize the data and societal influences to design a practical intervention.
- Implement a quality improvement intervention.
- Manage change in a diverse environment.
- Reflect critically on change implementation in relation to personal and professional transformation.

**Main Content**
- Social accountability
  - Active citizenship and social justice
  - Principles, values & framework for monitoring and evaluation
- Change management
  - Health systems strengthening

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**Main Outcomes**
- On completion of this module students should be able to:
  - Describe the different types of microorganisms and their classification which are of relevance to pharmacy.
  - Describe bacterial resistance and basic mechanisms of these.
  - Describe hospital acquired infections based on predisposing factors, different types and the dynamics of it.
  - Describe basic immunity for the use vaccines and other methods.
  - Have an understanding of relevant terms in
Pharmacology.
• Have an understanding of the various pharmacodynamics concepts and be able to apply them.
• Define the basic terms used in pathology.
• Understand the basic principles of pathology.
• Describe the pathophysiology and clinical manifestations of the following conditions: inflammation, benign and malignant tumours, circulatory disorders, granulomatous diseases.

**Main Content**

• Medical Microbiology
  - The science of microbiology with emphasis on the identification of major groups
  - Basic morphology & physiology of bacteria, viruses & fungi
  - Basic bacterial genetics to understand resistance
  - Host defenses against infections.
  - Immunological basis of vaccination
  - Basic principles of pathology: Inflammation; Cell injury; Environmental and nutritional pathology; Haemodynamics; Circulatory disorders; Granulomatous diseases; Growth disorders; Neoplasia.
• Introduction to Pharmacology
• Pharmacodynamics
• Definitions
• Concepts: Dose-Response Relationship
• Receptor occupancy theory
• Affinity, Potency, Efficacy
• Therapeutic index
• Drug Antagonism
• Mechanisms of Actions- Overviews
• Loss of Drug Response-Phenomena

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None

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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)
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<td>BPharm (3305)</td>
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**Main Outcomes**

On completion of this module students should be able to:
- Apply aspects of qualitative pharmacokinetics.
- Explain the theory and relevance of drug interactions, adverse drug reactions including drug allergy and toxicity.
- Classify and discuss drugs affecting the peripheral nervous system.
- Discuss the chemical mediators of inflammation and how drugs affect them.
- Explain fundamental concepts in pharmacotherapy and clinical pharmacy.
- Discuss the concepts of pharmaceutical care, eliciting a patient history, rational drug use, record-keeping and laboratory data.
- Construct a patient history profile and interpret laboratory data.
- Apply the theoretical knowledge learnt to computer simulation practicals.
- Assess the socio-economic and psychosocial factors that impact on community health.
- Demonstrate competence in clinic-based activities in the provision of preventive health care for priority diseases.
- Demonstrate competence in physical assessment and clinical skills.

**Main Content**

- **Qualitative Pharmacokinetics**
- **Concepts of pharmacotherapy**
- **Drugs affecting peripheral nervous system.**
- **Drugs affecting the respiratory system**
- **Inflammation & Autacoids.**
- **Concepts in Clinical Pharmacy**
  - Pharmaceutical care
  - History-taking
  - Rational drug use (concept and process)
  - Record-keeping
  - Laboratory data
- **Dermatology I**
  - Dermatitis
  - Urticaria
  - Drug eruptions
  - Pruritis
  - Acne
- **Practicals**
  - Computer Simulation Pharmacology Practical Sessions
Clinical skills (ENT, blood glucose and screening, interpreting laboratory findings, introduction to therapeutic work-up notes)

**Experiential learning**
- Community Health profiling: demographics, disease burden in vulnerable communities, history-taking, non-drug management of endemic diseases, psychosocial aspects of care, screening for communicable and non-communicable diseases and health promotion.

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| Methods of Student Assessment         | Continuous Assessment (CA): 50%                   |
|                                      | Final Assessment (FA): 50%                        |

| Assessment Module type               | Continuous and Final Assessment (CFA)             |

| Faculty                              | Natural Sciences                                |
| Home Department                      | School of Pharmacy                              |
| Module Topic                         | Pharmacology and Clinical Pharmacy             |
| Generic Module Name                  | Pharmacology and Clinical Pharmacy 223         |
| Alpha-numeric Code                   | PHC223                                         |
| NQF Level                            | 6                                              |
| NQF Credit Value                     | 15                                             |
| Duration                             | Semester                                       |
| Proposed semester to be offered      | Second Semester                                |
| Programmes in which the module will be offered | BPharm (3305)                       |
| Year level                           | 2                                              |

**Main Outcomes**
- On completion of this module students should be able to:
- Discuss the pharmacology of the drugs used to treat minor ailments and disorders related to the immune system.
- Apply pharmacotherapeutic concepts to the various (minor) disease states.
- Apply the knowledge acquired in the clinical case studies using a step-wise pharmaceutical care approach.
- Demonstrate skills in history-taking, clinical reasoning, decision making and communication through participation in case study laboratories and experiential learning.
- Apply the knowledge acquired in the clinical case study laboratories.
- Demonstrate skills in assessing maternal and child health care needs in underserved population groups.

**Main Content** Immunopharmacology
### Dermatology II
- Fungal infections (Candida, Tinea)
- Analgesics and anti-inflammatories
- Drugs used in gout

### ENT conditions (allergic rhinitis, otitis media /externa)
- Drugs affecting the gastro-intestinal system
- Oral cavity (ulcers, gingivitis, herpes)
- Pregnancy and infant care
- Immunisation & childhood illnesses
- Family planning
- Urinogenital system diseases
- HIV & TB I
- Cardiovascular I (Hypertension)
- Case Study Laboratories:
- PBLs for Primary health care
- Experiential learning:

### Service learning in Primary Health care clinics:
- Maternal and child health.

### Pre-requisite modules
- HUB113, HUB123, PHC 123, PHA116, PHC213 or a final mark of more than or equal to 40% for PHC213

### Co-requisite modules
- None

### Prohibited module
- None

### Breakdown of Learning Time

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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

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### Faculty
- Natural Sciences

### Home Department
- School of Pharmacy

### Module Topic
- Pharmacology and Clinical Pharmacy

### Generic Module Name
- Pharmacology and Clinical Pharmacy 313

### Alpha-numeric Code
- PHC313

### NQF Level
- 7

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- BPharm (3305)

### Year level
- 3

### Main Outcomes
- On completion of this module students should be able to:
  - Explain the etiology, pathophysiology, differential diagnosis, pharmacological treatment, non-

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pharmacological treatment, prevention, guidelines for referral and evidence-based treatment guidelines of various disease states.

- Discuss clinical applications of drugs in the treatment of various disease states and the possible adverse effects and drug interactions.
- Apply the knowledge acquired in the clinical case laboratories.

**Main Content**

**Cardiovascular and renal drugs**
- Dyslipidaemia
- Drugs affecting the blood (haematopoietic system, including anticoagulants)

**Chemotherapeutic agents**
- Infectious diseases (including dermatological conditions)
- Helminthic infestations

**Case study laboratories: PBL**
- Cardiovascular system
- Infectious diseases

**Pre-requisite modules**
PHC213 and PHC223

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

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**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
School of Pharmacy

**Module Topic**
Pharmacology and Clinical Pharmacy

**Generic Module Name**
Pharmacology and Clinical Pharmacy 323

**Alpha-numeric Code**
PHC323

**NQF Level**
7

**NQF Credit Value**
15

**Duration**
Semester

**Proposed semester to be offered**
Second Semester

**Programmes in which the module will be offered**
BPharm (3305)

**Year level**
3

**Main Outcomes**
On completion of this module students should be able to:
- Explain concepts related to quantitative pharmacokinetics and their relevance in therapeutic drug monitoring.
• Discuss various disease states, the clinical applications of drugs in the treatment of these diseases and the possible adverse effects and drug interactions with particular emphasis on evidence-based guidelines.
• Apply the knowledge acquired in the clinical case laboratories.
• Demonstrate pharmaceutical and clinical skills in the health services.

Main Content

**Drugs acting on endocrine system**
- Hormones of the pituitary and thyroid glands
- Pancreatic hormones and anti-diabetic drugs
- Adrenalcorticosteroids and adrenocorticol antagonists
- The gonadal hormones and inhibitors
- Agents that affect bone mineral homeostasis

**CNS pharmacology:**
- General and Local anaesthetics
- Anxiolytic and hypnotic drugs
- Anti-depressant drugs
- Neuroleptic drugs (anti-psychotic agents)
- Drugs used in Parkinson's disease
- Anticonvulsants

**Quantitative pharmacokinetics**

**Therapeutic Drug Monitoring**

**Clinical pharmacy concepts:**
- Antimicrobial stewardship
- Evidence-based medicine
- Medicine use evaluations
- Case study laboratories

### Pre-requisite modules
PHC213 and PHC223 and PHC313 or a final mark of more than or equal to 40% for PHC313

### Co-requisite modules
None

### Prohibited module
None

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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty** Natural Sciences

**Home Department** School of Pharmacy

**Module Topic** Preclinical , Clinical Trials – Elective

**Generic Module Name** Pharmacology and Clinical Pharmacy 403

**Alpha-numeric Code** PHC403

**NQF Level** 8
### NQF Credit Value
15

### Duration
Year

### Proposed semester to be offered
Both Semesters

### Programmes in which the module will be offered
BPharm (3305)

### Year level
4

### Main Outcomes
On completion of this module students should be able to:
- Have a broad understanding of principles involved in pre-clinical and clinical trials including pharmaco-epidemiology as post marketing surveillance
- Be able to describe the content of a clinical trial protocol.
- Have a good understanding of the South African Good Clinical Practice.
- Have an understanding of the relevance and importance of statistics to clinical research.

### Main Content
**Preclinical trials:**
- Types of preclinical studies
- Pharmacokinetic studies
- Pharmacodynamic studies
- Animal studies: toxicity & safety

**Clinical trials**
- Introduction to Good Clinical Practice: ethical, legal and regulatory issues in clinical research
- Phases of clinical trials
- Types of clinical trials
- Pharmaco-epidemiology
- Introduction
- Post marketing surveillance
- Information and data management in clinical research

### Pre-requisite modules
PHC313 & PHC323

### Co-requisite modules
None

### Prohibited module
Combination PCE401, PCH402 & PPR404

### Breakdown of Learning Time

<table>
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<th>Hours</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 40%
- Final Assessment (FA): 60%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
School of Pharmacy

### Module Topic
Therapeutics and Service Learning in Pharmacy

### Generic Module Name
Pharmacology and Clinical Pharmacy 405

### Alpha-numeric Code
PHC405

### NQF Level
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<td>BPharm (3305)</td>
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<td>Year level</td>
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</table>
| Main Outcomes    | On completion of this module students should be able to:  
|                  | • Undertake patient consultations at health care facilities, establish a therapeutic relationship to identify their medicine-related concerns.  
|                  | • Review patient medication history.  
|                  | • Evaluate evidence-based drug treatment options with identified patient/disease factors.  
|                  | • Balance benefit and risks of drug therapy options.  
|                  | • Document and communicate identified therapeutic discrepancies and justify recommended therapeutic options with training supervisors.  
|                  | • Identify the social determinants of health that impact on patient treatment adherence. |
| Main Content     | • Bedside teaching and learning: consult with patient, obtain medication history, record and interpret clinical and laboratory data, compile evidence base to assess drug treatment options.  
|                  | • Chronic care (clinics/clubs): Address patient concerns on chronic medicine use, identify social issues impacting on treatment adherence, promote health and wellness |
| Pre-requisite modules | PCE331, PCE333, PCH312, PCH322, PHC313, PHC323, PPR314, PPR324 |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time |  |
| Contact with lecturer / tutor: | 144 Lectures p.w. 0 |
| Assignments & tasks: | 64 Practicals p.w. 3 |
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| Tests & Examinations: | 28 |
| Selfstudy: | 92 |
| Other: | 0 |
| Total Learning Time | 300 |
| Methods of Student Assessment | Continuous Assessment (CA):100%  
| Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |

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<tr>
<td>--------------------------------</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>B.Pharm.</td>
</tr>
<tr>
<td>Year level</td>
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</tbody>
</table>
| **Main Outcomes** | On completion of this module students should be able to:  
• Assess and compare adverse events at population level as well as individual patient level.  
• Analyze and validate pharmacovigilance systems.  
• Analyze and evaluate pharmacovigilance methods.  
• Highlight and motivate the importance of spontaneous reporting of adverse drug reactions (ADRs) and the key role players.  
• Describe the use of the various epidemiological measures of association and effect in pharmacoepidemiology.  
• Apply the various measures of association and effect to the design and evaluation of pharmacoepidemiology studies.  
• Evaluate and assess literature on pharmacoepidemiology studies.  
• Design evidence based interventions to solve and identified pharmacoepidemiology problems.  
• Evaluate the quality and validity of evidence based medicine.  
• Formulate a clinical question.  
• Gather evidence to answer a clinical question and apply it to the care of a given patient. |
| **Main Content** | • Assess and compare adverse events at population level as well as individual patient level.  
• Analyze and validate pharmacovigilance systems.  
• Analyze and evaluate pharmacovigilance methods.  
• Highlight and motivate the importance of spontaneous reporting of adverse drug reactions (ADRs) and the key role players.  
• Describe the use of the various epidemiological measures of association and effect in pharmacoepidemiology.  
• Apply the various measures of association and effect to the design and evaluation of pharmacoepidemiology studies.  
• Evaluate and assess literature on pharmacoepidemiology studies.  
• Design evidence based interventions to solve and identified pharmacoepidemiology problems.  
• Evaluate the quality and validity of evidence based medicine.  
• Formulate a clinical question.  
• Gather evidence to answer a clinical question and apply it to the care of a given patient. |
<p>| Pre-requisite modules | PHC313, PHC323, PPR314, PPR324 |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| <strong>Breakdown of Learning Time</strong> | <strong>Hours</strong> | <strong>Time-table Requirement per week</strong> | <strong>Other teaching modes that does not require time-table</strong> |
| Contact with lecturer / tutor | 84 | Lectures p.w. | 3 |
| Assignments &amp; tasks | 0 | Practicals p.w. | 0 |</p>
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**Method of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>School of Pharmacy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>International Pharmacy Rotation</td>
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<td>Generic Module Name</td>
<td>Global Pharmacy</td>
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<td>Duration</td>
<td>Semester</td>
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<td>First Semester</td>
</tr>
<tr>
<td><strong>Programmes in which the module will be offered</strong></td>
<td>BPharm (3305)</td>
</tr>
<tr>
<td>Year level</td>
<td>4</td>
</tr>
</tbody>
</table>

**Main Outcomes**
- On completion of this module students should be able to:
  - Demonstrate cultural competence via communication skills and development of a culture-specific pharmacy knowledge base.
  - Analyze the management of HIV/AIDS in a resource-limited environment and compare the effectiveness of therapeutic regimens to those used in the United States.
  - Develop an appropriate treatment algorithm for tuberculosis and apply it during patient care activities.
  - Design a patient work-up system for collection of patient-specific data needed for developing daily therapeutic plans.
  - Formulate a strategy for effective verbal and non-verbal communication with patients, preceptors, and healthcare personnel.
  - Establish a working relationship with hospital and clinic personnel as well as personnel from University of the Western Cape.
  - Show a sense of confidence that allows for active participation with the medical team in a variety of settings.
  - Show critical thinking and problem-solving skills to optimize patient therapy using a rational evidence-based approach to decision making.
  - Review the differences in medication selection and availability differences between South Africa and the United States.
  - Show competency in the transition of knowledge learned throughout the curriculum to a patient-oriented practice setting.
  - Describe the South African healthcare system and compare it to the U.S. system;
  - Review common disease states (e.g., hypertension, heart failure, diabetes) and their treatment encountered across
all patient populations.
- Provide drug information in-services to hospital personnel, pharmacy staff and present patient cases reviewing both American and South African treatment guidelines.

### Main Content
- Using bedside teaching as a method, the main content is as follows:
  - Burden of disease in South Africa, with a focus on HIV and TB.
  - Health care systems in South Africa, with a focus on the public health care system.
  - Legal framework for pharmacy services in South Africa.
  - Standard Treatment Guidelines and the Essential Medicines List for South Africa.
  - Pharmaceutical care and the principles thereof for direct-patient-care.
  - Patient education on drug and disease management.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>Determined by home university</th>
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<tbody>
<tr>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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<table>
<thead>
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<table>
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<td>Home Department</td>
<td>School of Pharmacy</td>
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<tr>
<td>Module Topic</td>
<td>Rational Medicine Use</td>
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<tr>
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<tr>
<td>Duration</td>
<td>Year</td>
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<td>Programmes in which the module will be offered</td>
<td>BPharm (3305)</td>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>- Discuss the principles and importance of rational medicine use within health systems.</td>
</tr>
<tr>
<td></td>
<td>- Apply quantitative methods to investigate medicine use.</td>
</tr>
<tr>
<td></td>
<td>- Describe and apply the principles of evidence based medicine as part of the decision making process and</td>
</tr>
</tbody>
</table>
Main Content

Course Content:
The course content will be based on the following:
- Importance of rational medicines use and problems associated with irrational medicine use;
- Identification of medicines use problems using quantitative methods such as, prescribing indicator studies, application of defined daily dose (DDD), ABC, and analyses;
- Develop, implement and evaluate the results of a Medicines Use Evaluation (MUE);
- Application of the Essential Medicines Concept and the development of Standard Treatment Guidelines (STGs) and Essential Medicines Lists (EMLs) using evidence-based decision making principles;
- The role of the pharmacist in the Pharmaceutical Therapeutic Committees (PTCs);
- Development of a plan for a defined medicine use problem to quantify, investigate and intervene, with evaluation.

Pre-requisite modules: PHC 323, PPR 324
Co-requisite modules: None
Prohibited module combination: None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time Requirement per week</th>
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<td>Tutorials p.w.: 0</td>
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<td>Tutorials p.w.: 10</td>
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<tr>
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</table>

Total Learning Time: 150

Methods of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

Assessment Module type: Continuous Assessment (CA)
Main Outcomes
On completion of this module students should be able to:
• A knowledge and understanding of basic ideas relating to elementary mechanics.
• Understand the role of elementary mechanics in everyday life.
• A knowledge and understanding of basic ideas relating to electricity and magnetism.
• Understand natural phenomena and various technologies by applying the basic concepts of electricity and magnetism.
• Work in a laboratory environment and record, represent and interpret the data and deliver a public presentation.

Main Content
• Linear and non-linear motion including acceleration, free fall and projectile motion.
• Momentum, impulse and collisions.
• Work, power, potential and kinetic energy, conservation of energy and applications
• Rotational inertia, torque, center of mass and angular momentum.
• Electrostatics and current electricity including lightning, electric shielding, the Van de Graaff Generator, electrical circuits and safety.
• Magnetism including permanent magnets, electromagnets and applications.
• Electromagnetic Induction, Faraday’s law, generators and transformers.

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module Combination
None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Tutorials p.w. 1</td>
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<td>Selfstudy:</td>
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Methods of Student Assessment
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Physics and Astronomy

Module Topic
Mechanics

Generic Module Name
Physics 111

Alpha-numeric Code
PHY111

NQF Level
15

NQF Credit Value
5

Duration
Semester
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<th>First Semester</th>
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<tbody>
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<td>Programmes in which the module will be offered</td>
<td>BSc (Physical Science) (3233); BSc (Mathematics and Statistical Sciences) (3277); BSc (Chemical Science) (3220); BSc (Computer Science) (3221)</td>
</tr>
<tr>
<td>Year level</td>
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</tr>
</tbody>
</table>
| Main Outcomes | On completing of this module students should be able to:  
• Have knowledge and understanding of introductory mechanics of kinematics, dynamics and applications.  
• Be able to apply mechanics theory in everyday life situations.  
• Be able to work in a laboratory environment and record, represent and interpret data. |
| Main Content | Introduction to vectors  
• Kinematics: Motion in one dimension and in a plane  
• Dynamics: Newton’s laws of motion and their applications  
• Application of Newton’s laws: Translational equilibrium, circular motion, gravitational forces and fields, satellite motion.  
• Work and energy  
• Impulse and momentum  
• Rotational Equilibrium |
| Pre-requisite modules | None |
| Co-requisite modules | Calculus (Mathematics ) |
| Prohibited module Combination | PHY113, PHY118 |
| Breakdown of Learning Time | Hours  
| Contact with lecturer / tutor: | 42  
| Assignments & tasks: | 0  
| Practical: | 42  
| Tutorials: | 14  
| Tests & Examinations: | 9  
| Selfstudy: | 43  
| Other: | 0  
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 60%  
Final Assessment (FA): 40% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Physics for Pharmacy |
| Generic Module Name | Physics 112 |
| Alpha-numeric Code | PHY112 |
| NQF Level | 5 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered | Second Semester |
| Programmes in which the module will be offered | BPharm (3305) |
| Year level | 1 |
Main Outcomes
On completing of this module students should be able to:
- Have an ability to sensibly discuss in conceptual terms fundamentals of introductory mechanics, elasticity, hydrostatics, X-rays and electricity.
- Have an ability to solve both qualitative and quantitative problems in relation to everyday life with special reference to the context of pharmacy.
- Have an ability to work in a physics laboratory environment that draws upon fundamentals in recording, representing and interpreting data.

Main Content
- An introductory appreciation of science as a way of knowing.
- An introduction to vectors: representation, adding, subtracting, scalar product, vector product
- Equilibrium of a rigid body: Newton’s Laws, first condition of equilibrium, friction, second condition of equilibrium (moment of a force / torque); Energy (Work-Energy theorem; machines and efficiency)
- Elasticity: stress, strain and Young’s modulus.
- Hydrostatics: pressure in a fluid, buoyancy, flotation, Pascal’s principle, Archimedes’ principle, Bernoulli’s principle.
- Atomic physics: Atoms, molecules, compounds and mixtures; atomic structure; models of the atom and atomic spectra; quantization of energy levels and Louis de Broglie matter waves.
- Radioactivity: Radiation and effects of radiation on humans; radioactive isotopes and carbon dating.
- Electricity: Coulomb’s law, electric field, electrical potential energy, capacitors and dielectrics, simple circuits.
- Relevant applications to pharmacy will be discussed.

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module Combination
None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
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<td>Tests &amp; Examinations:</td>
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<tr>
<td>Selfstudy:</td>
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Methods of Student Assessment
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

Assessment Module type
Continuous and Final Assessment (CFA)
Faculty: Natural Sciences
Home Department: Physics and Astronomy
Module Topic: Physics for Dentists
Generic Module Name: Physics 113
Alpha-numeric Code: PHY113
NQF Level: 15
NQF Credit Value: 5
Duration: Semester
Proposed semester to be offered: First Semester
Programmes in which the module will be offered: BDS (5101)

Year level: 1
Main Outcomes:
On completion of this module students should be able to:
• Have an ability to sensibly discuss in conceptual terms fundamentals of introductory mechanics, elasticity, hydrostatics, X-rays and electricity.
• Have an ability to solve both qualitative and quantitative problems in relation to everyday life with special reference to the context of dentistry.
• Have an ability to work in a physics laboratory environment that draws upon fundamentals in recording, representing and interpreting data.

Main Content:
• An introductory appreciation of science as a way of knowing
• An introduction to vectors: representation, adding, subtracting, scalar product, vector product
• Equilibrium of a rigid body: Newton’s Laws, first condition of equilibrium, friction, second condition of equilibrium (moment of a force / torque).
• Elasticity: stress, strain and Young’s modulus.
• Hydrostatics: pressure in a fluid, buoyancy, flotation, Pascal’s principle, Archimedes’ principle, Bernoulli’s principle.
• X-rays: description, creation, and safety.
• Electricity: Coulomb’s law, electric field, electrical potential energy, capacitors and dielectrics, simple circuits.
• Relevant application to dentistry and pharmacy will be discussed

Pre-requisite modules: None
Co-requisite modules: None
Prohibited module Combination: PHY111, PHY116

Breakdown of Learning Time

| Contact with lecturer / tutor: | 42 | Lectures p.w. | 3 |
| Assignments & tasks: | 0 | Practicals p.w. | 3 |
| Practicals: | 42 | Tutorials p.w. | 1 |
| Tutorials: | 14 | | |

354
Tests & Examinations: 9
Selfstudy: 43
Other: 0
Total Learning Time: 150

Methods of Student Assessment:
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Physics and Astronomy
Module Topic: Modern Physics, Heat and Mechanics
Generic Module Name: Physics 115
Alpha-numeric Code: PHY115
NQF Level: 5
NQF Credit Value: 15
Duration: Year

Proposed semester to be offered: Both Semesters

Programmes in which the module will be offered:
- B Nursing (8310, 8311)

Year level: 1

Main Outcomes:
- On completion of this module students should be able to:
  - Explain an understanding of the nature of science.
  - Describe an understanding of the social, ethical and environmental dimensions of science.
  - Solve problems using modern physics and heat principles.
  - Solve problems by applying introductory kinematics and dynamics principles.
  - Solve problems by applying mechanics theory to everyday life situations.
  - Work in a laboratory environment and record, represent and interpret data.
  - Access science texts and communicate in a variety of forms: laboratory report, essay, poster presentation.

Main Content:
- The Language of Physics: Units, Measurements and basic mathematical calculations
- Understand the scientific method
- Electrostatics-Electric field and electrostatic force between point charges
- Electricity-Ohm’s law applicable to basic electric circuits
- Waves (light and sound)
- The Atomic nature of matter
- Kinetic molecular theory- Explanation of the state of matter
- Heat and temperature
- Kinematics: Motion in one dimension and in a plane
- Dynamics: Newton’s laws of motion and their applications, Work Energy and Power
- Basic operational principles behind selected nursing instruments work (e.g. Thermometer, blood pressure instruments, etc)

Pre-requisite modules: None
Co-requisite modules: None
Prohibited module Combination: PHY113, PHY118, PHY111
### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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#### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

#### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- **Natural Sciences**

### Home Department
- Physics and Astronomy

### Module Topic
- Mechanics, Modern Physics and Thermodynamics

### Generic Module Name
- Physics 116

### Alpha-numeric Code
- PHY116

### NQF Level
- 15

### NQF Credit Value
- 5

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- BSc (Applied Geology) (3214); BSc (Biotechnology) (3211); BSc (Computer Science) (3211); BSc (Environmental & Water Science) (3331); BSc (Mathematical & Statistical Sciences) (3227)

### Year level
- 1

### Main Outcomes
- On completion of this module students should be able to:
  - Understand and apply the scientific approach to problem solving.
  - Understand various technologies by applying the basic ideas of modern physics and thermodynamics.
  - A knowledge and understanding of basic ideas relating to elementary mechanics.
  - Understanding the role of elementary mechanics in everyday life.
  - Be able to work in a laboratory environment and record, represent and interpret data.

### Main Content
- Ideas and terminology of science as well as the impact of science on our world using a conceptual exploration platform, focusing on the atomic nature of matter.
- The nature of the atom, Atomic spectra, the Bohr model of the atom and basic concepts of quantum mechanics.
- Types of radiation, radioactive decay, decay schemes and c-14 dating.
- Nuclear Fission, nuclear reactors and fusion.
- Concepts of temperature and heat, specific heat and thermal expansion.
- Heat transfer by conduction, convection and radiation and applications.
- Linear and non-linear motion including acceleration, free fall and projectile motion.
- Newton’s three laws of motion.
- Momentum, impulse and collisions.
- Work, power, potential and kinetic energy, conservation of energy and applications
- Rotational inertia, torque, center of mass and angular momentum.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
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<tr>
<td>Prohibited module combination</td>
<td>PHY113, PHY118</td>
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<table>
<thead>
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<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Health Physics

**Generic Module Name**
- Physics 118

**Alpha-numeric Code**
- PHY118

**NQF Level**
- 15

**NQF Credit Value**
- 5

**Duration**
- Semester

**Proposed semester to be offered**
- First Semester

**Programmes in which the module will be offered**
- BSc (Physiotherapy) (8211)

**Year level**
- 1

**Main Outcomes**
- On completion of this module students should be able to:
  - Understand introductory basic physics principles as for non-physicists.
  - Establish a foundation from which to view and understand nature and everyday situations.
  - Show a connected framework of knowledge and thought that can lead to a better understanding of political and social issues that depend on scientific data.

**Main Content**
- The Nature of Matter and Radioactivity
- The Language of Physics; Measurements; Forces
- Work, Energy, Power and Machines
- Pressure; States of Matter; Gases
• Heat; Electrostatics and Electricity
• Electromagnetic Radiation
• Light and Sound

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
PHY111, PHY116

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**Methods of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Physics and Astronomy

**Module Topic**
Waves, Electricity and Magnetism

**Generic Module Name**
Physics 121

**Alpha-numeric Code**
PHY121

**NQF Level**
5

**NQF Credit Value**
15

**Duration**
Semester

**Proposed semester to be offered.**
Second Semester

**Programmes in which the module will be offered**
BSc Physical Science (3233) (3120)
BSc Applied Geology (3214) (3011)
BSc Chemical Sciences (3220) (3019)
BSc Computer Science (3221) (3023)
BSc Mathematics and Statistical Sciences (3227) (3031)

**Year level**
1

**Main Outcomes**
On completion of this module students should be able to:
- Demonstrate knowledge and understanding of introductory vibrations and waves theory and applications in sound
- Show knowledge and understanding of geometrical optics and applications of it in everyday life
- Be able to work in a laboratory environment and record, represent and interpret data.

**Main Content**
- Simple harmonic motion: Energetics of SHM, simple pendulum, damped oscillations, forced oscillations and resonance
- Mechanical waves: Basic wave properties, sinusoidal travelling waves, speed of a wave, energy in wave motion, reflection of waves, interference, standing waves and resonance
- Sound: sound waves, intensity and intensity levels, beats, Doppler effect
- Geometrical optics: ray optics, reflection and refraction, image formation by mirrors and lenses
- Electrostatics: point electrical charges, electric field, electric flux, Gauss’ law
- Electric potential, Electric currents and Resistance, DC circuits
- Capacitors and dielectrics.
- Magnetic field and forces, motion of charged particle in a B-field

**Pre-requisite modules**
None

**Co-requisite modules**
MAT105 or MAT103

**Prohibited module Combination**
None

### Breakdown of Learning Time

<table>
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<tr>
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</tr>
<tr>
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<tr>
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**Method of Student Assessment**
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**
Continuous and Final Assessment (CFA)

---

### Faculty
Natural Sciences

### Home Department
Physics and Astronomy

### Module Topic
Waves, Electricity and Magnetism

### Generic Module Name
Physics 126

### Alpha-numeric Code
PHY126

### NQF Level
15

### NQF Credit Value
5

### Duration
Semester

### Proposed semester to be offered.
Second Semester

### Programmes in which the module will be offered
- BSc (Applied Geology) (3214); BSc (Biotechnology) (3211); BSc (Computer Science) (3211); BSc (Environmental & Water Science) (3331); BSc (Mathematical & Statistical Sciences) (3227)

### Year level
1

### Main Outcomes
On completion of this module students should be able to:
- Have knowledge and understanding of basic ideas relating to wave phenomena, electricity and magnetism.
- Be able to understanding natural phenomena and various technologies by applying the basic concepts of vibrations, waves, electricity and magnetism.
- Be able to work in a laboratory environment and record, represent and interpret data and deliver a public presentation.
<table>
<thead>
<tr>
<th>Main Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Description of wave motion, standing waves, Doppler effect, radar gun and shock waves</td>
</tr>
<tr>
<td>• The origin and nature of sound, reflection and refraction of sound, forced vibrations, natural frequency, resonance, interference, pitch and loudness. Ultrasound applications and compact discs</td>
</tr>
<tr>
<td>• Electromagnetic waves transparent and opaque media, selective absorption and transmission, natural phenomena (e.g. why the sky is blue)</td>
</tr>
<tr>
<td>• Reflection, refraction, diffraction, interference and polarization</td>
</tr>
<tr>
<td>• Electrostatics and current electricity including lightning, electric shielding, the Van de Graaf Generator, electrical circuits and safety.</td>
</tr>
<tr>
<td>• Magnetism including permanent magnets, electromagnets and applications.</td>
</tr>
<tr>
<td>• Electromagnetic Induction, Faraday’s law, generators and transformers.</td>
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</table>

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
</tr>
</thead>
<tbody>
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<table>
<thead>
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<table>
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<tr>
<th>Prohibited module Combination</th>
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<tbody>
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<tr>
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<th>Methods of Student Assessment</th>
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<td>Final Assessment (FA): 40%</td>
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<tbody>
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<td>Continuous and Final Assessment (CFA)</td>
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<table>
<thead>
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<th>Faculty</th>
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<tbody>
<tr>
<td>Natural Sciences</td>
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<tbody>
<tr>
<td>Physics and Astronomy</td>
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<table>
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<tbody>
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<td>Modern Physics, Heat and Mechanics</td>
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<td>Physics 151</td>
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<table>
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<td>PHY151</td>
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<table>
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<table>
<thead>
<tr>
<th>Proposed semester to be offered</th>
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<tbody>
<tr>
<td>Both Semesters</td>
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<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
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<tbody>
<tr>
<td>BSc (Physical Science) (3233)</td>
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<table>
<thead>
<tr>
<th>Year level</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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</table>
### Main Outcomes

On completion of this module students should be able to:
- Demonstrate an understanding of the nature of science.
- Demonstrate an understanding of the social, ethical and environmental dimensions of science.
- Apply modern physics and heat principles to solve problems.
- Apply introductory kinematics and dynamics principles to solve problems.
- Apply mechanics theory to everyday life situations.
- Work in a laboratory environment and record, represent and interpret data.
- Access science texts and communicate in a variety of forms: laboratory report, essay, poster presentation.

### Main Content

- The nature of the atom, Atomic spectra, the Bohr model of the atom and basic concepts of quantum mechanics.
- Types of radiation, radioactive decay, decay schemes and C-14 dating.
- Nuclear fission, nuclear reactors and fusion.
- Concepts of temperature and heat, specific heat and thermal expansion.
- Heat transfer by conduction, convection and radiation and applications.
- Introduction to vectors and mathematics skills required for mechanics.
- Kinematics: Motion in one dimension and in a plane.
- Dynamics: Newton’s laws of motion and their applications.
- Application of Newton’s laws: Translational equilibrium, circular motion, gravitational forces and fields, satellite motion.
- Work and energy.
- Impulse and momentum.
- Rotational Equilibrium.

### Pre-requisite modules

None

### Co-requisite modules

MAM151

### Prohibited module Combination

PHY113, PHY118, PHY 111

### Breakdown of Learning Time

<table>
<thead>
<tr>
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<th>Hours</th>
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### Methods of Student Assessment

Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

### Assessment Module type

Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Physics and Astronomy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Waves, Electricity and Magnetism</td>
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<tr>
<td>Year level</td>
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</table>

**Main Outcomes**

On completion of this module students should be able to:

- Apply the physics principles of vibrations and waves to solve problems.
- Apply the physics principles of vibrations and waves to everyday life situations e.g. Light and sound.
- Apply the physics principles of introductory electricity and magnetism to solve problems.
- Apply the physics principles of introductory electricity and magnetism to everyday life situations.
- Work in a laboratory environment and record, represent and interpret data.
- Access science texts and communicate in a variety of forms: laboratory report, essay, poster presentation.
- Apply basic statistics to measurement and uncertainty in data.

**Main Content**

- Mathematics skills required for waves, electricity and magnetism
- Simple harmonic motion: Energetics of SHM, simple pendulum, damped oscillations, forced oscillations and resonance
- Mechanical waves: Basic wave properties, sinusoidal travelling waves, speed of a wave, energy in wave motion, reflection of waves, interference, standing waves and resonance
- Sound: sound waves, intensity and intensity levels, beats, Doppler effect
- Electrostatics: point electrical charges, electric field, electric flux, Gauss’ law
- Electric potential, Electric currents and Resistance, DC circuits
- Capacitors and dielectrics.
- Magnetic field and forces, motion of charged particle in a B-field
- Electromagnetic induction, inductance, AC circuits

**Pre-requisite modules**

None

**Co-requisite modules**

MAM152

**Prohibited module Combination**

PHY121
### Breakdown of Learning Time

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<td><strong>Selfstudy:</strong></td>
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<td><strong>Other:</strong></td>
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### Methods of Student Assessment
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type:** Continuous and Final Assessment (CFA)

### Faculty
- **Home Department:** Natural Sciences
- **Module Topic:** Modern Physics, Waves and Thermodynamics

### Generic Module Name
- **Alpha-numeric Code:** PHY212
- **NQF Level:** 6
- **NQF Credit Value:** 20

### Duration
- **Semester**
- **Proposed semester to be offered:** First Semester

### Programmes in which the module will be offered
- BSc (Physical Science) (3233,3120); BSc (Chemical Sciences) (3220,3019); BSc (Computer Science) (3221,30230); BSc (Mathematics and Statistical Sciences) (3227,3031)

### Year level
- 2

### Main Outcomes
- On completion of this module students should be able to:
  - Use crucial concepts to solve problems in modern physics, interference, diffraction, and thermodynamics.
  - Demonstrate practical laboratory skills.
  - Implement simple numerical computational algorithms to solve physics problems on the computer.
  - Demonstrate writing and presentation skills.
  - Explain the progression and nature of science in relation to modern physics.

### Main Content
- Temperature and ideal gases; heat flow and First Law of Thermodynamics; Second Law of Thermodynamics, heat engine, entropy.
- Wave physics, including interference and diffraction.
- Basic modern physics, including relativity, wave-particle duality, photo-electric effect, blackbody radiation, line spectra, foundations of modern quantum mechanics.
- Basic computational physics.
- Laboratory experiments.

### Pre-requisite modules
- PHY111 and PHY121 or PHY151 and PHY152
- MAT105 or (MAM151 and MAM152) or MAT103

### Co-requisite modules
- MAT211 or MAT104

### Prohibited module Combination
- None
### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
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<tr>
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<td>Practicals p.w.</td>
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<tr>
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</table>

### Methods of Student Assessment

- **Continuous Assessment (CA):** 60%
- **Final Assessment (FA):** 40%

### Assessment Module type

- Continuous and Final Assessment (CFA)

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### Faculty

- **Natural Sciences**

### Home Department

- **Physics and Astronomy**

### Module Topic

- **Introduction to Astronomy**

### Generic Module Name

- **Physics 217**

### Alpha-numeric Code

- **PHY217**

### NQF Level

- **6**

### NQF Credit Value

- **20**

### Duration

- **Semester**

### Proposed semester to be offered

- **First Semester**

### Programmes in which the module will be offered

- BSc (Physical Science) (3233, 3120);
- BSc (Chemical Sciences) (3220, 3019);
- BSc (Computer Science) (3221, 3023);
- BSc (Mathematics and Statistical Sciences) (3227, 3031);
- BSc (Environmental and Water Science) (3331);

### Year level

- **2**

### Main Outcomes

- On completion of this module students should be able to:
  - Explain basic ideas in Astronomy to a wide audience.

### Main Content

- The scientific method, technology and the development of astronomical ideas; the night sky; space travel and the solar system; stellar evolution; galaxies; evidence for the Big Bang and cosmology; Current research questions and SA contributions to Astronomy; Communicating basic astronomical ideas: tourism, the media and science education.

### Pre-requisite modules

- None

### Co-requisite modules

- None

### Prohibited module Combination

- None except from timetable clash groups

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>42</td>
<td>Lectures p.w.</td>
</tr>
<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
<td>14</td>
<td>Practicals p.w.</td>
</tr>
<tr>
<td><strong>Practicals:</strong></td>
<td>56</td>
<td>Tutorials p.w.</td>
</tr>
<tr>
<td><strong>Tutorials:</strong></td>
<td>14</td>
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</tr>
<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
<td>6</td>
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</tbody>
</table>
### Faculty
- **Faculty**: Natural Sciences

### Home Department
- **Home Department**: Physics and Astronomy

### Module Topic
- **Module Topic**: Health Physics

### Generic Module Name
- **Generic Module Name**: Physics 218

### Alpha-numeric Code
- **Alpha-numeric Code**: PHY218

### NQF Level
- **NQF Level**: 5

### NQF Credit Value
- **NQF Credit Value**: 15

### Duration
- **Duration**: Semester

### Proposed semester to be offered
- **Proposed semester to be offered**: First Semester

### Programmes in which the module will be offered
- **Programmes in which the module will be offered**: BSc (Occupational Therapy) (8111)

### Year level
- **Year level**: 2

### Main Outcomes
- On completion of this module students should be able to:
  - Understand introductory basic physics principles as for non-physicists.
  - Establish a foundation from which to view and understand nature and everyday situations.
  - Show a connected framework of knowledge and thought that can lead to a better understanding of political and social issues that depend on scientific data.

### Main Content
- The Nature of Matter and Radioactivity
- The Language of Physics; Measurements; Forces
- Work, Energy, Power and Machines
- Pressure; States of Matter; Gases
- Heat; Electrostatics and Electricity
- Electromagnetic Radiation
- Light and Sound

### Pre-requisite modules
- **Pre-requisite modules**: None

### Co-requisite modules
- **Co-requisite modules**: None

### Prohibited module Combination
- **Prohibited module Combination**: PHY111, PHY116

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
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<td>42</td>
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<td>3</td>
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<td><strong>Practicals:</strong></td>
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<tr>
<td><strong>Tutorials:</strong></td>
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<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
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</table>

### Methods of Student Assessment
- **Continuous Assessment (CA)**: 60%
- **Final Assessment (FA)**: 40%

### Assessment Module type
- **Continuous and Final Assessment (CFA)**
### Faculty
Natural Sciences

### Home Department
Physics and Astronomy

### Module Topic
Classical Mechanics and Electrodynamics

### Generic Module Name
Physics 222

### Alpha-numeric Code
PHY222

### NQF Level
6

### NQF Credit Value
20

### Duration
Semester

### Proposed semester to be offered.
Second Semester

### Programmes in which the module will be offered
- BSc Physical Science (3233, 3120)
- BSc Applied Geology (3214, 3011)
- BSc Chemical Sciences (3220, 3019)
- BSc Computer Science (3221, 3023)
- BSc Mathematics and Statistical Sciences (3227, 3031)

### Year level
2

### Main Outcomes
On completion of this module students should be able to:
- Solve problems in Classical Mechanics and Electrodynamics.
- Utilize mathematical and computer skills in problem solving.
- Interpret and represent the basic subject matter, with emphasis on the unity of electric and magnetic phenomena.
- Do experimental work related to topics in Classical Mechanics and Electrodynamics.
- Write and interpret practical reports.

### Main Content
- Electrostatics: The electrostatic Field, Divergence and Curl of electrostatic fields, Electric Potential, work and energy in electrostatics, Conductors.
- 325
- Electromagnetic waves: The Wave equation.

### Pre-requisite modules
(PHY111 and PHY121) or (PHY151 and PHY152) and (MAT105 or MAT103 or MAM152)

### Co-requisite modules
None

### Prohibited module combination
None except from timetable clash groups

### Breakdown of Learning Time

<table>
<thead>
<tr>
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| **Method of Student Assessment** | Continuous Assessment (CA): 60%  
Final Assessment (FA): 40% |
| **Assessment Module type** | Continuous and Final Assessment (CFA) |

**Faculty**  
Natural Sciences

**Home Department**  
Physics and Astronomy

**Module Topic**  
Environmental Physics and energy sources

**Generic Module Name**  
Physics 227

**Alpha-numeric Code**  
PHY227

**NQF Level**  
6

**NQF Credit Value**  
20

**Duration**  
Semester

**Proposed semester to be offered.**  
Second Semester

**Programmes in which the module will be offered**  
BSc Physical Science (3233, 3120)  
BSc Applied Geology (3214, 3011)  
BSc Chemical Sciences (3220, 3019)  
BSc Computer Science (3221, 3023)  
BSc Mathematics and Statistical Sciences (3227, 3031)  
BSc Environmental & Water Science (3331, 3027)

**Year level**  
2

**Main Outcomes**  
On completion of this module students should be able to:  
- Describe the environmental issues involved in energy generation  
- Be knowledgeable on environmental physics and applications.  
- Present on issues related to the environment.  
- Perform laboratory work on environmental physics  
- Explain how energy is generated  
- Explain and represent environmental issues around energy supply  
- Do experimental work related to energy issues.

**Main Content**  
- Introduction to Environmental Science, Environmental Physics, Environment and technology  
- The Energy Future, Electricity Generation, Fossil (coal, liquid, gas), Nuclear, Hydrogen economy, variety hydro-energy.  
- Experimental laboratory and computational applications

**Pre-requisite modules**  
(PHY116 and PHY126) or PHY111 or PHY151

**Co-requisite modules**  
None

**Prohibited module Combination**  
None except from timetable clash groups

<table>
<thead>
<tr>
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<td>Tutorials p.w.</td>
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367
<table>
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<td>Continuous and Final Assessment (CFA)</td>
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</table>

**Faculty**  
Natural Sciences

**Home Department**  
Physics and Astronomy

**Module Topic**  
Quantum and Nuclear Physics

**Generic Module Name**  
Physics 312

**Alpha-numeric Code**  
PHY312

**NQF Level**  
7

**NQF Credit Value**  
30

**Duration**  
Semester

**Proposed semester to be offered.**  
First Semester

**Programmes in which the module will be offered**  
BSc Physical Science (3233, 3120)  
BSc Applied Geology (3214, 3011)  
BSc Chemical Sciences (3220, 3019)  
BSc Computer Science (3221, 3023)  
BSc Mathematics and Statistical Sciences (3227, 3031)

**Year level**  
3

**Main Outcomes**  
On completion of this module students should be able to:
- Solve the Schrödinger equation for simple potentials and the Hydrogen atom.
- Use the Mathematical structure of quantum mechanics to describe quantum systems.
- Calculate properties of nuclei using nuclear models.
- Be able to interpret scientific data.
- Write scientific reports.
- Perform simple nuclear experiments.

**Main Content**  
**Quantum Physics:**

**Nuclear Physics:**
- Bulk nuclear properties, nucleon structure, nuclear structure models, nuclear decay and excitation, nuclear reactions, applied nuclear physics, social impact of nuclear physics, particle physics, unification theories, and structure of Universe.

**Laboratory component:**
- This component provides students with the practical skills to execute, record and analyse data in especially nuclear
and quantum physics experiments. Scientific report writing and presentation skills are developed further. Non-linear least squares, distributions in physics and other elements of data analysis are studied.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>PHY212 and PHY222 and MAT211 and MAT221</th>
</tr>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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</tr>
<tr>
<td>Prohibited module</td>
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### Method of Student Assessment

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type

- Continuous and Final Assessment (CFA)

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**Faculty**

- Natural Sciences

**Home Department**

- Physics and Astronomy

**Module Topic**

- Physics

**Generic Module Name**

- Physics 317

**Alpha-numeric Code**

- PHY317

**NQF Level**

- 7

**NQF Credit Value**

- 30

**Duration**

- Semester

**Proposed semester to be offered**

- First Semester

**Programmes in which the module will be offered**

- BSc (Physical Science) (3233,3120); BSc (Computer Science) (3221,3023)

**Year level**

- 3

### Main Outcomes

On completion of this module students should be able to:

- Explain the concept of energy sources.
- Discuss and explain renewable energy sources.
- Do standard evaluations for applications of renewable energy sources.
- Know about energy issues in SA.
- Discuss international issues on energy supply and demand.
- Explain the practical applications of renewable energy sources.
- Do standard PV systems sizing.

### Main Content

- Renewable fuels and electricity generation, Design of solar cells, Standard silicon solar cell technology incl. Crystalline, Polycrystalline, Thin film amorphous PV systems and design, Wind energy, Wave and Tidal energy.
• Overview of energy in SA, energy technology in SA. Fossil, nuclear and renewable energy sources. International energy supply and demand. Future scenarios.
• Practical: applications of renewable energies in the laboratories and in practice, Site visits of industrial applications

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>PHY227</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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</tr>
<tr>
<td>Prohibited module</td>
<td>None</td>
</tr>
<tr>
<td>Combination</td>
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<table>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Tests &amp; Examinations:</td>
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<table>
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<tr>
<th>Methods of Student Assessment</th>
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</thead>
<tbody>
<tr>
<td>Assessment Module type</td>
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</table>

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Physics and Astronomy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Solid State Physics, Statistical Physics</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Physics 322</td>
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<td>Duration</td>
<td>Semester</td>
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<tr>
<td>Proposed semester to be offered.</td>
<td>First Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
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</tr>
<tr>
<td>Year level</td>
<td>3</td>
</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to: * Integrate and find coherence from the experimental results using the Solid state theory * Explain thermal and electronic properties of crystals * Demonstrate how the theory should be used to solve problems * Solve the problems numerically using computer programs</td>
</tr>
</tbody>
</table>

- Practical component provides students with the skills to acquire and analyse data in solid state physics experiments, to apply the computational methods and to hone the report writing and presentation skills.

**Pre-requisite modules**  
PHY212 and PHY222 and MAT211 and MAT221

**Co-requisite modules**  
None

**Prohibited module Combination**  
None except from timetable clash groups

### Breakdown of Learning Time

<table>
<thead>
<tr>
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</table>

**Total Learning Time**  
300

**Method of Student Assessment**  
Continuous Assessment (CA): 60%
Final Assessment (FA): 40%

**Assessment Module type**  
Continuous and Final Assessment (CFA)

**Faculty**  
Natural Sciences

**Home Department**  
Physics and Astronomy

**Module Topic**  
Introduction module in astrophysics

**Generic Module Name**  
Physics 327

**Alpha-numeric Code**  
PHY327

**NQF Level**  
7

**NQF Credit Value**  
30

**Duration**  
Semester

**Proposed semester to be offered.**  
Second Semester

**Programmes in which the module will be offered**  
BSc Physical Science (3233, 3120)
BSc Applied Geology (3214, 3011)
BSc Chemical Sciences (3220, 3019)
BSc Computer Science (3221, 3023)
BSc Mathematics and Statistical Sciences (3227, 3031)

**Year level**  
3

**Main Outcomes**  
On completion of this module students should be able to:
- Explain the physics and mathematics of important ideas in astronomy.
- Operate a telescope.
- Analyse data from telescopes.
- Use computational techniques to model data and simulate astronomical objects.
- Explain advanced astronomical ideas to a wide audience.

**Main Content**  
Analysing astronomical spectra and photometry; Concepts in general relativity applied to cosmology and black holes;
### Breakdown of Learning Time

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<tr>
<td><strong>Total Learning Time</strong></td>
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### Method of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

### Faculty

- Natural Sciences

### Home Department

- School of Pharmacy

### Module Topic

- Philosophy of Pharmacy Practice

### Generic Module Name

- Pharmacy Practice 214

### Alpha-numeric Code

- PPR214

### NQF Level

- 6

### NQF Credit Value

- 10

### Duration

- Semester

### Proposed semester to be offered

- First Semester

### Programmes in which the module will be offered

- BPharm (3305)

### Year level

- 2

### Main Outcomes

- On completion of this module students should be able to:
  - Describe the philosophies of pharmaceutical care, Universal Health Coverage and public health.
  - Describe the attributes of a profession.
  - Demonstrate the ability to communicate professionally.
  - Describe the legal, professional and policy framework within which the pharmacy profession operates.
  - Analyse the link between the South African Constitution, human rights and health.
  - Describe the governmental hierarchy in which the Health Ministry operates.
  - Describe the functions of the SAPC and MCC.
  - Describe the purpose and scope of the Pharmacy and Medicines Act.
  - Differentiate between the scopes of practice of personnel authorised to work in pharmacy settings.
• Describe the services which specially pertain to the scope of practice of a pharmacist.
• Describe and apply the principles of the SAPC code of conduct.
• Describe the type of guidelines and standards available for pharmacists and the importance of adhering to these for the pharmacy profession.

**Main Content**

• Philosophies of pharmacy practice
• Relevant policy and legislation
• Standards and procedures in practice

**Pre-requisite modules**

PHA116 and PHC123

**Co-requisite modules**

None

**Prohibited module Combination**

None

<table>
<thead>
<tr>
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<tr>
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**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)

**Faculty**

Natural Sciences

**Home Department**

School of Pharmacy

**Module Topic**

Medicine supply: Management & Regulation

**Generic Module Name**

Pharmacy Practice 224

**Alpha-numeric Code**

PPR224

**NQF Level**

6

**NQF Credit Value**

15

**Duration**

Semester

**Proposed semester to be offered**

Second Semester

**Programmes in which the module will be offered**

BPharm (3305)

**Year level**

2

**Main Outcomes**

On completion of this module students should be able to:

• Describe and analyse the legislation governing the sale and pricing of medicines.
• Describe drug supply management principles and practice.
• Demonstrate the ability to implement stock control procedures.
• Demonstrate the ability to develop Standard operating procedures.
- Describe the phases of dispensing.
- Demonstrate the ability to use computer dispensing packages.
- Contextualize all of the above outcomes in terms of WHO 7-Star pharmacist.

**Main Content**
- The Medicines and Related Substances Act 101 of 1965
- Control of the sale of medicines (Section 22A)
- Validity of prescriptions
- Label, PILs, package insert
- Medicine pricing
- Introduction to medicine classification (Schedules)
- Generic substitution
- Drug supply management (including Stock management)
- Procurement cycle
- Information management
- Physical stock handling principles
- Standard Operating Procedures
- Dispensing practice according to GPP

**Pre-requisite modules**
PHA116 and PCE231 and PHC213 and PPR214 or a minimum of 40% final mark in each of these level 2 modules

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
School of Pharmacy

**Module Topic**
Professional Communication in Pharmacy

**Generic Module Name**
Pharmacy Practice 314

**Alpha-numeric Code**
PPR314

**NQF Level**
7

**NQF Credit Value**
15

**Duration**
Semester

**Proposed semester to be offered**
First Semester

**Programmes in which the module will be offered**
BPharm (3305)

**Year level**
3
### Main Outcomes

On completion of this module students should be able to:

- Describe the scope of services offered at pharmacy settings for which pharmacists may charge fees.
- Describe and apply the applicable fee structure for services.
- Describe the limitations imposed on the advertising of medicines and services by the relevant legislation.
- Critically evaluate medicine advertisements.
- Describe various communication styles and identify how to adopt these in a specific patient encounter or inter-professional encounter.
- Demonstrate the ability to interact with individual patients and recognise specific counselling needs with particular reference to adherence.
- Describe factors affecting patient behaviour.
- Analyse and advise on the general principles relating to responsible self-medication.
- Differentiate between ethics, morality and ethical theories, principles and actions.
- Demonstrate the ability to reflect, plan, implement and evaluate experiential learning in SLIP and other practice sites and record these in an ePortfolio.
- Demonstrate an understanding of the professional obligation of pharmacists to communities.
- Apply professional expertise and skill to initiate pharmaceutical and therapeutic care in line with community needs.
- Translate all of the above outcomes in terms of WHO 7-Star pharmacist.

### Main Content

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<thead>
<tr>
<th>Pharmacy Act No 53 of 1974</th>
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<tr>
<td>Services for which pharmacists may levy a fee</td>
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<td>Advertising</td>
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<table>
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<tr>
<th>Medicines and Related Substances Act 101 of 1965</th>
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<tr>
<td>Medicine fee structure</td>
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<td>Advertising</td>
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<table>
<thead>
<tr>
<th>Patient-centred pharmacy practice</th>
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<tr>
<td>Communication</td>
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<tr>
<td>Patient adherence</td>
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<tr>
<td>Patient counselling</td>
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<tr>
<td>Pharmaceutical and therapeutic care based on community needs</td>
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<tr>
<td>Psychosocial aspects of pharmacy practice</td>
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<td>Pharmacy ethics</td>
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**Service Learning in Pharmacy (SLIP)**

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<td>PPR214 and PPR224 and PHC213 and PHC223</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- School of Pharmacy

### Module Topic
- Pharmacy Management

### Generic Module Name
- Pharmacy Practice 324

### Alpha-numeric Code
- PPR324

### NQF Level
- 7

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered
- Second Semester

### Programmes in which the module will be offered
- BPharm (3305)

### Year level
- 3

### Main Outcomes

On completion of this module students should be able to:
- Explain the management of human resources in a pharmacy context.
- Describe marketing strategies and
  - Explain the significance of marketing in modern pharmacy practice settings.
  - Apply transactional and relationship marketing.
  - Apply relationship marketing as a personal and professional marketing opportunity.
- Plan a pharmacy marketing research project;
- Describe the SAPC disciplinary procedure for registered persons who deviate from the code of conduct.
- Describe the SAPC requirements for licensing of premises.
- Explain the main components of a dossier for registration of medicines.
- Describe the legislative requirements for medicine registration.
- Explain the concept of section 21 medicines and how to obtain access to such medicines.
- Demonstrate an understanding of the professional role of pharmacists in community health care.
- Describe, initiate, apply and evaluate strategies to promote the profession through the provision of values-based services.
- Demonstrate the ability to apply therapeutic and pharmaceutical care at community level.
**Main Content**

- Human Resources Management
- Marketing & business practice
- Pharmacy Act No 53 of 1974
  - SAPC role: conduct and disciplinary procedures
  - Licensing of premises
- Medicines and related substances Act
  - Registration of medicines
  - Dossiers
- Section 21 items
- Community-centred pharmacist initiated therapy
- Service Learning in Pharmacy

**Pre-requisite modules**

- PPR214 and PPR224 and PHC313 and PHC323 and PPR314 or a minimum of 40% final mark in PPR314

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

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**Methods of Student Assessment**

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)

---

**Faculty**

Natural Sciences

**Home Department**

School of Pharmacy

**Module Topic**

Pharmacoeconomics - Elective

**Generic Module Name**

Pharmacy Practice 404

**Alpha-numeric Code**

PPR404

**NQF Level**

8

**NQF Credit Value**

15

**Duration**

Year

**Proposed semester to be offered**

Both Semesters

**Programmes in which the module will be offered**

BPharm (3305)

**Year level**

4

**Main Outcomes**

- Demonstrate the ability to reflect, plan, implement and evaluate experiential learning in SLIP and other practice sites and record these in an ePortfolio.
- Translate all of the above outcomes in terms of WHO 7-Star pharmacist.

- Understand the role of pharmacoeconomics in pharmaceutical therapy, the pharmaceutical industry and health outcomes research.
• Define and understand the terminology associated with pharmacoeconomics and health outcomes research.
• Identify and apply the main economic principles used in pharmacoeconomics.
  - Cost-benefit analysis.
  - Cost-minimisation analysis.
  - Cost-utility analysis.
  - Cost-effectiveness analysis.
• Apply the different pharmacoeconomic principles to practical case scenarios.
• Identify and evaluate how the various perspectives influence pharmacoeconomic analysis and the decision making process.
• Evaluate and analyse Cost-of-illness studies and understand their financial implications.
• Understand the role and application of modelling in pharmacoeconomic research.
• Understand the role and application of pharmacoeconomics in clinical trials and early drug development.
• Evaluate pharmacoeconomic literature and health outcomes research critically.

Main Content
• Pharmacoeconomic theories and principles, including
  - Pharmacoeconomic analyses
  - Pharmacoeconomic modelling
  - Relevant pharmacoeconomic and health outcomes literature
  - Applications of the above in clinical trials and drug development

Pre-requisite modules
PPR314 & PPR324

Co-requisite modules
None

Prohibited module
PCE401, PCH402 & PHC403

Breakdown of Learning Time

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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)
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<td>First Semester</td>
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<td>BPharm (3305)</td>
</tr>
<tr>
<td>Year level</td>
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</table>

**Main Outcomes**

On completion of this module students should be able to:
- Interpret miscellaneous legislation
- Identify and interpret any amendments to legislation applicable to pharmacy practice;
- Interpret aspects of the Medical Schemes Act and its implementation;
- Describe the Managed Health Care concept and how it is practised and regulated;
- Describe how complementary and alternative medicines integrates into traditional pharmacy practice;
- Solve medicine queries through the use of various information sources;
- Identify drugs of abuse, patterns of drug abuse and the role of the pharmacist;
- Describe the role of the pharmacist in issues relating to reproductive health;
- Apply financial management principles and ratios in a business enterprise;
- Demonstrate the ability to reflect, plan, implement and evaluate experiential and formal learning in the context of SAPC competency standards and record these in an ePortfolio;
- Plan for future practice based on foreseeable trends;
- Translate all of the above outcomes in terms of WHO 7-Star pharmacist.

**Main Content**

- Miscellaneous legislation
  - Liquor Act : Methylated spirits
  - Foodstuff, cosmetics, disinfectants
  - Medical Schemes Act (MSA) : managed health care (MHC)
  - Amended legislation
- Disposal/ destruction of medicines
- Integration of Complementary and alternative medicines into pharmacy practice
- Medicines Information
- Substance abuse
- Reproductive health
  - Infertility
  - Cervical cytology
  - Menopause
  - Common gynaecological complaints
  - Contraception (other than methods in the EML)
- Financial management
- Competency standards
- Scenario-based future planning

**Pre-requisite modules**

PPR314 & 324

**Co-requisite modules**

None
<table>
<thead>
<tr>
<th>Prohibited module Combination</th>
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<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>School of Pharmacy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Management of Medicine Supply - Elective</td>
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<tr>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Identify and analyse key policy, legislative and regulatory frameworks applicable to medicines;</td>
</tr>
<tr>
<td></td>
<td>• Explain the importance of product selection, planning and procurement in managing medicines;</td>
</tr>
<tr>
<td></td>
<td>• Evaluate key principles applicable to the storage and distribution of medicines;</td>
</tr>
<tr>
<td></td>
<td>• Identify and analyse Inventory Management Systems for medicines;</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the use of Logistics Management Information Systems in managing medicines supply;</td>
</tr>
<tr>
<td></td>
<td>• Advocate for stakeholders to adopt Rational Medicines Use principles in medicines supply management and</td>
</tr>
<tr>
<td></td>
<td>• Critically evaluate financial management mechanisms applicable to managing medicines.</td>
</tr>
</tbody>
</table>

| Main Content              | Policy, Laws and Regulations applicable to medicines; |
|                          | Analysis of product selection, forecasting/quantification and supply planning for medicines; |
|                          | Key principles of procurement and quality assurance; |
|                          | Storage and distribution of medicines; |
|                          | Use of Inventory Management Systems for managing medicines; |
|                          | Logistics Management Information Systems for managing medicines and |
Rational Medicines Use and key financing mechanisms for managing medicines.

Pre-requisite modules
PPR314 & PPR324

Co-requisite modules
None

Prohibited module
Combination
PCE401, PCH402 & PHC403

Breakdown of Learning Time

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Total Learning Time 150

Method of Student Assessment
Continuous Assessment (CA): 100%
Final Assessment (FA): 0%

Assessment Module type
Continuous Assessment (CA)

Faculty
Natural Sciences

Home Department
Medical Biosciences

Module Topic
Applied Physiology for Dietetics I

Generic Module Name
PSE319

Alpha-numeric Code
PSE319

NQF Level
7

NQF Credit Value
5

Duration
Semester

Proposed semester to be offered
First Semester

Programmes in which the module will be offered
BSc (Dietetics) (8281)

Year level
3

Main Outcomes
On completion of this module students should be able to:
• Discuss the basics of oncology, and how diet influences the development of cancers.
• Describe the basic structure and function of the GIT.
• Discuss the physiology of gastrointestinal disorders and explain the nutritional implications and adjustments.
• Discuss the importance of the placenta in nutrition.
• Discuss the implications of renal disturbances on nutritional requirements.
• Explain the importance of laboratory testing.
• Give normal values for selected parameters.

Main Content
• Topic based discussions to supplement therapeutic nutrition.
• Topics include
• Basics of oncology, renal
• Diseases, physiology of the placenta,
• Gastrointestinal disorders, small bowel syndrome, etc.

Pre-requisite modules
MBS231 and MBS232
(MBS211,MBS212,MBS221,MBS222)

Co-requisite modules
None
### Prohibited module Combination

None

### Breakdown of Learning Time

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<th>Hours</th>
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### Methods of Student Assessment

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type

Continuous and Final Assessment (CFA)

---

### Faculty

Natural Sciences

### Home Department

Medical Biosciences

### Module Topic

Applied Physiology for Dietetics II

### Generic Module Name

Applied Physiology for Dietetics II

### Alpha-numeric Code

PSE329

### NQF Level

7

### NQF Credit Value

5

### Duration

Semester

### Proposed semester to be offered.

First Semester

### Programmes in which the module will be offered

BSc Dietetics (8281)

### Year level

3

### Main Outcomes

On completion of this module students should be able to:
- Discuss the physiology of CV diseases such as hypertension an atherosclerosis
- Explain how diet influence the development of CV diseases
- Discuss the physiology of the new born
- Explain the nutritional need during pregnancy, in the new born and in the premature infant
- Discuss the physiology of AIDS

### Main Content

Topic based discussions to supplement therapeutic nutrition. Topics include, cardiovascular diseases, AIDS, premature development, etc

### Pre-requisite modules

MBS 231 and MBS232 (MBS211, MBS212, MBS221, MBS222)

### Co-requisite modules

None

### Prohibited module Combination

None

### A. Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>21</td>
<td>Lectures p.w.</td>
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</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>0</td>
<td>Practicals p.w.</td>
<td></td>
</tr>
</tbody>
</table>

382
### Faculty
- Natural Sciences

### Home Department
- Mathematics and Applied Mathematics

### Module Topic
- Quantitative Skills for Administration

### Generic Module Name
- Quantitative Skills for Administration

### Alpha-numeric Code
- QSA105

### NQF Level
- 5

### NQF Credit Value
- 10

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- Year level: 1

### Main Outcomes
- On completion of this module students should be able to:
  - Carry out the basic mathematical operations such as adding fractions, calculating percentages, working with ratio and proportion, converting between different measuring units, currencies and number systems (Scientific notation, decimal form) working out interest rates, solving equations, drawing graphs of functions including exponential and logarithmic functions, required in Business Administration.

### Main Content
- Fractions and Percentage and Ratio
- Basic Algebra
- Exponents and Scientific Notation
- Solving Equations
- Understanding Simple Graphical Representations
- Conversions of Units
- Logarithms and Logarithmic Graphs
- Series (Interest)

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<tr>
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<td></td>
<td></td>
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</tbody>
</table>

383
### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Faculty
- Natural Sciences

### Home Department
- Mathematics and Applied Mathematics

### Module Topic
- Quantitative Skills for Commerce

### Generic Module Name
- Quantitative Skills for Commerce 131/132

### Alpha-numeric Code
- QSC131/QSC132

### NQF Level
- 5

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered
- QSC131 in First Semester
- QSC132 in Second Semester

### Programmes in which the module will be offered
- BCom (1008) (1101)
- BCom (ACC) (1753) 4-year programme
- BCom Law (1221)

### Year Level
- 1

### Main Outcomes
- On completion of this module students should be able to:
  - Demonstrate the ability to solve problems with Commercial applications involving:
  - Ratio, rates and simple proportion
  - Discounts and markdowns, breakeven analysis
  - Time value of money
  - Straight-line and parabolic graphs with particular reference to revenue/cost/profit supply/demand
  - Exponential and logarithmic curves drawing and interpreting statistical charts and calculating mean, median, mode

### Main Content
- Ratio and proportions, rates, approximations
- Pricing a product, profits, breakeven analysis
- Simple interest, compound interest, annuities
- Straight line graphs and parabolas with link to finance and economics e.g. supply/demand
- Exponential and logarithmic equations and graphs with link to finance and economics
- Descriptive statistics and measures of central tendency.

### Pre-requisite modules
- None

### Co-requisite modules
- QLC141/142

### Prohibited module combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that do not require time-table</th>
</tr>
</thead>
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<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Assignments &amp; tasks:</td>
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<tr>
<td>Practicals:</td>
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384
Assessments:

<table>
<thead>
<tr>
<th>Self-study:</th>
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<tr>
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**Method of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module Type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Radiation Physics

**Generic Module Name**
- Radiation Physics 220

**Alpha-numeric Code**
- RAP220

**NQF Level**
- 6

**NQF Credit Value**
- 5

**Duration**
- Semester

**Proposed semester to be offered**
- Second Semester

**Programmes in which the module will be offered**
- BDS (5101)

**Year level**
- 2

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain the interaction of radiation with matter.
  - Describe the instrumentation used to produce x-rays.
  - Discuss the factors affecting the quality of x-rays.
  - Discuss the factors affecting the quality of x-ray images.
  - Explain the biological effects and measurement of radiation.

**Main Content**
- Structure of matter: the atom, atomic energy levels, electromagnetic radiation, production of x-rays
- The x-ray tube: the anode, cathode, transformers, voltage rectification, basic x-ray circuit
- Physics of x-ray production: Bremsstrahlung, characteristic x-rays, x-ray energy spectrum, operating characteristics
- Interaction of radiation with matter: ionisation, photoelectric effect, Compton scattering, pair production
- Production of x-ray images: image formation and contrast
- Factors affecting the quality of x-ray images: radiographic contrast, scattered radiation and contrast, radiographic receptors
- Measurement of absorbed dose: absorbed dose, dose measurements
- Radiation protection: patient exposure and protection, personnel exposure and protection

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>20</td>
<td>Lectures p.w.</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
</tr>
<tr>
<td><strong>Practicals:</strong></td>
<td>0</td>
<td><strong>Tutorials p.w.:</strong></td>
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<tr>
<td><strong>Tutorials:</strong></td>
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</tr>
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<td><strong>Tests &amp; Examinations:</strong></td>
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<td><strong>Selfstudy:</strong></td>
</tr>
<tr>
<td><strong>Selfstudy:</strong></td>
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<td><strong>Other:</strong></td>
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<td><strong>Total Learning Time</strong></td>
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<td><strong>Methods of Student Assessment</strong></td>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
<td><strong>Faculty</strong></td>
</tr>
<tr>
<td><strong>Home Department</strong></td>
<td>Statistics and Population Studies</td>
<td><strong>Module Topic</strong></td>
</tr>
<tr>
<td><strong>Generic Module Name</strong></td>
<td>Statistics 111</td>
<td><strong>Alpha-numeric Code</strong></td>
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<tr>
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<td><strong>NQF Credit Value</strong></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Semester</td>
<td><strong>Proposed semester to be offered</strong></td>
</tr>
<tr>
<td><strong>Programmes in which the module will be offered</strong></td>
<td>BSc (Biodiversity and Conservation Biology) (3227); BSc (Computer Science) (3221); BSc (Environmental and Water Science) (3331); BSc (Mathematics and Statistical Sciences) (3220)</td>
<td><strong>Year level</strong></td>
</tr>
</tbody>
</table>
| **Main Outcomes** | On completion of this module students should be able to:  
  - Recognize the importance of statistics in both private and public sectors.  
  - Summarize data into summary measures (e.g. mean and standard deviation).  
  - Do simple statistical analysis.  
  - Use a computer to analyze data. | **Main Content** |  
  - Descriptive statistics  
  - Simple linear regression analysis  
  - Probability  
  - Sampling distributions  
  - Inferential Statistics  
  - Chi-Square  
  - Anova |
| **Pre-requisite modules** | None | **Co-requisite modules** | None |
| **Prohibited module Combination** | STA125, STA141, STA142, STA151, BUS131, BUS132 | **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| **Contact with lecturer / tutor:** | 42 | Lectures p.w. | 4 |  |
| **Assignments & tasks:** | 0 | Practicals p.w. | 3 |  |
| **Practicals:** | 60 | Tutorials p.w. | 0 |  |
| **Tutorials:** | 0 |  |  |  |
| **Tests & Examinations:** | 6 |  |  |  |
| **Selfstudy:** | 42 |  |  |  |
| **Other:** | 0 |  |  |  |
| **Total Learning Time** | 150 |  |  |  |
### Methods of Student Assessment
- **Continuous Assessment (CA): 50%**
- **Final Assessment (FA): 50%**

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Statistics and Population Studies

### Module Topic
- Quantitative Methods

### Generic Module Name
- Statistics 121

### Alpha-numeric Code
- STA121

### NQF Level
- 5

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered.
- Second semester

### Programmes in which the module will be offered
- BSc Mathematics and Statistical Sciences (3227) (3031)

### Year level
- 3

### Main Outcomes
- On completion of this module students should be able to:
  - Obtain basic knowledge on questionnaire design and planning of surveys.
  - Analyse survey data.
  - Obtain informed understanding of Official Statistics.
  - Obtain fundamental knowledge on different data collection types.

### Main Content
- Quantitative methods:
  - Questionnaire design and analysis
  - Planning of surveys
  - Introduction of Official Statistics
  - Censuses
  - Vital registration (civil registration)
  - Surveys (general household surveys, family surveys, demographic and health surveys)

### Pre-requisite modules
- None

### Co-requisite modules
- Knowledge of STA111/STA125/151 or BUS131/132 or STA141/142 or equivalent

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time Category</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>42</td>
<td>Lectures p.w.</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>0</td>
<td>Practicals p.w.</td>
</tr>
<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
</tr>
<tr>
<td>Assessments</td>
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<tr>
<td>Selfstudy</td>
<td>42</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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</tr>
</tbody>
</table>

### Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Introductory Statistics</td>
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<tr>
<td>Generic Module Name</td>
<td>Statistics 125</td>
</tr>
<tr>
<td>Alpha-numeric Code</td>
<td>STA125</td>
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<tr>
<td>NQF Level</td>
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<tr>
<td>NQF Credit Value</td>
<td>15</td>
</tr>
<tr>
<td>Duration</td>
<td>Semester</td>
</tr>
<tr>
<td>Proposed semester to be offered</td>
<td>Second Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc (Biodiversity and Conservation Biology) (3227); BSc (Computer Science) (3221); BSc (Environmental and Water Science) (3331); BSc (Mathematics and Statistical Sciences) (3220)</td>
</tr>
<tr>
<td>Year level</td>
<td>1</td>
</tr>
</tbody>
</table>
| Main Outcomes           | On completion of this module students should be able to:  
                        | • Recognize the importance of statistics in both private and public sectors.  
                        | • Summarize data into summary measures (e.g. mean and standard deviation).  
                        | • Do simple statistical analysis.  
                        | • Use a computer to analyze data |
| Main Content            | • Descriptive statistics               |
|                        | • Simple linear regression analysis    |
|                        | • Probability                          |
|                        | • Sampling distributions               |
|                        | • Inferential Statistics               |
|                        | • Chi-square                           |
|                        | • Anova                                |
| Pre-requisite modules   | None                                  |
| Co-requisite modules    | None                                  |
| Prohibited module       | STA111, STA141, STA142, STA151, BUS131, BUS132 |
| Combination             |                                        |
| Breakdown of Learning Time |                                        |
| Hours                   | Time Table Requirement per week       | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 42 | Lectures p.w. | 4                           |
| Assignments & tasks:    | 0 | Practicals p.w. | 3                           |
| Practicals:             | 60 | Tutorials p.w. | 0                           |
| Tutorials:              | 0 |                                               |
| Tests & Examinations:   | 6 |                                               |
| Selfstudy:              | 42 |                                               |
| Other:                  | 0 |                                               |
| Total Learning Time     | 150 |                                               |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
<pre><code>                    | Final Assessment (FA): 50%             |
</code></pre>
<p>| Assessment Module type  | Continuous and Final Assessment (CFA) |</p>
<table>
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<tr>
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<tbody>
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</tr>
<tr>
<td>Duration</td>
<td>Semester</td>
</tr>
</tbody>
</table>
| Proposed semester to be offered | STA141 – First Semester  
STA142 – Second Semester |
| Programmes in which the module will be offered | BAdmin (1018); BA (2101) |
| Year level | 1 |
| Main Outcomes | On completion of this module students should be able to:  
• Understand the importance of statistics in both private and public sectors.  
• Summarize basic data into summary measures (e.g. mean and standard deviation).  
• Prepare simple statistical analysis.  
• Use a computer to analyze data. |
| Main Content | • Descriptive statistics  
• Simple linear regression analysis  
• Probability  
• Sampling distributions  
• Inferential Statistics  
• Chi-square  
• Anova |
| Pre-requisite modules | QLC141, QLC142 FOR EMS Students or an Equivalent for Arts Students |
| Co-requisite modules | None |
| Prohibited module combination | STA111, STA125, STA141, STA151, BUS131, BUS132 |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 56 | Lectures p.w. | 3 |
| Assignments & tasks: | 20 | Practical p.w. | 0 |
| Practicals: | 10 | Tutorials p.w. | 0 |
| Tests & Examinations: | 0 | | |
| Selfstudy: | 64 | | |
| Total Learning Time | 150 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 60%  
Final Assessment (FA): 40% |
<p>| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Statistics and Population Studies |
| Module Topic | Introductory Statistics with Science Foundation support infused |
| Generic Module Name | Statistics 151 |
| Alpha-numeric Code | STA151 |
| NQF Level | 5 |
| NQF Credit Value | 15 |
| Duration | Year |
| Proposed semester to be offered | Both Semesters |
| Programmes in which the module will be offered | BSc (Applied Geology) (3011); BSc (Computer Science) (3023); BSc (Environmental and Water Science) (3027); BSc (Medical Bioscience) (3035) |</p>
<table>
<thead>
<tr>
<th>Year level</th>
<th>1</th>
</tr>
</thead>
</table>
| Main Outcomes | On completion of this module students should be able to:  
- Recognize the importance of statistics in both the private and public sectors.  
- Summarize the data into a few summary measures (e.g. Mean and standard deviation).  
- Do simple statistical analysis.  
- Use a computer to analyse the data and present data graphically.  
- Science communication; scientific investigation.  
- Probabilistic reasoning skills.  
- Introduction to sampling techniques. |
| Main Content | Introductory Statistics  
- Descriptive statistics; Regression analysis,  
- Introductory probability; Confidence intervals  
- Hypothesis testing; Statistical computer literacy  
- Presentation and computer skills directed toward probabilistic reasoning; Non-parametric statistics  
- Sampling techniques |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module combination | STA111/125/141/142/BUS131/132 |

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
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<td>Assignments &amp; tasks:</td>
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<tr>
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<td>Tutorials p.w.</td>
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<td>Tests &amp; Examinations:</td>
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</tr>
<tr>
<td>Selfstudy:</td>
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<td>Other:</td>
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</table>
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Distribution Theory</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Statistics 211</td>
</tr>
<tr>
<td>Alpha-numeric Code</td>
<td>STA211</td>
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<td>NQF Level</td>
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<td>NQF Credit Value</td>
<td>20</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
</tr>
<tr>
<td>Proposed semester to be offered</td>
<td>First Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc (Computer Science) (3221,3023); BSc (Mathematics and Statistical Sciences) (3227,3031)</td>
</tr>
<tr>
<td>Year level</td>
<td>2</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
- Understand probability theory. |
- Apply discreet and continuous probability distributions.
- Apply moments and moment generation functions.
- Understand sampling and sampling distributions.
- Develop statistical computer literacy skills.

### Main Content

**Distribution theory:**
- Definition of statistical terms
- Probability theory
- Discrete and continuous probability distributions
- Moments and moment generating functions
- Sampling and sampling distributions
- Manipulating and summarizing data with reports and graphs

### Pre-requisite modules

MAT105, MAM115, MAM126, MAM150, (MAM151 + MAM152), MAT103 and STA111, STA125, STA141, STA142, STA151, BUS 131, BUS 132 or equivalent

### Co-requisite modules

MAT104 if students enrolled for MAT103

### Prohibited module Combination

None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>60</td>
<td>Lectures p.w.</td>
<td>4</td>
</tr>
<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
<td>40</td>
<td>Practical p.w.</td>
<td>3</td>
</tr>
<tr>
<td><strong>Practicals:</strong></td>
<td>5</td>
<td>Tutorials p.w.</td>
<td>2</td>
</tr>
<tr>
<td><strong>Tutorials:</strong></td>
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</tr>
<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
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</tr>
<tr>
<td><strong>Selfstudy:</strong></td>
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</tr>
<tr>
<td><strong>Other:</strong></td>
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<tr>
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### Methods of Student Assessment

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type

Continuous and Final Assessment (CFA)

### Faculty

Natural Sciences

### Home Department

Statistics and Population Studies

### Module Topic

Inference and Regression

### Generic Module Name

Statistics 221

### Alpha-numeric Code

STA221

### NQF Level

6

### NQF Credit Value

20

### Duration

Semester

### Proposed semester to be offered

Second Semester

### Programmes in which the module will be offered

BSc (Computer Science) (3221, 3023); BSc (Mathematics and Statistical Sciences) (3227, 3031)

### Year level

2

### Main Outcomes

On completion of this module students should be able to:
- Perform statistical inference with the use of estimation and hypothesis tests.
- Explore linear models in more detail.
- Perform analysis of variance and categorical data analysis.

### Main Content

- Inference and Regression
- Central Limit Theorem
**Transformations;**  
**Point and interval estimation;**  
**Hypothesis tests**  
**Regression analyses using matrices**  
**ANOVA**  
**Categorical data analyses**

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>STA211 (at least qualified to write the exam for STA211)</th>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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<td>Combination</td>
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<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<table>
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<tbody>
<tr>
<td>Assessment Module type</td>
<td>Final Assessment (FA): 50%</td>
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<table>
<thead>
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<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
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</tr>
<tr>
<td>Module Topic</td>
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<td>Proposed semester to be offered</td>
<td>First Semester</td>
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<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>BSc (Mathematics and Statistical Sciences) (3227,3031)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
<td>3</td>
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</tbody>
</table>

**Main Outcomes**  
On completion of this module students should be able to:  
- Describe and explain multivariate distributions (discrete and continuous)  
- Demonstrate advanced inference  
- Explain statistical programming techniques

**Main Content**  
- Multivariate distribution Theory  
- Multivariate distributions (discrete and continuous)  
- Limit theories  
- Advanced estimation and hypothesis testing  
- Statistical programming techniques

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<tr>
<th>Pre-requisite modules</th>
<th>STA211 and STA221</th>
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<td>Co-requisite modules</td>
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### Breakdown of Learning Time

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<th>Hours</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type** Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Statistics and Population Studies

### Module Topic
- Advanced Inference & Linear Models

### Generic Module Name
- Statistics 332

### Alpha-numeric Code
- STA332

### NQF Level
- 7

### NQF Credit Value
- 30

### Duration
- Semester

### Proposed semester to be offered
- Second Semester

### Programmes in which the module will be offered
- BSc (Mathematics and Statistical Sciences) (3227,3031)

### Year level
- 3

### Main Outcomes
- On completion of this module students should be able to:
  - Execute advanced linear models for estimation.
  - Perform advanced analysis of variance and multivariate regression.
  - Design and execute data analysis using statistical package;
  - Write reports summarizing and interpreting results.

### Main Content
- **Advanced Inference and linear models**
  - Advanced linear models
  - Analysis of variance and advanced regression analysis.
  - Understanding and interpretation of computer output

### Pre-requisite modules
- STA211 and STA221

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
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393
### Module Details

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#### Main Outcomes
- Understand cross-sectional survey designs from a social-demographic perspective.
- Apply advanced statistics in the population studies environment.
- Understand sampling procedures and advanced sampling theory.
- Understand the different sources of demographic data such as surveys and censuses.
- Design a questionnaire and conduct a demographic survey.

#### Main Content
- Sources of demographic data; advanced sampling methods; advanced sampling theory Survey questionnaire design.

#### Pre-requisite modules
- STA211 and STA221

#### Co-requisite modules
- None

#### Prohibited module Combination
- None

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<th>Breakdown of Learning Time</th>
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<th>Timetable Requirement per week</th>
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#### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

#### Assessment Module type
- Continuous and Final Assessment (CFA)
### POSTGRADUATE MODULE DESCRIPTORS

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<td>Main Outcomes</td>
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<td></td>
<td>• At the end of the module be able to critically apply data analysis techniques.</td>
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<tr>
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<td>• Probability Theory,</td>
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<td>• Statistical Models and the Normal Distribution,</td>
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<td>• Sampling Distributions,</td>
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<td>• Categorical Data Analysis,</td>
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<td>• Analysis of Variance,</td>
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<td>• Correlation and Regression Analysis.</td>
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### POSTGRADUATE MODULE DESCRIPTORS

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<tbody>
<tr>
<td>Home Department</td>
<td>Earth Sciences (Applied Geology)</td>
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<tr>
<td>Module Topic</td>
<td>Research Project</td>
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Proposed semester to be offered. | Both Semester
---|---
Programmes in which the module will be offered | BSc Honours (Applied Geology) (3710)
Year level | 7
Main Outcomes | On completion of this module students should be able to:
• Do extensive literature research on a particular research topic.
• Perform independent to semi-independent field or laboratory-based research or experiments.
• Interpret chemical, geological, structural or other types of data.
• Write a comprehensive report based on measurements and observations obtained and the interpretation thereof.
• Present the results and interpretation orally.
Main Content | • Research topic literature review
• Research project proposal
• Geological setting
• Field and/or laboratory work
• Obtaining analytical results
• Interpretation of data
• Report writing
• Oral presentation of report
Pre-requisite modules | None
Co-requisite modules | None
Prohibited module Combination | None
Breakdown of Learning Time | Hours | Time-table Requirement per week | Other teaching modes that does not require time-table
---|---|---|---
Contact with lecturer / tutor: | 50 | Lectures p.w. | 3
Assignments & tasks: | 20 | Practicals p.w. | 1
Practicals: | 50 | Tutorials p.w. | 0
Assessments | | | |
Selfstudy | 180 | | |
Other: | 0 | | |
Total Learning Time | 300 | |
Method of Student Assessment | Final Assessment (FA): 100%
Continuous Assessment (CA): 0%
Assessment Module type | Final Assessment (FA)
Faculty | Natural Sciences
Home Department | Earth Sciences
Module Topic | Advanced Geology and Field School
Generic Module Name | Geology 721
Alpha-numeric Code | APG721
NQF Level | 8
NQF Credit Value | 30
Duration | Semester
Proposed semester to be offered. | First Semester
Programmes in which the module will be offered | BSc. Honours (Applied Geology) (3710)
Year level | 1
### Main Outcomes

On completion of this module students should be able to:

- Explain and describe the geological evolution of the African continent as a whole or parts thereof either with regards to time periods or regions of Africa.
- Explain the tectono-magmatic and tectono-metamorphic evolution of portions of Africa.
- Explain the formation of the principal mineral and hydrocarbon deposits of Africa.
- Independently map a large area in terms of lithologies and geological structures and produce a detailed and comprehensive geological map.
- Analyse the geological information obtained during mapping and interpret the geological processes and history of the area in terms of formation of the rock types as well as the deformation history of the area and place the total into a larger geotectonic framework.
- Describe and explain microscale deformation and structural features in rocks and how these develop.
- Relate large- and microscale structural scale features in rocks to the overall geotectonic and structural evolution and history of the rocks of an area.

### Main Content

- The geology and tectonic evolution of the Kalahari, Congo-Tanzania and West African Cratons, as well as tectogenetic cycles and Mobile Belts in Africa.
- Overall anorogenic and orogenic magmatism and tectonic evolution of Africa.
- Archaean and Proterozoic Metallogeny (Gold, Tin and Copper).
- The development of sedimentary Basins in Africa.
- The development of precious and base metal and hydrocarbon potentials.
- Structural Geology in the geotectonic context.
- Stress and its origin in the Earth’s crust
- Deformation mechanisms leading to strain, as found in compressional, extensional and strike-slip regimes.
- Application of microtectonics to assist in the unravelling of the geological history of an area.
- Microtectonics and the their role in determining the geodynamic and structural evolution of an area
- Semi-independent geological field mapping with data collection
- Interpretation of the lithological and structural data gathered
- Analysis and interpretation of petrographic thin sections and chemical analyses
- Complete geological interpretation of the mapped field area based on their own data

<table>
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<tbody>
<tr>
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### Method of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

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**Faculty**
- Natural Sciences

**Home Department**
- Earth Sciences

**Module Topic**
- Applied Geology

**Generic Module Name**
- Applied Geochemistry 722

**Alpha-numeric Code**
- APG722

**NQF Level**
- 8

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- BSc Hon (Applied Geology) (3710)

**Year level**
- 8

**Main Outcomes**

On completion of this module students should be able to:
- Understand the principles of low temperature geochemical modeling as it relates to:
  - Weathering and associated products.
  - Element speciation in aqueous phase modeling and the influence of redox processes.
  - Factors controlling mineral stability in aqueous phase.
  - Adsorption processes.

**Demonstrate an understanding of the principles underlying:**
- Sample preparation for geochemical analysis; sample digestion, and partial/ selective extraction techniques.
- Quality control and quality assurance.
- The use of GFAAS, XRF & ICP-MS in geochemical analysis.

**Demonstrate an understanding of the principles underlying:**
- The selection and design of various geochemical techniques.
- Execution of geochemical exploration programme.
- Evaluation and interpretation of geochemical data.

**Main Content**
- Sample preparation for geochemical analysis; sample digestion, and partial/ selective extraction techniques
- Quality control and quality assurance
• The use of GFAAS, XRF & ICP-MS in geochemical analysis.

**Low temperature geochemistry covering:**
• Chemical weathering and associated products
• Aqueous geochemistry: speciation modeling and redox processes
• Weathering and mineral stability diagrams.
• Adsorption processes

**Geochemical prospecting techniques**
• Lithogeochemistry
• Stream sediment geochemistry
• Regolith geochemistry
• Biogeochemistry
• Evaluation of geochemical data

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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Earth Sciences (Applied Geology)

**Module Topic**
Applied Geology

**Generic Module Name**
Economic Geology and Exploration Techniques

**Alpha-numeric Code**
APG723

**NQF Level**
8

**NQF Credit Value**
20

**Duration**
Semester

**Proposed semester to be offered.**
First Semester

**Programmes in which the module will be offered**
BSc Hon (Applied Geology) (3710)

**Year level**
8

**Main Outcomes**
On completion of this module, students should be able to:
• Understand the various techniques used to explore for, and discover an economic ore deposit.
• Have an understanding of various geological processes that cause the formation of economic mineral deposits and which may be used to discover a mineral deposit.
• Understand the role of the geologist in an exploration program.
• Have an understanding of the various geological and
geochemical techniques used during an exploration program.
- Have an understanding of the principles of application of geophysics to petroleum and mineral exploration, which include the following methods: Electrical, Magnetic, Density, Seismic, Potential Field, Electromagnetic, Nuclear, Logging Techniques and Tools.
- Will demonstrate an understanding of the principles underlying the selection and design of various geophysical, geochemical and drilling techniques, the execution of an exploration program, and the evaluation and interpretation of geophysical, geochemical and drilling data.
- Be able to start assessing various types of geological data to evaluate the viability of a mineralized area.
- Have an introductory understanding of mineral economics and the forces behind mineral exploration.
- Have an understanding of ore reserve calculations.

### Main Content
- Introduction to Mineral economics
- Geological features and processes related to ore deposits
- Reconnaissance exploration techniques (desk study, remote sensing)
- Exploration techniques (mapping, soil and sediment geochemistry, drilling, geochemical)
- Summary of Common Geophysical Methods,
- Geophysical quantities, geo-mechanical (engineering) properties, logging techniques and tools, subsurface characterization
- Determination of the depth/structure/fractures of bedrock
- Mapping fractures and identifying weak zones within the bedrock
- Exploration data evaluation
- Ore resource modelling
- Ore reserve estimation (tonnage and grade calculations)
- Case studies highlighting the various techniques

### Pre-requisite modules
- APG321 – Economic Geology component

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>70</td>
<td>Lectures p.w.</td>
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<td>Tests &amp; Examinations:</td>
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<tr>
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<tr>
<td>Other:</td>
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<tr>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Earth Sciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Applied Geology</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Applied Geochemistry 724</td>
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<td>APG724</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
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<tr>
<td>Proposed semester to be offered</td>
<td>Second Semester</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hon (Applied Geology) (3710)</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
</tbody>
</table>
| Main Outcomes           | On completion of this module students should be able to: Understand the principles of low temperature geochemical modeling as it relates to:  
  • Eathering and associated products.  
  • Lement speciation in aqueous phase modeling and the influence of redox processes.  
  • Factors controlling mineral stability in aqueous phase.  
  • Adsorption processes.  
  **Demonstrate an understanding of the principles underlying:**  
  • Sample preparation for geochemical analysis; sample digestion, and partial/ selective extraction techniques.  
  • Quality control and quality assurance.  
  • The use of gfaas, xrf & icp-ms in geochemical analysis.  
  **Demonstrate an understanding of the principles underlying:**  
  • The selection and design of various geochemical techniques.  
  • Execution of geochemical exploration programme.  
  • Evaluation and interpretation of geochemical data. | |
| Main Content            |  
  • Sample preparation for geochemical analysis; sample digestion, and partial/ selective extraction techniques  
  • Quality control and quality assurance  
  • The use of GFAAS, XRF & ICP-MS in geochemical analysis.  
  **Low temperature geochemistry covering:**  
  • Chemical weathering and associated products  
  • Aqueous geochemistry: speciation modeling and redox processes  
  • Weathering and mineral stability diagrams.  
  • Adsorption processes  
  **Geochemical prospecting techniques**  
  • Lithogeochemistry  
  • Stream sediment geochemistry  
  • Regolith geochemistry  
  • Biogeochemistry  
  • Evaluation of geochemical data | |
| Pre-requisite modules   | None                                  |
| Co-requisite modules    | None                                  |

401
Prohibited module Combination | None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
</table>

- **Contact with lecturer / tutor:** 60 Lectures p.w. 3
- **Assignments & tasks:** 10 Practicals p.w. 3
- **Practicals:** 60 Tutorials p.w.
- **Tests & Examinations:** 10
- **Selfstudy:** 20
- **Other:** 0

**Total Learning Time:** 200

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty** | Natural Sciences
**Home Department** | Physics and Astronomy
**Module Topic** | Research Project
**Generic Module Name** | Research Project
**Alpha-numeric Code** | ASP701
**NQF Level** | 8
**NQF Credit Value** | 30
**Duration** | Semester

**Programmes in which the module will be offered**
- BSc Hons (Astrophysics) (3793)

**Year level** | 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Conduct a research project in astrophysics
  - Prepare a presentations for communicating research findings.
  - Prepare a report on the research topic
  - Be able to program in Python
  - Work in the Linux environment

**Main Content**
- This module involves a research project done in collaboration with an astrophysics researcher as supervisor.
- Students will need to write a report and give a presentation on their findings.

**Pre-requisite modules** | None
**Co-requisite modules** | None

**Prohibited module Combination** | None

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</tr>
</thead>
</table>

- **Contact with lecturer / tutor:** 28 Lectures p.w. 0
- **Assignments & tasks:** 0 Practicals p.w. 0
- **Practicals:** 0 Tutorials p.w. 0

No Timetable Requirements.
| **Tests & Examinations:** | 2 |
| **Selfstudy:** | 270 |
| **Other:** | 0 |
| **Total Learning Time** | 300 |

**Methods of Student Assessment**
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

**Assessment Module type**
- Final Assessment (FA)

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| **Faculty** | Natural Sciences |
| **Home Department** | Physics and Astronomy |
| **Module Topic** | Topics in Physics |
| **Generic Module Name** | Topics in Physics 702 |
| **Alpha-numeric Code** | ASP702 |
| **NQF Level** | 8 |
| **NQF Credit Value** | 10 |
| **Duration** | Semester |
| **Proposed semester to be offered.** | First Semester |

**Programmes in which the module will be offered**
- BSc Hons (Astrophysics) (3793)

| **Year level** | 7 |

**Main Outcomes**

On completion of this module students should be able to:

**Electromagnetic theory:**
- Apply the general ideas of EM theory in various fields of physics.
- Apply Maxwell’s equations in its application to astronomy.
- Calculate the energy involved in electromagnetic radiation.

**Radiative Transfer**
- Calculate energy levels in simple atoms
- Calculate transitions in atoms relevant to stars

**Main Content**

- Vectors and Tensors
- Maxwell's Equations
- Electromagnetic Waves
- Radiative Processes

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

| **Contact with lecturer / tutor:** | 32 | **Timetable Requirement per week** |
| **Assignments & tasks:** | 10 | Lectures p.w. | 3 |
| **Practicals:** | 0 | Practicals p.w. |
| **Tutorials:** | 0 | Tutorials p.w. | 1 |
| **Tests & Examinations:** | 3 |
| **Selfstudy:** | 55 |
| **Other:** | 0 |
| **Total Learning Time** | 100 |

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)
<table>
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<th>Faculty</th>
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<td>Physics and Astronomy</td>
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<td>Module Topic</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
</tr>
<tr>
<td>Proposed semester to be offered.</td>
<td>First Semester</td>
</tr>
</tbody>
</table>

**Programmes in which the module will be offered**

- BSc Hons (Astrophysics) (3793)

**Year level**

- 7

**Main Outcomes**

- On completion of this module students should be able to:
  - Calculate the properties of stars.
  - Calculate the light output of stars.
  - Calculate the equilibrium conditions in stars.
  - Explain the different types of galaxies.
  - Explain galaxy evolution.
  - Explain the distance scales used in the cosmos.
  - Calculate the expansion of the universe.

**Main Content**

- Introduction to Multi-wavelength astronomy, focused on the research strengths of South Africa, including Stellar Astronomy, Galaxies, Cosmology

**Pre-requisite modules**

- None

**Co-requisite modules**

- None

**Prohibited module Combination**

- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
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<tr>
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**Methods of Student Assessment**

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**

- Continuous and Final Assessment (CFA)
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<thead>
<tr>
<th>Proposed semester to be offered.</th>
<th>First Semester</th>
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<tbody>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Astrophysics) (3793)</td>
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<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:
  - Write programmes to solve astrophysical problems.
  - Fit data using the least square method.
  - Solve differential equations numerically.
  - Find periodicity in data. |
| Main Content | Scientific Programming as it pertains to Astrophysics and Space Science. |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 64 | Lectures p.w. | 2 |
| Assignments & tasks: | 78 | Practicals p.w. | 1 |
| Practicals: | 0 | Tutorials p.w. | 1 |
| Tutorials: | 0 |
| Tests & Examinations: | 3 |
| Selfstudy: | 55 |
| Other: | 0 |
| Total Learning Time | 200 |
| Methods of Student Assessment | Continuous Assessment (CA): 50% |
| Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Stellar Physics |
| Generic Module Name | Stellar Physics 705 |
| Alpha-numeric Code | ASP705 |
| NQF Level | 8 |
| NQF Credit Value | 10 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |
| Programmes in which the module will be offered | BSc Hons (Astrophysics) (3793) |
| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to:
  - Calculate stellar positions.
  - Explain stellar evolution.
  - Explain the detection methods used with modern telescopes. |
| Main Content | Observing Basics
  - Telescopes
  - Detectors
  - Stellar evolution |
### Exoplanets

**Astronomical Data Reduction**

**Pre-requisite modules** None

**Co-requisite modules** None

**Prohibited module Combination** None

<table>
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**Methods of Student Assessment**

Continuous Assessment (CA): 50%

Final Assessment (FA): 50%

**Assessment Module type** Continuous and Final Assessment (CFA)

### Faculty

Natural Sciences

### Home Department

Physics and Astronomy

### Module Topic

 Astrophysical Physics Topics

### Generic Module Name

 Astrophysical Physics Topics 706

### Alpha-numeric Code

ASP706

### NQF Level

8

### NQF Credit Value

10

### Duration

Semester

### Proposed semester to be offered.

Second Semester

### Programmes in which the module will be offered

BSc Hons (Astrophysics) (3793)

### Year level

7

### Main Outcomes

On completion of this module students should be able to:

- Calculate atomic properties.
- Calculate the statistical distributions related to stars and galaxies.
- Describe and calculate the hydrodynamical fluid flow in astrophysics.

### Main Content

- Atomic Physics
- Statistical Mechanics
- Astrophysical Fluid Dynamics

### Pre-requisite modules

None

### Co-requisite modules

None

### Prohibited module Combination

None

<table>
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<tr>
<td>Tests &amp; Examinations:</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Geospace

**Generic Module Name**
- Geospace 707

**Alpha-numeric Code**
- ASP707

**NQF Level**
- 8

**NQF Credit Value**
- 10

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Astrophysics) (3793)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain what is meant by and the characteristics of Geospace
  - Calculate the physical parameters relevant to geospace
  - Describe plasma systems

**Main Content**
- Environment, Dynamics and structure of Geospace
- Physics of the region of space from 50 km above the earth to the sun's magnetopause
- Introduction to plasma physics

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

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**Methods of Student Assessment**
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**Assessment Module type**
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<tbody>
<tr>
<td>Home Department</td>
<td>Physics and Astronomy</td>
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<tr>
<td>Module Topic</td>
<td>General Relativity</td>
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<tr>
<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Apply Special Relativity.</td>
</tr>
<tr>
<td></td>
<td>• Use Curved Manifolds and Spacetime.</td>
</tr>
<tr>
<td></td>
<td>• Use Einstein’s Field Equations.</td>
</tr>
<tr>
<td></td>
<td>• Calculate Gravitational waves.</td>
</tr>
<tr>
<td></td>
<td>• Explain the phenomenon of Black holes.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Einstein’s theory of gravity known as General Relativity</td>
</tr>
<tr>
<td></td>
<td>• Special Relativity.</td>
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<tr>
<td></td>
<td>• Tensors.</td>
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<td>• Tensors in SR.</td>
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<td>• Curved Manifolds and Spacetime.</td>
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<td>• Gravitational waves.</td>
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<td>• Black holes.</td>
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<td>Breakdown of Learning Time</td>
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<td>Total Learning Time</td>
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</tr>
<tr>
<td>Methods of Student Assessment</td>
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</tr>
<tr>
<td></td>
<td>Final Assessment (FA): 50%</td>
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<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Physics and Astronomy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Observational Techniques</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Observational Techniques 709</td>
</tr>
<tr>
<td>Alpha-numeric Code</td>
<td>ASP709</td>
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<td>Semester</td>
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<td>Proposed semester to be offered.</td>
<td>Second Semester</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Astrophysics) (3793)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes    | On completion of this module students should be able to:  
|                  | - Calculate stellar positions  
|                  | - Explain how telescopes work and operate  
|                  | - Explain the detection methods used with modern telescopes. |
| Main Content     | Basics Observational Techniques  
|                  | Telescopes  
|                  | Detectors  
|                  | Photometry  
|                  | Virtual Observatory  
|                  | Near Infrared Techniques  
|                  | Polarimetry  
|                  | Radio telescopes  
|                  | Radio interferometry  
|                  | Aperture synthesis  
|                  | Astronomical Data Reduction  
|                  | SALT |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 32 | Lectures p.w. | 3 |
| Assignments & tasks: | 10 | Practicals p.w. |
| Practicals: | 0 | Tutorials p.w. | 1 |
| Tutorials: | 0 | |
| Tests & Examinations: | 3 | |
| Selfstudy: | 55 | |
| Other: | 0 | |
| Total Learning Time | 100 |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
|                  | Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Cosmology |
| Generic Module Name | Cosmology 710 |
| Alpha-numeric Code | ASP710 |
| NQF Level | 8 |
| NQF Credit Value | 10 |
| Duration | Semester |
| Proposed semester to be offered. | Second Semester |
| Programmes in which the module will be offered | BSc Hons (Astrophysics) (3793) |
| Year level | 8 |
| Main Outcomes | On completion of this module students should be able to:  
  - Calculate geometric aspects of the universe.  
  - Explain the measurement, origin and structure of the cosmic wave background.  
  - Describe the large scale structure of the universe. |
| Main Content |  
  - Geometry  
  - Observational parameters  
  - Cosmic Wave Background  
  - Early Universe  
  - Large scale structures  
  - Baryon acoustic oscillations and dark energy |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| **Contact with lecturer / tutor:** | 32 | Lectures p.w. | 3 |
| **Assignments & tasks:** | 10 | Practicals p.w. |
| **Practicals:** | 0 | Tutorials p.w. | 1 |
| **Tests & Examinations:** | 3 | |
| **Tutorials:** | |
| **Selfstudy:** | 55 | |
| **Other:** | 0 | |
| **Total Learning Time** | **100** | |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Space Science Topics |
| Generic Module Name | Space Science Topics 711 |
| Alpha-numeric Code | ASP711 |
| NQF Level | 8 |
| NQF Credit Value | 20 |
| Duration | Semester |
| Proposed semester to be offered. | Second Semester |
| Programmes in which the module will be offered | BSc Hons (Astrophysics) (3793) |
| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to:  
  - Explain the important aspects in Space weather  
  - Calculate the wave behaviour in the solar wind and the magnetosphere  
  - Explain the dynamics of solar flares |
| Main Content |  
  - Space Technology  
  - Space Weather  
  - Plasma Physics  
  - Fluid Dynamics  
  - Solar Physics |
### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
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<tr>
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<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Lectures p.w. 3</td>
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</tr>
<tr>
<td>Practicals p.w. 0</td>
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<tr>
<td>Tutorials p.w. 1</td>
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</tbody>
</table>

### Contact with lecturer / tutor:
64 Lectures p.w.

### Assignments & tasks:
33 Practicals p.w.

### Self-study:
113

### Tutorials:
1 Tutorials p.w.

### Tests & Examinations:
3

### Total Learning Time
200

### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Physics and Astronomy

### Module Topic
Advanced Topics in Astrophysics

### Generic Module Name
Advanced Topics in Astrophysics 712

### Alpha-numeric Code
ASP712

### NQF Level
8

### NQF Credit Value
20

### Duration
Semester

### Proposed semester to be offered.
Second Semester

### Programmes in which the module will be offered
BSc Hons (Astrophysics) (3793)

### Year level
7

### Main Outcomes
On completion of this module students should be able to:
- Describe issues around galaxy formation.
- Explain the evolution of galaxies.

### Main Content
- This module will contain topics of research interest to the researchers who are available locally as well as visitors.
- The content will depend on the research expertise of these researchers, but galaxy formation and evolutions will be emphasized.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Lectures p.w.</td>
<td>64</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Practicals p.w.</td>
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<td></td>
</tr>
<tr>
<td>Tutorials p.w.</td>
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<tr>
<td>------------------------</td>
<td>---</td>
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</tr>
<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
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</tr>
<tr>
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</tr>
<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Electrodynamics

**Generic Module Name**
- Electrodynamics 713

**Alpha-numeric Code**
- ASP713

**NQF Level**
- 8

**NQF Credit Value**
- 10

**Duration**
- Year

**Proposed semester to be offered.**
- Both Semesters

**Programmes in which the module will be offered**
- BSc Hons (Astrophysics) (3793)

**Year level**
- 7

**Faculty**
- On completion of this module students should be able to:
  - Do calculations using Vectors and Tensors.
  - Apply Maxwell’s equations for simple systems to find fields.
  - Calculate the properties of electromagnetic waves, electromagnetic energy and momentum.
  - Obtain the paths for charged particles in fields.
  - Calculate the radiative processes that take place in antennas.

**Main Content**
- Vectors and Tensors
- Maxwell's Equations
- Electromagnetic Waves
- Relativity and Electromagnetism
- Electromagnetic energy and momentum
- Single particle motion
- Radiative Processes
- Antennas

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**
<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>32</td>
<td>Lectures p.w. 3</td>
</tr>
<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
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<td>Practicals p.w.</td>
</tr>
<tr>
<td><strong>Practicals:</strong></td>
<td>0</td>
<td>Tutorials p.w. 1</td>
</tr>
</tbody>
</table>
### Module Information

| **Tutorials:** | 0 |
| **Tests & Examinations:** | 3 |
| **Selfstudy:** | 65 |
| **Other:** | 0 |
| **Total Learning Time** | 110 |

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

### Faculty & Department Information

- **Faculty**: Natural Sciences
- **Home Department**: Biodiversity and Conservation Biology
- **Module Topic**: Research Project
- **Generic Module Name**: Research Project 700
- **Alpha-numeric Code**: BCB700
- **NQF Level**: 8
- **NQF Credit Value**: 40
- **Duration**: Year
- **Proposed semester to be offered**: Both Semesters
- **Programmes in which the module will be offered**: BSc Hons (Biodiversity and Conservation Biology) (3731)
- **Year level**: 7

### Main Outcomes

- Execute research under supervision.
- Formulate research question/s.
- Review the appropriate literature and contextualize a study.
- Collect field and/or lab data.
- Statistically analyse data.
- Summarise data in tabular/graphic format.
- Interpret data in the context of the literature and the research question/s.
- Communicate research findings in oral and written formats.

### Main Content

- Subject specific, depending upon the topics offered by staff in any one year.

### Pre-requisite modules

- None

### Co-requisite modules

- None

### Prohibited module

- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th><strong>Hours</strong></th>
<th><strong>Timetable Requirement per week</strong></th>
<th><strong>Other teaching modes that does not require time-table</strong></th>
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<td>Practicals p.w.</td>
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<td><strong>Tests &amp; Examinations:</strong></td>
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**Methods of Student Assessment**
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- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)
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<tr>
<td>Module Topic</td>
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<td>Second Semester</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Find taxonomic information by selecting appropriate taxonomic treatments or revisions for a particular group of organisms.</td>
</tr>
<tr>
<td></td>
<td>• Understand species concepts related to angiosperm and animal diversity.</td>
</tr>
<tr>
<td></td>
<td>• Understand the links between zoological and botanical nomenclature, and the conservation of those organisms.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate competence in basic laboratory techniques including dna extraction, amplification, and sequencing.</td>
</tr>
<tr>
<td></td>
<td>• Perform and present appropriate data analyses.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Diversity and evolution of Cape Flora</td>
</tr>
<tr>
<td></td>
<td>• Diversity of plant and animal families in South Africa</td>
</tr>
<tr>
<td></td>
<td>• Conservation of taxa with special emphasis on Red Data Species</td>
</tr>
<tr>
<td></td>
<td>• Modern species concepts and classification</td>
</tr>
<tr>
<td></td>
<td>• Botanical and Zoological nomenclature</td>
</tr>
<tr>
<td></td>
<td>• Electronic keys and descriptive databases</td>
</tr>
<tr>
<td></td>
<td>• Plant and animal classification</td>
</tr>
<tr>
<td></td>
<td>• Sources of taxonomic information</td>
</tr>
<tr>
<td></td>
<td>• Evolutionary and ecological processes maintaining species diversity</td>
</tr>
<tr>
<td></td>
<td>• Herbarium/museum curating techniques and Flora writing</td>
</tr>
<tr>
<td></td>
<td>• Molecular systematic techniques and analyses</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
<td>A BSc with Botany and/or Zoology as major subject areas, or an equivalent qualification.</td>
</tr>
<tr>
<td>Co-requisite modules</td>
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<td>Prohibited module Combination</td>
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<td>Breakdown of Learning Time</td>
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<td><strong>Tests &amp; Examinations:</strong></td>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous Assessment (CA)</td>
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| **Faculty** | Natural Sciences |  |  |
| **Home Department** | Biodiversity and Conservation Biology |  |  |
| **Module Topic** | Biodiversity Information Management |  |  |
| **Generic Module Name** | Biodiversity Information Management |  |  |
| **Alpha-numeric Code** | BCB736 |  |  |
| **NQF Level** | 8 |  |  |
| **NQF Credit Value** | 20 |  |  |
| **Duration** | Semester |  |  |
| **Proposed semester to be offered.** | Second Semester |  |  |
| **Programmes in which the module will be offered** | BSc Hons (Biodiversity & Conservation Biology) (3731) |  |  |
| **Year level** | 7 |  |  |
| **Main Outcomes** | On completion of this module students should be able to:  
  • Analyse spatial information and derive patterns.  
  • Spatially model information for the management of natural resources and prediction of landscape processes.  
  • Compile a self-executing installation CD/DVD of spatial data with a viewer to explore the data, complete with compiled meta-data and help facilities.  
  • Evaluate the requirements for developing a biodiversity/taxonomic database. |  |  |
| **Main Content** |  
  • Geographical Information Systems (GIS) and remote-sensing;  
  • Mapping using a Global Positioning System (GPS) and analysis of this data;  
  • Digitizing using online resources;  
  • Geostatistics and spatial interpolations for modeling point data;  
  • Use of spatial data to develop species distribution data and to define meta-populations and identify species with conservation-critical distributions;  
  • General Internet mapping ;  
  • Classification of satellite imagery (supervised, unsupervised and object-based approaches);  
  • Development principles of a biodiversity/taxonomic database. |  |  |
| **Pre-requisite modules** | None |  |  |
| **Co-requisite modules** | None |  |  |
| **Prohibited module Combination** | None |  |  |
| **Breakdown of Learning Time** |  |  |  |
| **Contact with lecturer / tutor:** | 40 | Lectures p.w. | 4 |
| **Assignments & tasks:** | 45 | Practicals p.w. | 4 |

415
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)

**Faculty**
- Natural Sciences

**Home Department**
- Biodiversity and Conservation Biology

**Module Topic**
- Analysis of the major vegetation types in the Fynbos Biome

**Generic Module Name**
- Plant Community Ecology Field Course

**Alpha-numeric Code**
- BCB737

**NQF Level**
- 8

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- BSc Hons (Biodiversity & Conservation Biology) (3731)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Compare the different vegetation types in the Fynbos Biome, using basic ordination and classification techniques applicable to these vegetation types.
  - Examine and critically evaluate the factors driving the similarities and differences in these vegetation types.

**Main Content**
- Investigation of the following vegetation types:
  - Afromontain forest; Thicket;
  - Renosterveld;
  - Succulent Karoo; and Fynbos.
  - In addition, analytical techniques applicable to the Fynbos Biome and reviews and synthesis of the relevant literature will form core components of this field module.

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Contact with lecturer / tutor</th>
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<th>Lectures p.w.</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**
- Continuous and Final Assessment (CFA)
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<td>Biodiversity and Conservation Biology</td>
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<td>Module Topic</td>
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<td>Duration</td>
<td>Semester</td>
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<td>First Semester</td>
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<td>BSc Hons (Biodiversity &amp; Conservation Biology) (3731)</td>
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<tr>
<td>Year level</td>
<td>7</td>
</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Read and understand the relevant literature.</td>
</tr>
<tr>
<td></td>
<td>• Design and execute simple marine biological field studies.</td>
</tr>
<tr>
<td></td>
<td>• Analyse simple field data.</td>
</tr>
<tr>
<td></td>
<td>• Write a professional research report on a marine biological topic.</td>
</tr>
<tr>
<td>Main Content</td>
<td>The course is a blend of practical field work, structured discussion classes and research in the field of pelagic and benthic ecology.</td>
</tr>
<tr>
<td></td>
<td><strong>Topics include:</strong></td>
</tr>
<tr>
<td></td>
<td>• Introductory physical and chemical oceanography;</td>
</tr>
<tr>
<td></td>
<td>• The role that the physical environment plays in shaping pelagic organisms (from individuals to communities);</td>
</tr>
<tr>
<td></td>
<td>• The natural and not so natural factors affecting the diversity and functioning of pelagic ecosystems; and the role of biological interactions in structuring the communities of rocky intertidal habitats.</td>
</tr>
<tr>
<td></td>
<td>The emphasis throughout, will be on Southern Africa.</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
<td>None</td>
</tr>
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<td>Faculty</td>
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<td>Home Department</td>
<td>Biodiversity and Conservation Biology</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Herpetological evolution, Ecology, and Conservation</td>
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<td>Alpha-numeric Code</td>
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<td>First Semester</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Biodiversity &amp; Conservation Biology) (3731)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes       | On completion of this module students should be able to:
<p>|                     | - Converse competently regarding herpetological diversity, evolution, ecology, and conservation. |
|                     | - Contribute novel virtual museum data to an appropriate national database. |
|                     | - Gather appropriate herpetological data in the field as part of a group. |
|                     | - Analyse, present and report herpetological research. |
| Main Content        | Evolution of tetrapods. |
|                     | Systematics of reptiles and amphibians. |
|                     | Natural history and ecology of reptiles and amphibians. |
|                     | Conservation of southern African and global herpetofaunal populations. |
|                     | Current herpetological science trends. |
|                     | Field survey, data collection, data analysis, and professional research writing. |
| Pre-requisite modules | None                                    |
| Co-requisite modules | None                                    |
| Prohibited module   | None                                    |
| Combination         | None                                    |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 30 | Lectures p.w. | 3 |
| Assignments &amp; tasks: | 65 | Practicals p.w. | 1 |
| Practicals:         | 80 | Tutorials p.w. | 0 |
| Tutorials:          | 0 |                                             |
| Tests &amp; Examinations: | 5 |                                             |
| Selfstudy:          | 20 |                                             |
| Other:              | 0 |                                             |
| Total Learning Time | 200 |                                             |
| Methods of Student Assessment | Continuous Assessment (CA):100% Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |</p>
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<tbody>
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<tr>
<td>Module Topic</td>
<td>Introduction to research techniques, planning, execution, and presentation.</td>
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<td>Research Method</td>
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<td>Duration</td>
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<td>First Semester</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>- Plan and execute a research project.</td>
</tr>
<tr>
<td></td>
<td>- Interpret research data and research literature.</td>
</tr>
<tr>
<td></td>
<td>- Write-up research material for submission as a scientific paper.</td>
</tr>
<tr>
<td></td>
<td>- Communicate research findings orally and in a poster format.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Introduction to sampling design, research techniques, instruments, and laboratory safety.</td>
</tr>
<tr>
<td></td>
<td>Developing a project proposal and planning field research.</td>
</tr>
<tr>
<td></td>
<td>Presentation of data as tables and figures.</td>
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<td>Reading and writing skills and interpreting scientific data.</td>
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<tr>
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<td>Preparing and presenting a scientific oral and poster presentation.</td>
</tr>
<tr>
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<td>Preparation of scientific research for publication.</td>
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<td>Assessment Module type</td>
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Faculty                     | Natural Sciences                                      |
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<td>Module Topic</td>
<td>Quantitative Assessment of Ecological Hypotheses</td>
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<td>Year level</td>
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</table>

**Main Outcomes**

On completion of this module students should be able to:

- Understand the concepts of alpha, beta and gamma diversity.
- Know and understand the current hypotheses that attempt to explain species assembly processes in space and time (e.g. Neutral and niche mechanisms).
- Be able to collect ecological data at the appropriate scale, which would lend themselves to a quantitative analysis of points 1 and 2, above.
- Be able to use the r software and associated packages to undertake the analyses required in point 3, above.
- Be able to interpret the outcomes of the above analyses and use it to quantitatively characterise points 1 and 2, above.
- Be able to communicate the findings by written and oral means.

**Main Content**

- Core theoretical framework: ecological hypotheses underlying the processes of species assembly in space and time, including neutral and niche-based mechanisms, and historical events; overview of the currently known and understood distributional patterns of major groups of organisms at global, regional and local scales; consideration of sampling designs aimed at capturing these patterns and drivers so as to arrive at a processed based understanding of species assembly.
- Field-activities: data collection aimed at a quantitative test of the relevant hypotheses, above.
- Statistical/software competence: the management and analysis of ecological data; reproducible and collaborative research; the use of R as a tool for the analysis multivariate ecological data; multivariate techniques such as nMDS, PCA, RDA and cluster analysis; graphical data summaries and visualisations.

**Pre-requisite modules**

BCB744 (Biostatistics)

**Co-requisite modules**

None

**Prohibited module combination**

None

**Breakdown of Learning Time**

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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)

**Faculty**
- Natural Sciences

**Home Department**
- Biodiversity and Conservation Biology

**Module Topic**
- Quantitative Assessment of Ecological Hypotheses

**Generic Module Name**
- Quantitative Ecology

**Alpha-numeric Code**
- BCB743

**NQF Level**
- 8

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- BSc Hons (Biodiversity & Conservation Biology) (3731)

**Year level**
- 7

**Main Outcomes**

- On completion of this module students should be able to:
  - Understand the concepts of alpha, beta and gamma diversity.
  - Know and understand the current hypotheses that attempt to explain species assembly processes in space and time (e.g. Neutral and niche mechanisms).
  - Be able to collect ecological data at the appropriate scale, which would lend themselves to a quantitative analysis of points 1 and 2, above.
  - Be able to use the R software and associated packages to undertake the analyses required in point 3, above.
  - Be able to interpret the outcomes of the above analyses and use it to quantitatively characterise points 1 and 2, above.
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**Main Content**

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  - Field-activities: data collection aimed at a quantitative test of the relevant hypotheses, above.
  - Statistical/software competence: the management and analysis of ecological data; reproducible and collaborative research; the use of R as a tool for the
analysis multivariate ecological data; multivariate techniques such as nMDS, PCA, RDA and cluster analysis; graphical data summaries and visualisations.

### Pre-requisite modules
- BCB744 (Biostatistics)

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
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<tr>
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### Methods of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

### Assessment Module type
Continuous Assessment (CA)

### Faculty
- Natural Sciences

### Home Department
- Biodiversity and Conservation Biology

### Module Topic
- An Introduction to Biostatistics

### Generic Module Name
- Biostatistics

### Alpha-numeric Code
- BCB744

### NQF Level
- 8

### NQF Credit Value
- 20

### Duration
- Semester

### Proposed semester to be offered.
- First Semester

### Programmes in which the module will be offered
- BSc Hons (Biodiversity & Conservation Biology) (3731)

### Year level
- 7

### Main Outcomes
- On completion of this module students should be able to:
  - Design basic experiments.
  - Manage data.
  - Use appropriate proprietary and open-source software to analyse data.

### Main Content
- Training and skills development with appropriate analytical software including SPSS and R.
- Data management.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
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<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)

**Faculty**
- Natural Sciences

**Home Department**
- Biotechnology

**Module Topic**
- Molecular Biology and Bioinformatics Practical

**Generic Module Name**
- Molecular Biology and Bioinformatics Practical

**Alpha-numeric Code**
- BTY701

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered.**
- First semester

**Programmes in which the module will be offered**
- BSc Hons (Biotechnology) (3707)

**Year level**
- 7

**Main outcomes**
- On completion of this module, students should be able to:
  - Practical and technical experience.
  - Laboratory safety knowhow.
  - Scientific presentation skills.
  - Scientific writing skills.

**Main content**
- Molecular basis of viral vector technologies
- Types of viral vectors
- Viral vectors for vaccine delivery
- Viral vectors for gene therapy
- Molecular biology practical component

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

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**Methods of Student Assessment**
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**
- Continuous and Final Assessment (CFA)
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<td>Biotechnology</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Literature Review</td>
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<tr>
<td>Main outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Basic scientific writing skills.</td>
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<tr>
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<td>• Scientific sentence construction.</td>
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<td>• How to perform a literature survey.</td>
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<td>• Literature preparation for research project.</td>
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<tr>
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<td>• Literature survey</td>
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<td>Home Department</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Research Project</td>
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<td>BTY703</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Biotechnology) (3707)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main outcomes | On completion of this module students should be able to:  
| | • Preparation of research proposal.  
| | • Conducting laboratory experiments.  
| | • Scientific presentation skills.  
| | • Statistical data analysis.  
| | • Constructing a mini-thesis. |
| Main content | • Biotechnology research project  
| | • Scientific methodology  
| | • Scientific writing  
| | • Research article preparation  
| | • Data analysis  
| | • Laboratory training  
| | • Health and safety training  
| | • Chemical safety training |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | | |
| | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 0 | Lectures p.w. | 0 | No Timetable Requirements. |
| Assignments & tasks: | 0 | Practicals p.w. | 0 | |
| Practicals: | 0 | Tutorials p.w. | 0 | |
| Tests & Examinations: | 0 | | | |
| Selfstudy: | 56 | | | |
| Other: | 100 | | | |
| Total Learning Time | 400 | | | |
| Methods of Student Assessment | Continuous Assessment (CA): 100%  
| | Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |

**Faculty** | Natural Sciences  
**Home Department** | Biotechnology  
**Module Topic** | Advances in Plant Science  
**Generic Module Name** | BTY704  
**Alpha-numeric Code** | BTY704  
**NQF Level** | 8  
**NQF Credit Value** | 10  
**Duration** | Semester  
**Proposed semester to be offered.** | First Semester  
**Programmes in which the module will be offered** | BSc Hons (Biotechnology) (3707)  

| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to:  
| | • Plant transformation and regeneration.  
| | • The mechanisms and regulation of plant gene expression.  
| | • Plant stress signaling. |
| Main Content | • Transformation and regeneration of plants  
| | • Expression systems and gene suppression  
| | • Disease and pest (fungi, virus, bacteria, insect) |
resistance
• Molecular tools for plant breeding
• Crop modification and improvement

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<th>60% Pass Average Geology Third Year</th>
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<th>Timetable Requirement per week</th>
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<tr>
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<th>On completion of this module students should be able to:</th>
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<tbody>
<tr>
<td></td>
<td>• Overview of the need for drug discovery, its costs and time-course.</td>
</tr>
<tr>
<td></td>
<td>• Strategies for drug target identification: disease studies, genomics, bioinformatics, proteomics,</td>
</tr>
<tr>
<td></td>
<td>• Strategies for drug discovery; natural products chemistry, combinatorial chemistry, molecular modeling</td>
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<tr>
<td></td>
<td>• Effect of variation in human systems on responses to drugs – pharmacogenomics.</td>
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</table>

<table>
<thead>
<tr>
<th>Main content</th>
<th>• Review of pharmaceutical industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Strategies for candidate drug identification; natural products, combinatorial chemistry, molecular selection and evolution, high throughput screening.</td>
</tr>
<tr>
<td></td>
<td>• Role of clinical trial systems.</td>
</tr>
<tr>
<td></td>
<td>• Impact of pharmacogenomics on drug use and discovery in the future.</td>
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## Module Information

### Faculty
Natural Sciences

### Home Department
Biotechnology

### Module Topic
Extremophiles; Ecology, Microbiology and Biotechnology

### Generic Module Name
Biotechnology 706

### Alpha-numeric Code
BTY706

### NQF Level
8

### NQF Credit Value
10

### Duration
Year

### Proposed semester to be offered.
Both Semesters

### Programmes in which the module will be offered
BSc Hons (Biotechnology) (3707)

### Year level
7

### Main outcomes
On completion of this module students should be able to:
- A detailed understanding of the molecular basis of extremophilism and the diversity of extremophiles (including thermophiles, psychrophiles, acidophiles, alkaliophiles, halophiles, barophiles).
- Familiarity with recent review and research literature in the subject area.
- Information on applications of Bacterial and Archaeal extremophiles in biotechnology.

### Main content
- Diversity of extremophiles
- Adaptations to extreme environments
- Community interactions and analysis
- Applications of extremophiles and their products

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)
### Faculty
- **Natural Sciences**

### Home Department
- **Biotechnology**

### Module Topic
- **Plant Breeding and Markers**

### Generic Module Name
- **Plant Breeding and Markers 708**

### Alpha-numeric Code
- **BTY708**

### NQF Level
- **8**

### NQF Credit Value
- **10**

### Duration
- **Year**

### Proposed semester to be offered.
- **Both Semesters**

### Programmes in which the module will be offered
- **BSc Hons (Biotechnology) (3707)**

### Year level
- **7**

### Main outcomes
- On completion of this module, students should be able to:
  - The generation and use of molecular markers in plant breeding, in particular, pome fruit breeding.

### Main content
- Classical plant breeding strategies,
- Basic genetics of pome fruit,
- Basic plant physiology and molecular techniques for marker generation.

### Pre-requisite modules
- None

### Co-requisite modules
- None

### Prohibited module combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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### Methods of Student Assessment
- **Continuous Assessment (CA): 50%**
- **Final Assessment (FA): 50%**

### Assessment Module type
- Continuous and Final Assessment (CFA)

---

### Faculty
- **Natural Sciences**

### Home Department
- **Biotechnology**

### Module Topic
- **Genomics and Molecular Genetics**

### Generic Module Name
- **Biotechnology**

### Alpha-numeric Code
- **BTY709**
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<td></td>
<td>• Fundamental understanding of genes and chromosomes.</td>
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<tr>
<td></td>
<td>• Features of the genome.</td>
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<tr>
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<td>• Mapping of the genome.</td>
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<td></td>
<td>• Human genetic diseases.</td>
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<tr>
<td>Main content</td>
<td>DNA and chromosome structure, organization and function</td>
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<tr>
<td></td>
<td>• Genes in pedigrees</td>
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<td>• Physical and genetic mapping</td>
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<td>• Mutations and instability of DNA</td>
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<td>• Selected genome projects</td>
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<td>• Selected genetic diseases</td>
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<td>Hours</td>
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<tr>
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<td>Biotechnology</td>
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<td>Module Topic</td>
<td>Apoptosis</td>
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<td>Year level</td>
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</table>
| **Main Outcomes** | On completion of this module students should be able to:  
- A sound knowledge of cell growth control.  
- Interpret scientific literature regarding the cell cycle and the role of cell signaling in the control aspects of the cell cycle.  
- Know about different types of cell death, including apoptosis and the induction of apoptosis by various mechanisms.  
- Gain knowledge on the role of apoptosis in tumourigenesis. |
| **Main Content** |  
- **The Cell Cycle**  
  - Checkpoints in the cell cycle  
  - Cyclin-dependent kinases  
  - Inhibitors of cyclin-dependent kinase  
- **Cell Death Pathways**  
  - Necrosis, Apoptosis, atrophy and terminal differentiation, genetic control of programmed cell death  
- **Apoptosis and disease** |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module | None |
| Combination Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer: / tutor: | 12 | Lectures p.w. | 2 |
| Assignments & tasks: | 34 | Practicals p.w. | 0 |
| Practicals: | 0 | Tutorials p.w. | 0 |
| Tutorials: | 0 | | |
| Tests & Examinations: | 0 | | |
| Selfstudy: | 54 | | |
| Other: | 0 | | |
| **Total Learning Time** | **100** | | |
| **Methods of Student Assessment** | Continuous Assessment (CA): 60% |
| | Final Assessment (FA):40% |
| **Assessment Module type** | Continuous and Final Assessment (CFA) |

**Faculty**: Natural Sciences  
**Home Department**: Biotechnology  
**Module Topic**: Advanced Food Microbiology  
**Generic Module Name**: Biotechnology 711  
**Alpha-numeric Code**: BTY711  
**NQF Level**: 8  
**NQF Credit Value**: 10  
**Duration**: Term  
**Proposed semester to be offered**: Term 3 or Term 4  
**Programmes in which the module will be offered**: BSc Hons (Biotechnology) (3707)
## Year level
7

### Main outcomes
On completion of this module students should be able to:
- A detailed understanding of the molecular basis of detection of pathogens in complex food samples.
- Familiarity with recent review and research literature in the subject area.
- Information on applications of HACCP and other food safety management tools.
- Microbial control and quality.
- Problem solving and sanitation.

### Main content
- Diversity of food borne microorganisms
- Adaptations to food environments
- Food borne pathogens
- Management of food safety

### Pre-requisite modules
None

### Co-requisite modules
None

### Breakdown of Learning Time

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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

---

### Faculty
Natural Sciences

### Home Department
Biotechnology

### Module Topic
Forensic DNA Analysis

### Generic Module Name
Forensic DNA Analysis 714

### Alpha-numeric Code
BTY714

### NQF Level
8

### NQF Credit Value
10

### Duration
Year

### Proposed semester to be offered.
Both Semesters

### Programmes in which the module will be offered
BSc Hons (Biotechnology) (3707)

### Year level
7

### Main outcomes
On completion of this module students should be able to:
- Understand the scientific basis of DNA typing.
- Have detailed knowledge of forensic DNA typing systems.
- Understand the procedures used in forensic DNA analysis: DNA isolation, determining quantity & quality of DNA, RFLP analysis, PCR amplification, analysis of PCR
products, automated analysis systems.
- Interpret DNA typing results when there are many complicating factors: multiple contributors, DNA degradation, extraneous substances, and system-specific interpretational issues.
- Assess the strength of forensic evidence: determination of genetic concordance, evaluation of results, frequency estimation calculations, population substructure, and likelihood ratios.

### Main content

**Introduction:**
- What is forensics
- The criminal justice system

**Working with the dead:**
- Time of death, decomposition & fire, events at death.
- Forensic archaeology & excavation of human remains
- Osteobiography

**Working with the living:**
- The nature of physical evidence
- The scientific basis of DNA typing
- An overview of forensic DNA typing systems
- Procedures for forensic DNA analysis
- Interpretation of DNA typing results.
- Assessing the strength of forensic evidence

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)
Main outcomes
On completion of this module students should be able to:

- Understand the basics of X-ray crystallography and NMR spectroscopy to a level sufficient to complete projects offered in these areas at UWC.

Main content

**X-ray crystallography (2 weeks)**
- Basics of X-ray diffraction
- Protein structure determination using X-ray diffraction

**NMR spectroscopy (2 weeks)**
- Basics of NMR spectroscopy
- Characterisation of protein samples
- Interaction studies using NMR
- Protein structure determination using NMR

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per Week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment

- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

### Assessment Module type
Continuous and Final Assessment (CFA)
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |

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| Methods of Student Assessment | Continuous Assessment (CA): 100% |
| Assessment Module type | Continuous Assessment (CA) |

**Faculty**
Natural Sciences

**Home Department**
Biotechnology

**Module Topic**
Proteomics

**Generic Module Name**
Proteomics 718

**Alpha-numeric Code**
BTY718

**NQF Level**
8

**NQF Credit Value**
10

**Duration**
Year

**Proposed semester to be offered.**
Both Semesters

**Programmes in which the module will be offered**
BSc Hons (Biotechnology) (3707)

**Year level**
8

**Main outcomes**
On completion of this module, students should be able to:
- Understanding of the various aspects of Proteomics such as experimental design, sample preparations, quantification, separation, comparative analysis, identification etc.
- Also learning Proteomics as a broad research tool and its various applications in molecular biology research particularly in plant biotechnology and medical research.

**Main content**

**Proteomics Phase 1** (Week 1)
- Proteomics definition, background and principle
- Protein sample preparation for proteomics studies
- Protein quantification methods
- Protein separation methods

**Proteomics Phase 2** (Week 2)
- Protein staining approaches (gel based)
- Sample comparative analysis (gel based)
- Protein staining approaches (non-gel based)
- Sample comparative analysis (non-gel based)

**Proteomics Phase 3** (Week 3)
- Protein Identification methods (mass spectrometry)

**Proteomics Phase 4** (Week 4)
- Proteomics applications
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Biotechnology

**Module Topic**
- Biofuels

**Generic Module Name**
- Biofuels 719

**Alpha-numeric Code**
- BTY719

**NQF Level**
- 8

**NQF Credit Value**
- 10

**Duration**
- Year

**Proposed semester to be offered.**
- Both Semesters

**Programmes in which the module will be offered**
- BSc Hons (Biotechnology) (3707)

**Year level**
- 7

**Main outcomes**
- On completion of this module students should be able to:
  - An understanding of the types of biofuels available and currently in development.
  - Knowledge of the various aspects of the biofuels value chain and how each step requires improvement.
  - An appreciation of the current state of the art in first and second generation biofuels.
  - Knowledge of how metabolic engineering and pretreatment methods are being used to improve biofuel yields and decrease costs of biofuel production.

**Main content**
- Types of biofuels including first generation and second generation biofuels
- Analysis of the entire biofuels value chain from feedstock to fuel and energy
- Biodiesel, biogas and bioethanol: current state of the art
- The prospect of algae in fuel production
- Biomass pretreatment and hydrolysis
- Improvement of state of the art technologies: metabolic engineering to achieve consolidated bioprocessing
- Next generation technologies and drop-in fuels
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Total Learning Time: 100

Methods of Student Assessment:
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

Assessment Module type: Continuous and Final Assessment (CFA)

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<td>Year level</td>
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</table>

Main outcomes:
- Understand the main concepts in evolutionary genetics and genetic record of the past.
- Explain the current methods for discovering and assaying human genome diversity, and making inferences from this observed diversity.
- Analyze information on use of genetic evidence to trace the populating of the earth by our human ancestors.
- Understand the functional consequences of human genetic diversity for health and disease.

Main content:
- Introduction to evolutionary genetics.
- Discovering and assaying human genetic diversity.
- Making inferences from genetic diversity.
- Finding and typing single nucleotide polymorphisms (SNP).
- Use of genetic evidence to trace the origins of modern humans and the populating of the earth.
- Y chromosome and mitochondrial DNA phylogenies.
- Finding genes and specific genetic variants responsible for disease and drug response.
- Pharmacogenetics and personalized medicine.

Pre-requisite modules: None
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**Faculty** | Natural Sciences
---|---
**Home Department** | Biotechnology
**Module Topic** | Molecular Mechanisms of Cancer
**Generic Module Name** | Molecular Mechanisms of Cancer
**Alpha-numeric Code** | BTY721
**NQF Level** | 8
**NQF Credit Value** | 10
**Duration** | Semester
**Proposed semester to be offered.** | First Semester
**Programmes in which the module will be offered** | BSc Hons (Biotechnology) (3707)
**Level** | 7
**Main Outcomes** | On completion of this module students should be able to:
| | • The basic manifestations of cancer.
| | • The development of the field of cancer research during the 20th century.
| | • The roles of oncogenes and tumour suppressors in its regulation.

**Main Content** | • The Nature of Cancer
| | • Tumour Viruses
| | • Cellular Oncogenes
| | • Growth Factors and their Receptors
| | • Cytoplasmic Signalling Circuitry
| | • Tumour Suppressor Genes
| | • pRb and Control of the Cell Cycle
| | • p53 and Apoptosis

**Pre-requisite modules** | None
**Co-requisite modules** | None
**Prohibited module Combination** | None
<p>| <strong>Breakdown of Learning Time</strong> | <strong>Hours</strong> | <strong>Timetable Requirement per week</strong> | <strong>Other teaching modes that does not require time-table</strong> |
| Contact with lecturer / tutor: | 16 | Lectures p.w. | 2 |
| Assignments &amp; tasks: | 30 | Practicals p.w. | 0 |</p>
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**Total Learning Time**: 100

**Methods of Student Assessment**
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Biotechnology

**Module Topic**
- Application of Next Generation Sequencing in Biotechnology

**Generic Module Name**
- Next Generation Sequencing 722

**Alpha-numeric Code**
- BTY722

**NQF Level**
- 8

**NQF Credit Value**
- 10

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Biotechnology) (3707)

**Year level**
- 8

**Main outcomes**
- On completion of this module students should be able to:
  - An understanding of the various sequencing technologies available.
  - Been exposed to novel applications of sequencing technology in the biotechnology industry.

**Main content**
- Overview of sequencing technology – Sanger, 454, Illumina and Ion Torrent
- Sequencing in genomics and metagenomics.
- Applications in transcriptomics.
- Applications in viromics for studying gene delivery systems.
- Future applications in metabolomics.

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

<table>
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**Total Learning Time**: 100

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)
**Faculty** | Natural Sciences  
---|---  
**Home Department** | Chemistry  
**Module Topic** | Analytical Chemistry  
**Generic Module Name** | Chemistry 701  
**Alpha-numeric Code** | CHM701  
**NQF Level** | 8  
**NQF Credit Value** | 15  
**Duration** | Semester  
**Proposed semester to be offered.** | First Semester  
**Programmes in which the module will be offered** | BSc Hons (Chemistry) (3734)  
**Year level** | 7

**Main Outcomes**  
On completion of this module students should be able to:  
- Apply the methods of mass spectroscopy (MS), nuclear magnetic resonance (NMR) spectroscopy, graphite furnace atomic absorption spectrometry (GF-AAS) and inductively coupled plasma atomic emission spectrometry (ICP-AES) to collect, analyse and interpret analytical data, for either qualitative and/or quantitative purposes.  
- Apply the principles of mass spectroscopy (MS), and nuclear magnetic resonance (NMR) spectroscopy to elucidate structural aspects of simple organic and inorganic molecules e.g. alcohols, aldehydes, ketones and esters.  
- Evaluate the technical and operational principles of MS instrumentation in order to derive plausible combinations to analyse simple organic and inorganic molecules.  
- Apply the principles of graphite furnace atomic absorption (GF-AAS) and inductively coupled plasma atomic emission spectrometry (ICP-AES) to elucidate compositional aspects of simple organic and inorganic molecules.  
- Perform qualitative investigations in order to determine the elemental composition of real samples.  
- Conduct research using the library, the web and other sources of information.  
- Reference sources of information correctly.  
- Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.  
- Recognise the relationship of chemistry to society, technology and the environment.  
- Present a clear, well-structured oral presentation and well-structured research report.  
- Work productively in co-operative learning groups.  
- Demonstrate life-long learning capabilities and an appreciation of chemistry as discipline in a wider context.

**Main Content**  
- Advanced mass spectroscopy: Ion sources, analyser and detector types, and spectral interpretation.  
- Advanced nuclear magnetic resonance (NMR) spectroscopy: 1H-NMR, 13C-NMR, 1H correlation spectroscopy (COSY), hetero-nuclear correlation.
spectroscopy (HETCOR) and the nuclear Overhauser effect (NOE).
- Advanced atomic spectrometry: High sensitivity sampling techniques, graphite furnace atomic absorption spectroscopy (GF-AAS) and inductively coupled plasma atomic emission spectrometry (ICP-AES).

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<td>Year level</td>
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</table>

**Main Outcomes**

- On completion of this module students should be able to:
  - Apply accepted rules to classify terpenoids, carbohydrates and alkaloids into subgroups, in order to better understand their chemistry.
  - Develop synthetic strategies for the laboratory preparation of terpenoids, carbohydrates and alkaloids, based on chemical reactivity and stereochemical orientation.
  - Apply the principles of predictive reaction pathways in order to identify plausible products derived from the terpenoids, carbohydrates and alkaloids.
  - Apply the fundamental principles of molecular orbital theory and orbital symmetry for the confirmation and identification of the products of selected organic reactions.
• Develop strategies for advanced synthetic methods based on functional group inter conversion and one-group and two-group disconnections.
• Conduct research using the library, the web and other sources of information.
• Reference sources of information correctly.
• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.
• Recognise the relationship of chemistry to society, technology and the environment.
• Present a clear, well-structured oral presentation and well-structured research report
• Work productively in co-operative learning groups.
• Demonstrate life-long learning capabilities and an appreciation of chemistry as discipline in a wider context.

Main Content
• Advanced mass spectroscopy: Ion sources, analyser and detector types, and spectral interpretation.
• Advanced nuclear magnetic resonance (NMR) spectroscopy: 1H-NMR, 13C-NMR, 1H correlation spectroscopy (COSY), hetero-nuclear correlation spectroscopy (HETCOR) and the nuclear Overhauser effect (NOE).
• Advanced atomic spectrometry: High sensitivity sampling techniques, graphite furnace atomic absorption spectrometry (GF-AAS) and inductively coupled plasma atomic emission spectrometry (ICP-AES).

Pre-requisite modules BSc. (Chemical Sciences)
Co-requisite modules None
Prohibited module Combination None

Breakdown of Learning Time
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)
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<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Chemistry) (3734)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module, students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Apply chemical trends of the main group elements to explain the chemistry and reactivity of inorganic rings, cages and chains.</td>
</tr>
<tr>
<td></td>
<td>• Apply the principles of crystal field theory in order to identify bonding and orientation in simple inorganic molecules.</td>
</tr>
<tr>
<td></td>
<td>• Apply the principles of molecular orbital theory in order to identify bonding and orientation in metal-ligand coordination complexes.</td>
</tr>
<tr>
<td></td>
<td>• Apply the trends and principles of spectrochemical properties in order to characterise transition metal complexes.</td>
</tr>
<tr>
<td></td>
<td>• Justify the composition of simple bio-inorganic compounds based on the fundamental principles of chemical reactivity and properties.</td>
</tr>
<tr>
<td></td>
<td>• Classify, and propose pathways for the synthesis of organometallic compounds of the types: T-M Alkyls, T-M Alkenes, T-M Carbenes, and T-M Carbynes.</td>
</tr>
<tr>
<td></td>
<td>• Apply the principles of transition metal compound chemistry to selected industrial homogeneous catalysis processes.</td>
</tr>
<tr>
<td></td>
<td>• Conduct research using the library, the web and other sources of information.</td>
</tr>
<tr>
<td></td>
<td>• Reference sources of information correctly.</td>
</tr>
<tr>
<td></td>
<td>• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.</td>
</tr>
<tr>
<td></td>
<td>• Recognise the relationship of chemistry to society, technology and the environment.</td>
</tr>
<tr>
<td></td>
<td>• Present a clear, well-structured oral presentation and well-structured research report</td>
</tr>
<tr>
<td></td>
<td>• Work productively in co-operative learning groups.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate life-long learning capabilities and an appreciation of chemistry as discipline in a wider context.</td>
</tr>
<tr>
<td><strong>Main Content</strong></td>
<td>• Chemical trends of the main group elements and their application to inorganic rings, cages and chains.</td>
</tr>
<tr>
<td></td>
<td>• Advanced crystal field theory and its application to transition metal complexes.</td>
</tr>
<tr>
<td></td>
<td>• Molecular orbital theory as applied to coordination complexes.</td>
</tr>
<tr>
<td></td>
<td>• Spectrochemical properties of transition metal complexes.</td>
</tr>
<tr>
<td></td>
<td>• Introduction to the chemistry of bio-inorganic compounds.</td>
</tr>
<tr>
<td></td>
<td>• Classification and nomenclature of the organometallic compounds known as T-M Alkyls, T-M Alkenes, T-M Carbenes, and T-M Carbynes.</td>
</tr>
<tr>
<td></td>
<td>• Transition metal compounds in industrial homogenous catalysis</td>
</tr>
<tr>
<td><strong>Pre-requisite modules</strong></td>
<td>BSc. (Chemical Sciences)</td>
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</table>
**Co-requisite modules**  
None  

**Prohibited module Combination**  
None  

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>TimeTable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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**Methods of Student Assessment**  
Continuous Assessment (CA): 50%  
Final Assessment (FA): 50%  

**Assessment Module type**  
Continuous and Final Assessment (CFA)  

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<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Honours Physical Chemistry</td>
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<td>Generic Module Name</td>
<td>Chemistry 704</td>
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<td>Proposed semester to be offered.</td>
<td>First Semester</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Chemistry) (3734)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>

**Main Outcomes**  
On completion of this module students should be able to:  
• Explain postulates, derive expressions for, and calculate rate constants and thermodynamic parameters based on the theories of simple homogeneous gas phase reactions: collision and transition state (activated complex) theories.  
• Derive expressions and calculate kinetic parameters for unimolecular reactions.  
• Apply the principles, and laws governing different types of photochemical reactions in order to solve theoretical problems.  
• Distinguish between the different types of adsorption isotherms.  
• Apply the principles and mathematical underpinnings of the electrochemistry of kinetics and mitigation measures to analysis of real samples.  
• Relate the concept of founding quantum mechanical theory on postulates.  
• Demonstrate the mathematical competency to solve a variety of problems involving mathematical operators.  
• Construct a quantum mechanical operator from the classical expression for the corresponding operator.  
• Use the properties of the electronic states of the
hydrogen ion to construct approximate wave functions and electron configurations for homonuclear diatomic molecules.

- Apply general properties of molecular orbitals and criteria for formation of good bonding orbitals, to predict the qualitative properties of electronic states of heteronuclear diatomic molecules.
- Apply the principles of rotational and vibrational spectra as well as the origin of selection rules to the interpretation of spectra.
- Apply the principles of Raman Spectroscopy in order to predict which normal modes of a polyatomic molecule will be Raman active.
- Apply the principles of electron spin resonance to spectral analysis and data interpretation.
- Solve problems involving probabilities of molecular states using the statistical mechanical distribution.
- Calculate values of molecular partition functions for atoms, diatomic molecules, and polyatomic molecules.
- Calculate values of thermodynamic functions of dilute gases from molecular partition functions.
- Conduct research using the library, the web and other sources of information.
- Reference sources of information correctly.
- Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.
- Recognise the relationship of chemistry to society, technology and the environment.
- Present a clear, well-structured oral presentation and well-structured research report.
- Work productively in co-operative learning groups.
- Demonstrate life-long learning capabilities and an appreciation of chemistry as discipline in a wider context.

<table>
<thead>
<tr>
<th>Main Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced theories of chemical reactivity: unimolecular reactions; adsorption isotherms; homogeneous, heterogeneous and enzyme catalysis; photochemical reactions; electrode kinetics; and fast reactions.</td>
</tr>
<tr>
<td>Theories, principles and procedures for solving quantum mechanical problems for simple systems: variation and perturbation theorems, Born-Oppenheimer approximations; valence bond and molecular orbital theories.</td>
</tr>
<tr>
<td>Symmetry and group theory. Atomic structures of hydrogen-like and helium-like atoms; angular momentum. Molecular orbital and valence bond theories applied to the structures of the hydrogen molecule ion, the hydrogen molecule and other polyatomic molecules.</td>
</tr>
<tr>
<td>Theories and applications of rotational and vibrational spectroscopy. Canonical and molecular partition functions and their applications in the statistical thermodynamics of entropy, internal energy, enthalpy, free energy and heat capacity.</td>
</tr>
<tr>
<td><strong>Pre-requisite modules</strong></td>
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<tr>
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</tr>
<tr>
<td><strong>Co-requisite modules</strong></td>
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<th><strong>Hours</strong></th>
<th><strong>Timetable Requirement per week</strong></th>
<th><strong>Other teaching modes that does not require time-table</strong></th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type** Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Chemistry

**Module Topic**
- Honours Applied Chemistry

**Generic Module Name**
- Chemistry 705

**Alpha-numeric Code**
- CHM705

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Chemistry) (3734)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Apply the principles of homogenous and heterogeneous catalysis to the evaluation of chemical processes at work in real life examples from the petroleum Industry.
  - Apply the principles and classification of electro catalysis to the differentiation of catalytic processes in chemical technologies.
  - Identify special features and advantages that may enhance the efficiency of electrochemical processes.
  - Apply the definition of oxygen reduction and hydrogen evolution reactions to the delineation of electrochemical windows in various electrolytes.
  - Identify the basic principles of process design.
  - Evaluate the advantages and disadvantages of adsorption and chemisorption in process design and model these as Temkin adsorption isotherms.
  - Characterize and evaluate the electrochemical processes at work in fuel cells and batteries in terms of structural properties, surface spectroscopy and surface morphology.

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using cyclic voltammetry chronoamperometry, AC electrochemical techniques, AFM, HRSEM and HRTEM.

• Rationalise the technical, economic and social considerations of the hydrogen economy and hydrogen storage in terms of physical and chemical processes, costs of catalysts and electrode materials, best practice for storage and characterisation of materials and processes.

• Conduct research using the library, the web and other sources of information.

• Reference sources of information correctly.

• Use the internet and computer-based word-processing, spreadsheet, and presentation software to complete tasks.

• Recognise the relationship of chemistry to society, technology and the environment.

• Present a clear, well-structured oral presentation and well-structured research report

• Work productively in co-operative learning groups.

• Demonstrate life-long learning capabilities and an appreciation of chemistry as discipline in a wider context.

Main Content

• Application of homogenous and heterogenous catalysis to the petroleum Industry.

• Characterisation of different types and applications of electrocatalysis in chemical technology.

• Electrochemical Processes: Special features and advantages.

• Electrochemical reactions based on oxygen reduction and hydrogen evolution.

• Basic principles of process design.

• Principles of adsorption and chemisorption and the Temkin adsorption isotherm.

• Introduction to characterization techniques for studying the electrochemical processes, structural properties, surface spectroscopy and surface morphology of fuel cells and batteries.

• Technical, economic and social considerations of the hydrogen economy and hydrogen storage.

Pre-requisite modules

BSc. (Chemical Sciences)

Co-requisite modules

None

Prohibited module

Combination

None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
<td>Contact with lecturer: / tutor:</td>
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<tr>
<td>Tutorials:</td>
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<td></td>
</tr>
</tbody>
</table>

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### Main Content
- Introduction to nanotechnology:
  - Historical considerations Nanoscience in Nature and the environment: Biomimetics; NanoScience and Society: Societal implications and ethics
  - Risk assessment: Safety and toxicology; Regulation
  - Properties of nanomaterials: Dimensionality; Quantum phenomena; Physical properties
  - Areas of application.
- Synthetic approaches to making nanomaterials:
  - Viewing at the nanoscale;
  - Top down vs bottom up approaches; Green chemistry principles and approaches
  - Natural systems at the nanoscale
  - Control at the nanoscale:
  - Molecular self-assembly Characterisation of nanoscale properties
  - Classification of nanomaterials in different orientational dimensions
  - Chemie Douce: supramolecular chemistry
  - Zeolites, mesoporous materials
  - Surface functionalization and functional materials
  - Medicinal nanomaterials
  - Applications of Nanomaterials
  - Nanomaterials and the environment
  - Nanoscience in energy applications, electronics pharmaceutics and biotechnology
  - Commercial nanoproducts
  - Nanoscience research

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>BSc. (Chemical Sciences)</th>
</tr>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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<td>Prohibited module Combination</td>
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<table>
<thead>
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<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
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<td>Tutorials p.w.</td>
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<thead>
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<th>Continuous Assessment (CA): 50%</th>
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<tbody>
<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
</tr>
</tbody>
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Faculty: Natural Sciences
Home Department: Chemistry
Module Topic: Honours research projects
Generic Module Name: Chemistry 707
Alpha-numeric Code: CHM707
NQF Level: 8
NQF Credit Value: 15
Duration: Semester
Proposed semester to be offered: Second Semester
Programmes in which the module will be offered: BSc Hons (Chemistry) (3734)
Year level: 4
Main Outcomes

On completion of this module students should be able to:

- Apply the principles, reasoning and mathematical competencies developed to date to the design, synthesis, characterisation, qualification and quantification of materials and methods relevant to the research focus of the mini-project selected.
- Propose a rationale, research question(s), methodology, resource requirements, research plan, preliminary reading list and timeline for the mini-project, in clear, written English and using the terminology, style and format customary to the field of chemistry research.
- Work productively and (where applicable) co-operatively to collect and critically evaluate experimental data, with recognition and sensitivity for the impact of the research on society, technology and the environment, following a clear literature precedent.
- Inform the research process using literature resources from the library, the web and other sources, referencing these correctly, in the format that is customary in the field.
- Present clear, well-structured oral and written presentations using current technologies and software applications.
- Pose questions to extend the research beyond the scope of the mini-project, under guidance of a mentor.

Main Content

- Introduction to the research focus of the department by means of post graduate brochure, departmental research open days or other suitable and innovative ways.
- Consideration and selection of research mini-project from a compilation of contemporary offerings prepared by the department each year in a printed format.
- Oral and written presentation of a research proposal developed under the guidance of the principal researcher(s) and their research team.
- Conducting research in one of the research groups.
- Oral and written presentation of the research process and findings in a critical manner within the context of relevant literature.

Pre-requisite modules

BSc. (Chemical Sciences)

Co-requisite modules

None

Prohibited module

None

Breakdown of Learning Time

<table>
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Methods of Student Assessment

Continuous Assessment (CA): 0%
Final Assessment (FA): 100 %

Assessment Module type

Final Assessment (FA)
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<td>Statistics and Population Studies</td>
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<tr>
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<td>Simulation</td>
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<td>Computational Finance 710</td>
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<td>• Examine a basic approach to statistical simulation and develop basic Matlab skills.</td>
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<tr>
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<td>• Introduction to Matlab;</td>
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<td>• Generating random numbers from different distributions;</td>
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<td>• Cellular automata;</td>
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<td>• Systems of linear equations;</td>
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<td>• Modelling time series;</td>
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<td>• Simulating queues;</td>
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<td>• Bootstrapping.</td>
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<tr>
<td>Year level</td>
<td>7</td>
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</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
  • Apply fundamentals of time domain methods and develop elementary analysis skills. |
| Main Content |  
  • Classical time series methods; strong and weak stationarity, and non-stationarity; ARMA models – acf, pacf, stationarity and invertibility; evaluation of residuals; ARIMA models; seasonality in ARIMA models; estimation and prediction; spectral density functions; periodogram; example analyses using SPSS |
| Pre-requisite modules | STA211; STA221; MAT211; MAT221 or equivalent |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor | 21 | Lectures p.w. | 1 |
| Assignments & tasks | 30 | Practicals p.w. | 0 |
| Practicals | 30 | Tutorials p.w. | 0 |
| Tutorials | 0 | | |
| Tests & Examinations | 5 | | |
| Selfstudy | 60 | | |
| Other | 4 | | |
| Total Learning Time | 150 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
  Final Assessment (FA):50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Statistics and Population Studies |
| Module Topic | Probability and Stochastic Processes |
| Generic Module Name | Computational Finance 712 |
| Alpha-numeric Code | COF712 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |
| Programmes in which the module will be offered | BSc Hons (Computational Finance) (3739); |
| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to:  
  Apply the laws of large numbers:  
  • The Weak Law of Large Numbers.  
  • The Central Limit Theorem.  
  • Generate random observations from specified distributions, e.g. The inverse transform method, acceptance-rejection method. |
| Main Content | • Review concepts in Probability.  
• Random variables, distributions, cumulative distribution functions, densities.  
Generating moments of functions:  
• Cumulants, probabilities, factorial moments.  
• Basic inequalities, e.g. Tchebychev inequality.  
Approximate methods, the Delta method.  
Introduction to Stochastic Processes.  
The Poisson process.  
Branching processes.  
Introduction to Markov Chains. |
<table>
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<tr>
<td>Pre-requisite modules</td>
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<td>Tests &amp; Examinations</td>
<td>3</td>
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<td>Selfstudy</td>
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<td>Other</td>
<td>0</td>
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<tr>
<td>Total Learning Time</td>
<td>150</td>
</tr>
</tbody>
</table>
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Mathematics & Applied Mathematics |
| Module Topic | Stochastic Calculus for Finance |
| Generic Module Name | Stochastic Calculus for Finance 714 |
| Alpha-numeric Code | COF714 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered | First Semester |
| Programmes in which the module will be offered | BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739) |
| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to:  
• Have a working knowledge of Ito calculus including stochastic control. |
| Main Content | • Probability spaces  
• Random walk and Brownian motion  
• Discrete and continuous martingales  
• Stopping times  
• Quadratic variation  
• Ito integral and basic formulae  
• Stochastic differential equations |
### Financial Engineering

**Pre-requisite modules** None

**Co-requisite modules** None

**Prohibited module Combination** None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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<tr>
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**Total Learning Time** 150

**Methods of Student Assessment**

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type** Continuous and Final Assessment (CFA)

**Faculty** Natural Sciences

**Home Department** Mathematics & Applied Mathematics

**Module Topic** Financial Engineering

**Generic Module Name** Financial Engineering

**Alpha-numeric Code** COF716

**NQF Level** 8

**NQF Credit Value** 15

**Duration** Semester

**Proposed semester to be offered.** Second Semester

**Programmes in which the module will be offered**

- BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

**Year level** 7

**Main Outcomes**

- On completion of this module students should be able to:
  - Have basic knowledge about modeling and evaluation of financial derivatives.

**Main Content**

- Forward, Futures and Options Contracts,
- Futures Markets and the Use of Futures for Hedging,
- Forward and Futures Prices,
- Properties of Stock Option Prices (Put-Call Parity),
- Valuation of Stock Options,
- Itô's Lemma and its Applications,
- Analytical Approach of Black-Scholes to Price Stock Options,
- Greeks,
- Numerical Approaches of Pricing Stock Options (Binomial Trees, Monte Carlo Simulation, Finite Difference Methods)
- The Role of Martingales and Measures in Derivatives.

**Pre-requisite modules** None

**Co-requisite modules** None

**Prohibited module Combination** None
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<tr>
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<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

---

**Faculty**
- Natural Sciences

**Home Department**
- Statistics and Population Studies

**Module Topic**
- Financial Risk Management

**Generic Module Name**
- Computational Finance 726

**Alpha-numeric Code**
- COF726

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Computational Finance) (3739)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Summarize knowledge and analyse risk management problems.

**Main Content**
- Risk measurement, analytical methods of risk management, value-at-risk methodologies, risk modelling.

**Pre-requisite modules**
- STA331 or equivalent

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

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<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)
### Faculty
Natural Sciences

### Home Department
Computer Science

### Module Topic
Machine Learning

### Generic Module Name
Computer Science 711

### Alpha-numeric Code
COS711

### NQF Level
8

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
First Semester

### Programmes in which the module will be offered
BSc Hons (Computer Science) (3735)

### Year level
7

### Main Outcomes
On completion of this module students should be able to:
- Understand key concepts and theories in machine learning.
- Develop and implement key machine learning algorithms including decision tree learning, Bayesian learning, back-propagation neural networks, and genetic algorithms.

### Main Content
- Concept Learning,
- Decision Tree Learning,
- Artificial Neural Networks,
- Bayesian Learning,
- Instance-Based Learning,
- Evolutionary Computation,
- Computational Learning Theory

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module combination
None

### Breakdown of Learning Time

<table>
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<tr>
<th>Activity</th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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<td>Contact with lecturer / tutor:</td>
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<tr>
<td>Assignments &amp; tasks:</td>
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<tr>
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<td>Tutorials p.w.</td>
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<td>Tests &amp; Examinations:</td>
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<tr>
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</table>

### Methods of Student Assessment
Continuous Assessment (CA): 100%
Final Assessment (FA): 0%

### Assessment Module type
Continuous Assessment (CA)

---

### Faculty
Natural Sciences

### Home Department
Computer Science

### Module Topic
Internet Programming

### Generic Module Name
Computer Science 725

### Alpha-numeric Code
COS725

### NQF Level
8
<table>
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<tr>
<td>Proposed semester to be offered.</td>
<td>First Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Computer Science) (3735)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module, students should be able to:  
- Foundation Web programming.  
- CGI based Web application implementation knowledge is gained.  
- The student can infer principles in implementing on other platforms (Perl is the base language). |
| Main Content |  
- Perl as a new language is learned,  
- CGI programming  
- Very basic HTML coding.  
- Apache or IIS web server setup and installation is also done. |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 34 | Lectures p.w. | 3 |
| Assignments & tasks: | 26 | Practicals p.w. | 2 |
| Practicals: | 30 | Tutorials p.w. | 0 |
| Tutorials: | 0 |
| Tests & Examinations: | 9 |
| Selfstudy: | 51 |
| Other: | 0 |
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 100%  
Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |

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<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tr>
<td>Home Department</td>
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<tr>
<td>Module Topic</td>
<td>Advanced Software Engineering</td>
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<td>Duration</td>
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<td>Proposed semester to be offered.</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Computer Science) (3735)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
- Create a Formal Mathematical Specification using Z. |
- Demonstrate the use of box structure specification for analysis, design & verification.
- Demonstrate domain engineering & component-based development.
- Analyze and blend conventional principles, concepts and methods with Object-Oriented & component-based SE.
- Create high quality Web applications.
- Restructure (reconstruct/re-engineer) software to improve quality.
- Demonstrate the use automated tools in support of the SE process.
- Explain and be aware of the latest developments within SE.

### Main Content
- Formal Methods;
- Z Specification Language
- Cleanroom Software Engineering (SE);
- Component-Based SE;
- Client/Server SE;
- Web Engineering;
- Reengineering;
- Computer-Aided SE;
- Recent publications (e.g. IEEE, ACM, etc) concerning the latest trends and developments with SE

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<th>Pre-requisite modules</th>
<th>CSC312</th>
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<td>Co-requisite modules</td>
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<tr>
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### Breakdown of Learning Time

<table>
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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Contact with lecturer / tutor:</td>
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<tr>
<td>Total Learning Time</td>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Proposed semester to be offered.</th>
<th>First Semester</th>
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<tbody>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Computer Science) (3735)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module students should be able to:  
  - Understand operating system internals via theory.  
  - Be able to examine code.  
  - Demonstrate the ability to infer OS design principles and programming skills to other operating systems and environments. |
| Main Content |  
  - The course is based around a conceptual and practical in-dept case study of contemporary operating system.  
  - Operating system design and implementation content can include one or more of the following topics  
    - Process management;  
    - Parallel and concurrent programming;  
    - Memory management;  
    - File system; input and output (device drivers and networking);  
    - Inter-process communication and security. |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 42 | Lectures p.w. | 4 |
| Assignments & tasks: | 80 | Practicals p.w. | 0 |
| Practicals: | 0 | Tutorials p.w. | 0 |
| Tutorials: | 0 | | |
| Tests & Examinations: | 0 | | |
| Selfstudy: | 28 | | |
| Other: | 0 | | |
| Total Learning Time | 150 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 100%  
Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |

**Faculty**  
Natural Sciences  
**Home Department**  
Computer Science  
**Module Topic**  
Compilers  
**Generic Module Name**  
Computer Science 729  
**Alpha-numeric Code**  
COS729  
**NQF Level**  
8  
**NQF Credit Value**  
15  
**Duration**  
Semester  
**Proposed semester to be offered.**  
First  
**Programmes in which the module will be offered**  
BSc Hons (Computer Science) (3735)  
**Year level**  
7
| Main Outcomes | On completion of this module students should be able to:  
| | • Understand key concepts in the theory of LALR(1) compilers and their implementation.  
| | • Complete a working compiler.  
| | • Experience a largish programming project. |
| Main Content | Scanners,  
| | Experience with a scanner generator,  
| | Context-free grammars,  
| | Parsing,  
| | Top-down recursive descent parsing,  
| | LL(1) parsing,  
| | Bottom-up parsing with SLR(1),  
| | LR(1),  
| | LALR(1) parsers,  
| | Experience with an LALR(1) parser generator,  
| | Semantic analysis,  
| | Attribute grammars,  
| | Run-time environments  
| | Code generation.  
| | Practical implementation of compiler |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours  
| | Timetable Requirement per week  
| | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 48 Lectures p.w.  
| | No Timetable Requirements |
| Assignments & tasks: | 12 Practicals p.w. |
| Practicals: | 0 Tutorials p.w. |
| Tutorials: | 0 |
| Tests & Examinations: | 0 |
| Selfstudy: | 90 |
| Other: | 0 |
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 100%  
| | Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |
| Faculty | Natural Sciences |
| Home Department | Computer Science |
| Module Topic | Advanced Computer Networks |
| Generic Module Name | Computer Science 730 |
| Alpha-numeric Code | COS730 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |
| Programmes in which the module will be offered | BSc Hons (Computer Science) (3735) |
| Year level | 7 |
## Main Outcomes

On completion of this module students should be able to:
- Be knowledgeable of fundamental data link protocol theoretical concepts.
- Be able to set up, monitor, manage, secure and evaluate the performance of networks deployed.
- Be able to use different topologies.
- Be able to apply these techniques to other network topologies and technologies.

## Main Content

- Detailed exploration of a data link layer protocol from the TCP/IP stack;
- Routing and bridging;
- Advanced topologies and networking including dynamic routing;
- TCP/IP security;
- Traffic control and performance;
- Network monitoring.

## Pre-requisite modules

None

## Co-requisite modules

None

## Prohibited module Combination

None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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## Methods of Student Assessment

- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

## Assessment Module type

- Continuous Assessment (CA)

---

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<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Project Analysis and Design</td>
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<td>BSc Hons (Computer Science) (3735)</td>
</tr>
<tr>
<td>Year level</td>
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</table>

## Main Outcomes

On completion of this module students should be able to:
- Understand and implement the Analysis & Design activities of the Software Development Life-cycle,
- Analyze User Requirements (e.g. UML/OOA/HLD).
- Write a Project Proposal.
- Write a User Requirements Document.
- Write a Requirements Analysis Document.
- Produce a Project Plan.
- Write a User Interface Specification for a GUI, API, etc.
- Produce a design (e.g. UML/OOD/LLD).
- Produce a prototype.
- Write a Project Report on Analysis & Design.
- Present the analysis, design and prototype to an audience.

### Main Content
- Requirements Engineering
- Analysis modeling & documentation (e.g. UML/OOA)
- Object-Oriented Analysis
- Design Engineering
- Design Concepts (e.g. UML/OOD)
- Design Models & Documentation
- User Interface Specification & Design
- Prototyping
- Project Presentation

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module
None

### Breakdown of Learning Time

<table>
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<tr>
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Total Learning Time
150

### Methods of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

### Assessment Module type
Continuous Assessment (CA)

### Faculty
Natural Sciences

### Home Department
Computer Science

### Module Topic
Project Implementation and Testing

### Generic Module Name
Computer Science 732

### Alpha-numeric Code
COS732

### NQF Level
8

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
Second Semester

### Programmes in which the module will be offered
BSc Hons (Computer Science) (3735)

### Year level
7

### Main Outcomes
- On completion of this module students should be able to:
  - Understand and implement the Implementation & Testing activities of the Software Development Life-cycle.
  - Implement a project from design documentation (produce code).
- Refine design documentation.
- Devise evaluation criteria & test cases.
- Test a program against a test-suite.
- Write a Users Guide.
- Present/Demonstrate the final program to an audience.

**Main Content**

- Code Generation
- Compilation
- Testing Strategies
- Testing Tactics
- Debugging
- Software Program
- Software User Guide
- Software Program
- Project Presentation

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
Continuous Assessment (CA): 100%
Final Assessment (FA): 0%

**Assessment Module type**
Continuous Assessment (CA)

**Faculty**
Natural Sciences

**Home Department**
Computer Science

**Module Topic**
Information and Communication Technologies for Development

**Generic Module Name**
ICT4D

**Alpha-numeric Code**
COS734

**NQF Level**
8

**NQF Credit Value**
15

**Duration**
Semester

**Proposed semester to be offered.**
Second Semester

**Programmes in which the module will be offered**
BSc Hons (Computer Science) (3735)

**Year level**
7

**Main Outcomes**

- On completion of this module students should be able to:
  - Critically evaluate development and how technology fits in with development.
  - Describe the interactions between technologists, social scientists and communities by examining multiple case studies.
- Understand multi-disciplinary and trans-sector ICT4D research, research methods, evaluation and practice.
- Engage with seminal and topical ICT4D research outputs.
- Partake in independent and group outputs through practicals, papers, presentations and workshops.
- Demonstrate awareness of ethics, community engagement and challenges to sustainability particular to ICT4D contexts.

Main Content

The main course content is divided into three parts:

**Part 1: What is ICT4D?**
- Definitions of development, e.g. Techno-centric and social-centric;
- Theory of development, e.g. Sen and capabilities theory; and also theory of technology, e.g. Amplification theory.
- Ethics and intent

**Part 2: Domains**
- Community networks
- Education
- Disability
- Health
- Governance

**Part 3: Critique**
- Challenges, e.g. Barriers to access, ICT4D failures
- Gender and ICT
- Decolonisation and post-colonial thinking

Pre-requisite modules: None
Co-requisite modules: None
Prohibited module Combination: None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
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<th>Timetable Requirement per week</th>
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Methods of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

Assessment Module type
- Continuous Assessment (CA)

Faculty
- Natural Sciences
Home Department
- Computer Science
Module Topic
- Capita Selecta
Generic Module Name
- Computer Science 792/3/4
Alpha-numeric Code
- COS792
NQF Level
- 8
NQF Credit Value
- 15
Duration
- Semester
Proposed semester to be offered.
- Second Semester
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<th>BSc Hons (Computer Science) (3735)</th>
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</thead>
<tbody>
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<td>Year level</td>
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</table>
| Main Outcomes | On completion of this module, students should be able to:  
| | - Have the knowledge and skills pertaining to a topic in Computer Science that is not covered by or that is an extension to an existing Computer Science NQF level 8 module. |
| Main Content | Special topics as determined by the lecturer, visiting academic or industrial partner. |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module combination | None |

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment

- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

### Assessment Module type

- Continuous Assessment (CA)

---

**Faculty**: Natural Sciences  
**Home Department**: Earth Sciences  
**Module Topic**: Environmental Assessment and Management  
**Generic Module Name**: Environmental Assessment and Management 701  
**Alpha-numeric Code**: EWP701  
**NQF Level**: 8  
**NQF Credit Value**: 20  
**Duration**: Term  
**Proposed semester to be offered**: Term 1 or Term 2  
**Programmes in which the module will be offered**: BSc Hons (Environmental and Water Science) (3780)  
**Year level**: 7  
**Main Outcomes** | On completion of this module students should be able to:  
| | - Conduct a review on applying key principles, approaches and thrusts in water resources management projects.  
| | - Evaluate water resources protection, quality, allocation and monitoring projects.  
| | - Assess performance of water management institutions, water governance, water regulations.  
| | - Write reflective reports of the process followed to conduct water resources assessment, planning and allocation.  
| | - Review EIA report sand write a reflective reports on the processes, methods and recommendations.  
| | - Assess the extent to which the use technical, institutional
and legal approaches facilitate the prevention and remediation environmental challenges.

- Critique the use of policy and laws to regulate environmental management and impact assessment in water resources.

<table>
<thead>
<tr>
<th>Main Content</th>
<th>Water Resources Management</th>
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<tr>
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<td>Water resources system Assessment and planning</td>
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<tr>
<td></td>
<td>Protection and monitoring</td>
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<tr>
<td></td>
<td>Water allocation and use</td>
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<td></td>
<td>Institutional arrangements</td>
</tr>
<tr>
<td></td>
<td>Policies, laws and strategies</td>
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</tbody>
</table>

**Environmental Management**

- Technical, institutional and legal approaches for prevention and remediation
- Overview key aspects on environmental law
- The policy and law regulation environmental management and impact assessment
- The various law that govern various components of the environment

**Environmental Assessment**

- Overview of EIA processes, procedure and methods in environmental management tools (Environmental Risk Assessment, Strategic Environmental Assessment)
- EIA reports and License application documents

<table>
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<tr>
<th>Pre-requisite modules</th>
<th>EWP321, EWP312</th>
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<tbody>
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<td>Combination</td>
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<td><strong>Year level</strong></td>
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</table>
| **Main Outcomes** | On completion of this module students should be able to:  
- Have knowledge of ArcCatalog and ArcMap to view and manipulate GIS Data  
- Have knowledge on GIS data models, type and structure  
- Distinguish between Data measurements types  
- Display vector, thematic and raster images  
- Distinguish between feature class and layers  
- Choose appropriate coordinate systems and map labelling  
- Understand Relational Database Management System (RDBMS), and Cardinality concept  
- Understand queries and their applications (attribute and location queries)  
- How to select features based on attribute using SQL and Boolean operation  
- How to select features on their spatial location with respect to other features  
- Understand the purpose and application of spatial joins and set up spatial joins based on cardinality and feature type  
- Understand difference between spatial joins and overlays  
- Understand spatial analysis functions and geoprocessing  
- Understand the different types of coordinate systems and map projections  
- Add features to map layers using basic editing functions  
- Understand topology and learn how to preserve topological rules during editing  
- Understand geodatabase models, create geodatabases and import layers  
- Know the dominant metadata standards and their relationships to each other |
| **Main Content** |  
- Structure of ArcGIS: ArcMap, ArcCatalog, ArcToolbox  
- GIS Data and Maps  
  - GIS data (attribute and spatial data)  
  - Mapping and Presenting GIS Data  
- GIS Data Analysis  
  - Queries  
  - Spatial join  
  - Map overlay and Geoprocessing  
  - Raster analysis  
  - Network analysis  
  - Geocoding  
- GIS Data Management  
  - Coordinate systems  
  - GIS Data editing and topology  
  - Geodatabase  
  - Metadata |
<p>| <strong>Pre-requisite modules</strong> | EWP311 or APG311 |
| <strong>Co-requisite modules</strong> | None |
| <strong>Prohibited module Combination</strong> | None |</p>
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<th>Natural Science</th>
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<td>Earth Sciences</td>
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<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Understand the hydro-geological principles that are used in analyzing and solving groundwater problems.</td>
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<td>Main Content</td>
<td>• Review of key concepts of hydrogeology</td>
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<td></td>
<td>• Groundwater recharge, flow and discharge</td>
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<td>• Groundwater quality and contamination</td>
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<td>• Groundwater resource assessments</td>
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<tr>
<td>Year level</td>
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</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• An understanding of hydrological processes.</td>
</tr>
<tr>
<td></td>
<td>• Knowledge of methods used for measuring movement of water.</td>
</tr>
<tr>
<td></td>
<td>• Ability to analyse movement of water within the hydrological cycle.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Analysis of spatial and temporal variations of precipitation</td>
</tr>
<tr>
<td></td>
<td>• Infiltration and soil water movement</td>
</tr>
<tr>
<td></td>
<td>• Methods for measuring and estimating evapotranspiration rates</td>
</tr>
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<td></td>
<td>• Runoff formation in different environmental settings</td>
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<tr>
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<td>• River flow measurement</td>
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<td>• Hydrograph analysis</td>
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<td>• Flooding and flood frequency analysis</td>
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<td></td>
<td>• Hydrological modelling</td>
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<tr>
<td></td>
<td>• Introduction to the use of earth observation/remote sensing for hydrological assessments</td>
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<td>• Hydrological effects of land use changes</td>
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<td>• Surface water quality and water pollution</td>
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<td>• Reservoir yield estimation</td>
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</tr>
<tr>
<td>Year level</td>
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</tr>
</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to: **EITHER:**
- Conduct research of limited scope on an Environmental and Water Science related project of his/her choice or recommended by his/her supervisor within the fields of expertise in the Department and compile a scientific report on the research.

**OR**
- Develop a full research proposal on a suitable topic that may enable him/her to continue directly with a Masters study on completion of the Honours program.

**OR**
- In the case of employed students or students on an internship, compile a report on a project they may be working on.
- This report should be of equivalent status to the Honours project.

**Main Content**

- Conducting a thorough literature survey
- Identifying a research problem
- Formulating a research methodology
- Data collection
- Data analysis
- Reporting on the results in a report of 5000 – 7500 words

**Pre-requisite modules**

EWP Third year undergraduate modules or equivalent outcome skills suitable for the selected research topic

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
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<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**

Continuous Assessment (CA): 20%
Final Assessment (FA): 80%

**Assessment Module type**

Continuous and Final Assessment (CFA)
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<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<td></td>
<td>• Understand the fluvial geomorphic processes operating in a catchment and how these processes can be monitored.</td>
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<tr>
<td>Main Content</td>
<td>• General fluvial geomorphology</td>
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<td>• Erosion, transportation and deposition of material in channels and on slopes</td>
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<td></td>
<td>• Tools in Fluvial Geomorphology</td>
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<td>• River health monitoring</td>
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<td>Final Assessment (FA): 50%</td>
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<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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</table>

**HBS712 Herbal Research**  
[Pre-requisite: MBS326]  
Selection, design and planning of research proposal and research methods. Budget protocol writing. Execution of the research. Generation of data, project management, quantification and interpretation of scientific data. Writing of a mini thesis on the research project. The design, execution, interpretation and writing of a research project in thesis and paper format. Selection, planning, presentation and writing of a research project.

**HBS713 Herbal Medicine and Human Health**  
[Pre-requisite: MBS326]  
Medically important organisms causing human infections and diseases of lifestyle. The uses of indigenous herbal medicines to prevent, treat and manage disease and promote health and safely, effectively and affordably.
HBS714 Herbal Taxonomy and Systematics
[Pre-requisite: LSC142]
The basic taxonomy and systematics of herbal plants.

HBS715 Herbal Pharmacology
[Pre-requisite: MBS326]
Pharmacodynamics (how drugs act): General principles, molecular aspects, excitable tissues and
secretory mechanisms, cell proliferation and apoptosis. Pharmacodynamics: method and
measurement in pharmacology.
Pharmacokinetics: Absorption, distribution and elimination of drugs and aspects of quantitative
pharmokinetics.
Pharmacotherapeutics: Introduction to concepts of clinical uses and adverse effects of drugs
and herbal medicines: aspects of the pharmacodynamics, pharmacokinetics and
pharmacotherapeutics of herbal medicines. Pharmaceutics and biopharmaceutics.

HBS716 Herbal Nutrition
[Pre-requisite: MBS326]
The role of herbal nutrition in human health and primary healthcare with special emphasis on
herbal plant nutrients. The importance of herbal nutrients as part of traditional diets in human
health.

HBS717 Herbal Science and Environmental Education
[Pre-requisite: LSC142]
The environmental value of medicinal plants, their biodiversity, conservation and management.

HBS718 Herbal Biodiversity
[Pre-requisites: BCB212, BCB221]
Lectures, surveys and herbarium techniques to provide students with the understanding and
tools of the basis and practice of plant identification. The protection and conservation of genetic
resources, biodiversity and indigenous knowledge. Land issues, horticultural and agricultural
technologies that have an impact on the biodiversity, conservation and cultivation of indigenous
medicinal plants.

HBS719 Herbal Science and Anthropology
[Pre-requisite: MBS326]
The history of herbal plant use by humans. The evolution of herbal plant use throughout human
history.

HBS720 Herbal Economics
[Pre-requisite: MBS326]
The trade and commercial value of herbal materials including amongst others the food,
pharmaceutical and cosmetic markets.

HBS721 Herbal Immunology
[Pre-requisite: MBS326]
The use of herbal phytotherapies and herbal pharmaceuticals for immune modulation.

HBS722 Herbal Chemistry
[Pre-requisite: CHE114, CHE124 or CHE116, CHE126]
A review of the fundamental chemical concepts such as intermolecular forces/molecular
interactions and aspects of solubility. Solvent extraction: (a) liquid-liquid extraction (b) liquid-
solid extraction. Chromatography: A general overview and some theoretical aspects, the
practice of Planar Chromatography, Gas Chromatography and High Performance Liquid
Chromatography. A brief overview of classes of organic compounds found in plants and
methods of identification of organic compounds.
<table>
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<tr>
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<th>Natural Sciences</th>
</tr>
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<tbody>
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<td>First Semester</td>
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<td>BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Well-prepared for more advanced studies in group theory.</td>
</tr>
<tr>
<td></td>
<td>• Able to apply their knowledge to give a complete classification of groups of a given order.</td>
</tr>
<tr>
<td></td>
<td>• Able to apply their knowledge in areas where group theory is required.</td>
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<tr>
<td>Main Content</td>
<td>• Isomorphic Theorems, Zassenhaus' lemma, Automorphism groups, Group Action, Sylow theorem, Solvable groups, Permutation Groups, Free Abelian Groups</td>
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<td>Pre-requisite modules</td>
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<td>• Have a firm foundation in algebraic number theory.</td>
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<tr>
<td></td>
<td>• Algebraic Numbers,</td>
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<tr>
<td></td>
<td>• Quadratic and Cyclotomic Fields,</td>
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<td></td>
<td>• Factorization into irreducibles,</td>
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<td></td>
<td>• Ideals,</td>
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<td></td>
<td>• Lattices,</td>
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<td></td>
<td>• Minkowski’s Theorem,</td>
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<td></td>
<td>• Geometric representation of algebraic numbers,</td>
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<td>• Class group and Class number,</td>
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<td>• Computational methods,</td>
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<td>• Fermat’s Last theorem,</td>
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<tr>
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<td>First or Second Semester</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module, students should be able to:</td>
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<td>• Have a firm foundation in elementary number theory.</td>
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</table>
### Main Content
- Divisibility and Primes,
- Modular Arithmetic,
- Fundamental theorems of Modular Arithmetic,
- Cryptography, Primality Testing, Applications,
- Primitive Roots, Quadratic Congruences, Diophantine Equations, Quadratic Reciprocity Law, Elliptic Curves.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Mathematics & Applied Mathematics

### Module Topic
Graph Theory

### Generic Module Name
Graph Theory 710

### Alpha-numeric Code
MAM710

### NQF Level
8

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
First or Second Semester

### Programmes in which the module will be offered
- BSc Hons (Mathematical Science) (3736)
- BSc Hons (Computational Finance) (3739)

### Year level
7

### Main Outcomes
On completion of this module, students should be able to:
- Have a firm foundation in graph theory

### Main Content
- Definitions of Graphs
- Connectivity
- Characterization of Trees
- Eulerian and Hamiltonian graphs
- Planar graphs
- Matching
- Colorings

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
None
Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table
---|---|---|---
Contact with lecturer / tutor: | 30 | Lectures p.w. | 2
Assignments & tasks: | 25 | Practicals p.w. | 1
Practicals: | 15 | Tutorials p.w. | 0
Tutorials: | 0 | | |
Tests & Examinations: | 8 | | |
Selfstudy: | 72 | | |
Other: | 0 | | |
Total Learning Time | 150 | | |

Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Mathematics & Applied Mathematics

Module Topic
Partial Differential Equations

Generic Module Name
Partial Differential Equations 717

Alpha-numeric Code
MAM717

NQF Level
8

NQF Credit Value
15

Duration
Semester

Proposed semester to be offered.
Second Semester

Programmes in which the module will be offered
BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

Year level
7

Main Outcomes
On completion of this module, students should be able to:
• Solve the PDEs analytically.

Main Content
• First order PDE (Linear equations of the first order, Quasi-linear equations, Non-linear first order PDE);
• Second order PDE (One-dimensional wave equation, vibrations of strings: Riemann’s method, method of separation of variables. Laplace equation:
• BVPs, Maximum and Minimum principles; Cauchy, Dirichlet and Neumann problems, Harnack’s theorem, Green’s function. Wave equation, Heat equation, Duhamel’s principle. Kelvin’s inversion theorem).
Elements of distribution theory: weak solutions, Sobolev spaces.

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module Combination
None

Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table
---|---|---|---
Contact with lecturer / tutor: | 30 | Lectures p.w. | 2
Assignments & tasks: | 25 | Practicals p.w. | 1
Practicals: | 15 | Tutorials p.w. | 0

475
| Tutorials: | 0 |
| Tests & Examinations: | 8 |
| Selfstudy: | 72 |
| Other: | 0 |
| Total Learning Time | **150** |

Methods of Student Assessment:
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type: Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Mathematics & Applied Mathematics

**Module Topic**
- Measure and Integration

**Generic Module Name**
- Measure and Integration 727

**Alpha-numeric Code**
- **MAM727**

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Have a firm foundation in elementary measure theory.

**Main Content**

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>30</td>
<td>Lectures p.w.</td>
</tr>
<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
<td>25</td>
<td>Practicals p.w.</td>
</tr>
<tr>
<td><strong>Practicals:</strong></td>
<td>15</td>
<td>Tutorials p.w.</td>
</tr>
<tr>
<td><strong>Tutorials:</strong></td>
<td>0</td>
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</tr>
<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Selfstudy:</strong></td>
<td>72</td>
<td></td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
<td><strong>150</strong></td>
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</tr>
</tbody>
</table>

**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Mathematics & Applied Mathematics

**Module Topic**
- Computational Linear Algebra

**Generic Module Name**
- Computational Linear Algebra

**Alpha-numeric Code**
- **MAM728**

**NQF Level**
- 8
<table>
<thead>
<tr>
<th>NQF Credit Value</th>
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<tbody>
<tr>
<td>Duration</td>
<td>Semester</td>
</tr>
<tr>
<td>Proposed semester to be offered.</td>
<td>First or Second Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• A strong foundation in computational methods in Numerical Linear Algebra.</td>
</tr>
<tr>
<td></td>
<td>• Proficiency in the use of MATLAB for solving problems in Numerical Methods.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• INTRODUCTION TO MATLAB</td>
</tr>
<tr>
<td></td>
<td>• MATRIX FACTORIZATIONS: LU-factorization, QR-factorization, Cholesky factorization.</td>
</tr>
<tr>
<td></td>
<td>• MATRIX AND VECTOR NORMS: Properties of the $</td>
</tr>
<tr>
<td></td>
<td>• ERROR ANALYSIS OF LINEAR SYSTEMS: The Condition Number of a Matrix. Ill-Conditioned systems. Perturbation Analysis of Linear Systems.</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module Combination</td>
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<tr>
<td>Breakdown of Learning Time</td>
<td>Hours</td>
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<td>Contact with lecturer / tutor:</td>
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<td>Total Learning Time</td>
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<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA): 50%</td>
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<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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### Design Theory

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
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<tr>
<td>Home Department</td>
<td>Mathematics &amp; Applied Mathematics</td>
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<td>Module Topic</td>
<td>Design Theory</td>
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<td>Semester</td>
</tr>
<tr>
<td>Proposed semester to be offered.</td>
<td>First or Second Semester</td>
</tr>
</tbody>
</table>

#### Programmes in which the module will be offered
- BSc Hons (Mathematical Science) (3736)
- BSc Hons (Computational Finance) (3739)

### Main Outcomes
On completion of this module, students should be able to:
- Apply various construction techniques both classic and current, to construct combinatorial designs.

### Main Content
- Steiner Triple Systems
- l-Fold Triple Systems
- Maximum Packings and Minim Coverings
- Kirkman Triple Systems
- Mutually Orthogonal Latin squares
- Affine and Projective Planes
- Steiner Quadruple Systems

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Contact with lecturer / tutor:</th>
<th>Lectures p.w.</th>
<th>2</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Practicals:</td>
<td>Tutorials p.w.</td>
<td>0</td>
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<tr>
<td>Tutorials:</td>
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<td></td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
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<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>72</td>
<td></td>
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<tr>
<td>Other:</td>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Year level</th>
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<tbody>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Have a firm foundation in general topology</td>
</tr>
<tr>
<td><strong>Main Content</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Set Theory and Metric Spaces</td>
</tr>
<tr>
<td></td>
<td>• Topological Spaces</td>
</tr>
<tr>
<td></td>
<td>• Product</td>
</tr>
<tr>
<td></td>
<td>• Subspaces and Quotients</td>
</tr>
<tr>
<td></td>
<td>• Convergence</td>
</tr>
<tr>
<td></td>
<td>• Separation and Countability</td>
</tr>
<tr>
<td></td>
<td>• Compactness</td>
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<td>• Connectedness</td>
</tr>
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<td>• The Fundamental Group.</td>
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<td><strong>Pre-requisite modules</strong></td>
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<tr>
<td><strong>Co-requisite modules</strong></td>
<td>None</td>
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<tr>
<td><strong>Prohibited module</strong></td>
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<tr>
<td><strong>Combination</strong></td>
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<td><strong>Breakdown of Learning Time</strong></td>
<td>Hours</td>
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<tr>
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<td>Continuous Assessment (CA): 50%</td>
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<td>Final Assessment (FA): 50%</td>
</tr>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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</table>

**Faculty**
- Natural Sciences

**Home Department**
- Mathematics & Applied Mathematics

**Module Topic**
- Functions of a Complex Variable

**Generic Module Name**
- Functions of a Complex Variable 738

**Alpha-numeric Code**
- MAM738

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Semester

**Proposed semester to be offered.**

**Programmes in which the module will be offered**
- BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

**Year level**
- 7

**Main Outcomes**
- On completion of this module, students should be able to:
  - Have a Firm Foundation In Complex Function Theory

**Main Content**
- Algebra and Geometric representation of complex numbers
- Analytic functions
- Elementary topology
- Conformal mapping and Riemann Mapping Theorem
- Linear transformations
- Cauchy’s Theorem and Integral Formula
- Residue theory
<table>
<thead>
<tr>
<th>Module Content</th>
<th>Pre-requisite modules</th>
<th>Co-requisite modules</th>
<th>Prohibited module Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor and Laurent series, Harmonic functions, Elliptic functions and Weierstrass theory, Analytic continuation, Riemann surfaces and Picard’s Theorem.</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>Co-requisite modules</th>
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</tr>
</thead>
<tbody>
<tr>
<td>None</td>
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<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer: / tutor:</td>
<td>30</td>
<td>Lectures p.w.</td>
<td>2</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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</tr>
<tr>
<td>Practicals:</td>
<td>15</td>
<td>Tutorials p.w.</td>
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</tr>
<tr>
<td>Tutorials:</td>
<td>0</td>
<td></td>
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</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>0</td>
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</table>

| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

| Faculty | Natural Sciences |
| Home Department | Mathematics & Applied Mathematics |
| Module Topic | Group Theory |
| Generic Module Name | Group Theory 739 |
| Alpha-numeric Code | MAM739 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | Second Semester |
| Programmes in which the module will be offered | BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739) |
| Year level | 7 |
| Main Outcomes | On completion of this module students should be able to: |
| | • Be well-prepared for more advanced studies in group theory. |
| | • Apply their knowledge to give a complete classification of groups of a given order. |
| | • Apply their knowledge in areas where group theory is required. |

<table>
<thead>
<tr>
<th>Main Content</th>
<th>Pre-requisite modules</th>
<th>Co-requisite modules</th>
<th>Prohibited module Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isomorphic Theorems, Zassenhaus’ lemma, Automorphism groups, Group Action, Sylow theorem, Solvable groups, Permutation Groups, Free Abelian Groups</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Breakdown of Learning Time</td>
<td>Hours</td>
<td>Timetable Requirement per week</td>
<td>Other teaching modes that does not require time-table</td>
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<tr>
<td>Contact with lecturer / tutor</td>
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<td>Tests &amp; Examinations:</td>
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<td>Other:</td>
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<td>Total Learning Time</td>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Mathematics & Applied Mathematics

Module Topic
Coding Theory

Generic Module Name
Coding Theory 747

Alpha-numeric Code
MAM747

NQF Level
8

NQF Credit Value
15

Duration
Semester

Proposed semester to be offered.
First Semester

Programmes in which the module will be offered
BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

Year level
7

Main Outcomes
On completion of this module students should be able to:
- Understand how mathematics, in particular, linear algebra, number theory, groups, finite fields, is applied in real life.
- Understand how the error-detection and error-correction capabilities of codes are used in the process of data storage and data transmission between sources.
- Understand the inter-relationship between the parameters of a code and its limitations.
- Understand how the properties of selected known codes such as Reed-Solomon, BCH, Reed-Muller are used in practical situations.

Main Content
- Error-detection, error-correction, encoding, decoding, dual codes, finite fields, BCH, Reed-Solomons, reed-Muller, burst errors, erasures, interleaving

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module
None

Combination
None

Breakdown of Learning Time
<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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</table>
Practicals: 15  Tutorials p.w. 0
Tutorials: 0
Tests & Examinations: 8
Selfstudy: 72
Other: 0
Total Learning Time 150

Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type Continuous and Final Assessment (CFA)

Faculty Natural Sciences
Home Department Mathematics & Applied Mathematics
Module Topic Project
Generic Module Name Project
Alpha-numeric Code MAM748
NQF Level 8
NQF Credit Value 15
Duration Semester
Proposed semester to be offered. First or Second Semester
Programmes in which the module will be offered
- BSc Hons (Mathematical Science) (3736)
- BSc Hons (Computational Finance) (3739)

Year level 7

Main Outcomes
On completion of this module students should be able to:
- Do independent research on a chosen topic.
- Read relevant literature.
- Write a report which displays clarity of understanding, logical reasoning, the correct use of language (including subject vocabulary).

Main Content
- Students choose a given topic in consultation with the lecturer.

Pre-requisite modules None

Co-requisite modules None

Prohibited module Combination None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Assignments &amp; tasks:</td>
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<tr>
<td>Practicals:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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</tr>
</tbody>
</table>

Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type Continuous and Final Assessment (CFA)
### Rings and Modules 757

**Faculty:** Natural Sciences  
**Home Department:** Mathematics & Applied Mathematics  
**Module Topic:** Rings and Modules  
**Generic Module Name:** Rings and Modules 757  
**Alpha-numeric Code:** MAM757  
**NQF Level:** 8  
**NQF Credit Value:** 15  
**Duration:** Semester  
**Proposed semester to be offered:** First or Second Semester  
**Programmes in which the module will be offered:**  
BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)  
**Year level:** 7  
**Main Outcomes:** On completion of this module, students should be able to:  
- Well prepared for more advanced studies in rings and modules.  
- Well equipped to understand the intricate relationship between modules and their underlying rings.  
- Able to apply their knowledge in areas such as representation theory.  
**Main Content:**  
- Jacobson radical, Artinian rings, Schur’s lemma, Projective modules, Free modules, Semi-simple rings, Wedderburn Thoerem, Tensor products, Prime ideals and Nullstellensatz, Krüll’s intersection Theorem, Localization  
**Pre-requisite modules:** None  
**Co-requisite modules:** None  
**Prohibited module Combination:** None  
**Breakdown of Learning Time:**  
<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
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<tr>
<td>Other:</td>
<td>0</td>
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</tr>
<tr>
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<td>150</td>
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</table>

**Methods of Student Assessment:**  
Continuous Assessment (CA): 50%  
Final Assessment (FA): 50%  
**Assessment Module type:** Continuous and Final Assessment
<table>
<thead>
<tr>
<th>Proposed semester to be offered.</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module, students should be able to:  
• Have a firm foundation in functional analysis. |
| Main Content | • Normed linear spaces and Banach spaces  
• bounded linear operators  
• Inner product spaces and Hilbert spaces  
• Baire category theorem  
• Open mapping theorem  
• Closed graph theorem  
• Dual spaces, reflexive spaces  
• Hahn-Banach theorem  
• Banach-Steinhaus theorem  
• Riesz representation theorem |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 30 | Lectures p.w. | 2 |
| Assignments & tasks: | 25 | Practicals p.w. | 1 |
| Practicals: | 15 | Tutorials p.w. | |
| Tutorials: | 0 | | |
| Tests & Examinations: | 8 | | |
| Selfstudy: | 72 | | |
| Other: | 0 | | |
| Total Learning Time | 150 | | |
| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |
| Faculty | Natural Sciences |
| Home Department | Mathematics & Applied Mathematics |
| Module Topic | Numerical Analysis |
| Generic Module Name | Numerical Analysis 777 |
| Alpha-numeric Code | MAM777 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | First or Second Semester |
| Programmes in which the module will be offered | BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739) |
| Year level | 7 |
| Main Outcomes | On completion of this module, students should be able to:  
• Find numerical approximations to systems of linear equations, using both direct and iterative methods. |
Find numerical approximation for eigen-values and eigenvectors.
• Find polynomial approximation of functions, with error estimate.
• Find numerical solutions to boundary-value problems for ODEs.
• Find numerical solutions to parabolic and hyperbolic partial differential equations.

Main Content

• Perturbation Analysis of linear systems, matrix factorization, Error estimates and Iterative Refinements, QR-algorithm, Hermite Interpolation, cubic spline interpolation, Gaussian quadrature, Least squares approximations, Finite-difference method for linear and non-linear problems, Rayleigh Ritz method, Parabolic and hyperbolic PDE’s.

Pre-requisite modules

None

Co-requisite modules

None

Prohibited module

Combination

None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>25</td>
<td>Practicals p.w.</td>
</tr>
<tr>
<td>Practicals:</td>
<td>15</td>
<td>Tutorials p.w.</td>
</tr>
<tr>
<td>Tutorials:</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>8</td>
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</tr>
<tr>
<td>Selfstudy:</td>
<td>72</td>
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</tr>
<tr>
<td>Other:</td>
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</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
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<td></td>
</tr>
</tbody>
</table>

Methods of Student Assessment

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type

Continuous and Final Assessment
### Main Content
- Finite extensions, algebraic extensions, algebraic closure of Fields, Isomorphism extension theorem, splitting fields, separable extensions, perfect fields, Galois fields, Normal extensions, Main Theorem of Galois groups over finite fields, Extension by Radicals, Insolvability of the Quintic.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module Combination</td>
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</tbody>
</table>

#### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>30</td>
<td>Lectures p.w.</td>
<td>2</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>25</td>
<td>Practicals p.w.</td>
<td>1</td>
</tr>
<tr>
<td>Practicals:</td>
<td>15</td>
<td>Tutorials p.w.</td>
<td></td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
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<td>Other:</td>
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<td></td>
</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
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#### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

<table>
<thead>
<tr>
<th>Assessment Module type</th>
<th>Continuous and Final Assessment</th>
</tr>
</thead>
</table>

#### Faculty
- Natural Sciences

#### Home Department
- Mathematics & Applied Mathematics

#### Module Topic
- Cryptography

#### Generic Module Name
- Cryptography 797

#### Alpha-numeric Code
- MAM797

#### NQF Level
- 8

#### NQF Credit Value
- 15

#### Duration
- Semester

#### Proposed semester to be offered.
- First or Second Semester

#### Programmes in which the module will be offered
- BSc Hons (Mathematical Science) (3736); BSc Hons (Computational Finance) (3739)

#### Year level
- 7

#### Main Outcomes
- On completion of this module, students should be able to:
  - Have a firm foundation in the principles and methods of cryptography.

#### Main Content
- Classical Cryptography
- Shannon’s Theory
- Encryption Standards
- Public-key Cryptography
- RSA, ElGamal, Finite field, Elliptic curve, Knapsack and McEliece Cryptosystems
- Signature schemes
- Hash functions
- Key distribution
- Identification schemes
- Authentication codes
- Pseudo-random number generation
- Zero-knowledge proofs.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
</tbody>
</table>
Specialist Module in Medical Bioscience 701 (MBS701)
The content of the module offered will depend on staff availability, visiting lecturers, etc.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Applied Physiology for Dietetics II</td>
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<tr>
<td>Generic Module Name</td>
<td>MBS702</td>
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<tr>
<td>Alpha-numeric Code</td>
<td>MBS702</td>
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<td>NQF Level</td>
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<td>NQF Credit Value</td>
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<tr>
<td>Duration</td>
<td>Year</td>
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<tr>
<td>Proposed semester to be offered</td>
<td>Both Semesters</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Medical Biosciences) (3721)</td>
</tr>
<tr>
<td>Year level</td>
<td>7</td>
</tr>
</tbody>
</table>

**Main Outcomes**
On completion of this module, students should be able to:
- The students will develop competence in various hands-on laboratory techniques, information management and generation of data

**Main Content**
- The student will have to make a selection of a minimum number of departmentally approved techniques to constitute this module.
- The selection of techniques will be determined by the availability of lecturers and by the specific techniques required by the student’s research project.
- Examples of techniques that may be available:
  - Basic laboratory calculations
  - Laboratory etiquette and protocols
  - General lab behaviour
  - Working in a group
  - General lab rules
  - Project management, etc.
  - Microscopy
  - Enzyme linked immunosorbent assays (ELISA’s)
  - Bioinformatics Electrophysiological techniques
  - Molecular biology techniques
  - Polymerase Chain Reaction
Pre-requisite modules

- BSc. in Medical Biosciences or related field (minimum 60%)

Co-requisite modules

None

Prohibited module

None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
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<td>Tutorials:</td>
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<td></td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>12</td>
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<tr>
<td>Selfstudy:</td>
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<td></td>
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Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type

Continuous and Final Assessment (CFA)

Faculty

Natural Sciences

Home Department

Medical Biosciences

Module Topic

Research Project

Generic Module Name

Research Project

Alpha-numeric Code

MBS704

NQF Level

8

NQF Credit Value

50

Duration

Year

Proposed semester to be offered.

Both Semesters

Programmes in which the module will be offered

- BSc Hons (Medical Biosciences) (3721)

Year level

7

Main Outcomes

On completion of this module, students should be able to:
- The student will demonstrate competency in the planning, execution and presentation of a departmentally approved research project.

Main Content

- Selection of and planning of a research project
- Budget
- Protocol writing
- Execution of research
- Generation of data
- Project management
- Quantification and interpretation of scientific data
- Writing of a scientific report on the research project
- Presenting project (e.g. PowerPoint) – public lecture

Pre-requisite modules

BSc. in Medical Biosciences or related field (minimum 60%)
<table>
<thead>
<tr>
<th>Co-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibited module Combination</td>
<td>None</td>
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</table>

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<td>Tests &amp; Examinations:</td>
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<td>Selfstudy:</td>
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<tbody>
<tr>
<td></td>
<td>Final Assessment (FA): 0%</td>
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<table>
<thead>
<tr>
<th>Assessment Module type</th>
<th>Continuous Assessment (CA)</th>
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</thead>
</table>

<table>
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<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Specialist Module in Anatomical Science</td>
</tr>
<tr>
<td>Generic Module Name</td>
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<tr>
<td>Alpha-numeric Code</td>
<td>MBS705</td>
</tr>
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<tr>
<td>Duration</td>
<td>Semester</td>
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<td>Proposed semester to be offered.</td>
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<td>Programmes in which the module will be offered</td>
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</tr>
<tr>
<td>Year level</td>
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</table>

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module, students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Demonstrate a sound knowledge of theoretical aspect regarding morphological, histological and molecular techniques currently used for research in basic science.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate competence in various hands-on laboratory techniques and dissection techniques.</td>
</tr>
<tr>
<td></td>
<td>• Perform laboratory calculations, analyse data, and interpret scientific literature.</td>
</tr>
<tr>
<td></td>
<td>• Write and present a scientific report with proper referencing.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate competence in planning, execution and presentation of a dissection assignment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The module provides an introduction to molecular techniques used in scientific research,</td>
</tr>
<tr>
<td></td>
<td>• In addition, it offers basic training on writing and publishing scientific reports.</td>
</tr>
<tr>
<td></td>
<td>• Comprehensive lectures and dissection sessions will be introduced to enable graduates to specialize as anatomists.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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</tr>
<tr>
<td>Prohibited module Combination</td>
<td>None</td>
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<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Breakdown of Learning Time</td>
<td></td>
</tr>
<tr>
<td><strong>Hours</strong></td>
<td><strong>Timetable Requirement per week</strong></td>
</tr>
<tr>
<td>Contact with lecturer / tutor:</td>
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<tr>
<td>Assignments &amp; tasks:</td>
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</tr>
<tr>
<td>Practicals:</td>
<td>20</td>
</tr>
<tr>
<td>Tutorials:</td>
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</tr>
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<td>Tests &amp; Examinations:</td>
<td>10</td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>25</td>
</tr>
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<td>Other:</td>
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</tr>
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<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA): 50%</td>
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<tr>
<td>Assessment Module type</td>
<td>Continuous and Final Assessment (CFA)</td>
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</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Microbiology of Female Morbidity</td>
</tr>
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<td>Duration</td>
<td>Term</td>
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<td>Term 4</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Medical Biosciences) (3721)</td>
</tr>
<tr>
<td>Year level</td>
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</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain how women’s anatomy predisposes them to certain infections.</td>
</tr>
<tr>
<td></td>
<td>• Identify the role of women as childbearers, caregivers, users and managers of the local environment.</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate how the above roles impact on women’s susceptibility to disease.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Latrogenic causes of female morbidity and mortality (hospital acquired infections, side effects from drug/antibiotic over-use, malpractice).</td>
</tr>
<tr>
<td></td>
<td>• Environmental and occupational diseases (diseases due to air pollution and pesticides, health risks from migrant labour, waterborne infections).</td>
</tr>
<tr>
<td></td>
<td>• The microbial aetiology of female genito-urinary tract infections (cystitis, toxic shock syndrome, sexually transmissible diseases, septic abortion.</td>
</tr>
<tr>
<td></td>
<td>• Infections transmitted from mother to infant (those causing life-threatening pre-term and/or low weight births</td>
</tr>
<tr>
<td></td>
<td>• Infections that challenge the fetus causing birth defects.</td>
</tr>
<tr>
<td></td>
<td>• Effects of hormone shifts on women’s oral health (oral manifestations during menstruation; oral contraceptives and pregnancy; estrogen supplements during menopause).</td>
</tr>
</tbody>
</table>
Pre-requisite modules: None
Co-requisite modules: None
Prohibited module: None

Breakdown of Learning Time
\[
\begin{array}{|c|c|c|}
\hline
\text{Activity} & \text{Hours} & \text{Timetable Requirement per week} \\
\hline
\text{Contact with lecturer / tutor:} & 40 & \text{Lectures p.w.} & 5 \\
\text{Assignments & tasks:} & 10 & \text{Practicals p.w.} & 0 \\
\text{Tutorials:} & 0 & \text{Tutorials p.w.} & - \\
\text{Tests & Examinations:} & 15 & & \\
\text{Selfstudy:} & 27 & & \\
\text{Other:} & 8 & & \\
\hline
\text{Total Learning Time} & 100 & & \\
\hline
\end{array}
\]

Other teaching modes that does not require time-table:

Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

Assessment Module type:
- Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Medical Biosciences
Module Topic: Nutrition
Generic Module Name: Nutrition
Alpha-numeric Code: MBS708
NQF Level: 8
NQF Credit Value: 10
Duration: Term

Proposed semester to be offered:
Term 2

Programmes in which the module will be offered:
- BSc Hons (Medical Biosciences) (3721)

Year level: 7

Main Outcomes:
- Understand the role of the most important macro and micro-nutrients in human health.
- The learner will understand the importance of normal development during foetal life and the consequences of in utero compromise (e.g. due to lifestyle) on the future health of the individual.
- Understand the causes and consequences of deficiencies in one or more of these nutrients.
- Understand the approaches in addressing these deficiencies on a population or group scale.

Main Content:
- The course will cover the importance of the different macro and micro-nutrients in human health from a deficiency point of view. Attention will be on the role of these nutrients in health at different life stages. These stages will focus on pregnancy, infancy and the young child.
- The “foetal origins hypothesis” will be covered.
- Placental insufficiency and inheritance vs. maternal malnutrition.
- Impact of life style e.g. alcohol abuse, smoking, socio-
Attention will be given to the causes and the health consequences of these deficiencies throughout life. In addition, the strategies of how to address these deficiencies on a large scale (population and or groups) will be covered in detail.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module</td>
<td>None</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Other:</td>
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| Total Learning Time | 100 |

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<td>Final Assessment (FA): 50%</td>
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<tr>
<td>Home Department</td>
<td>Medical Biosciences</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Apoptosis and Cell Signalling</td>
</tr>
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<tr>
<th>Programmes in which the module will be offered</th>
<th>BSc Hons (Medical Biosciences) (3721)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
<td>7</td>
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</table>

**Main Outcomes**
- Demonstrate a sound knowledge of cell growth control.
- Interpret scientific literature regarding the cell cycle and the role of cell signalling in the control aspects of the cell cycle.
- Compare and contrast different types of cell death, including apoptosis and autophagy and the induction of apoptosis by various mechanisms.
- Appraise the role of tumorigenesis.

**Main Content**
- The Cell Cycle
- Checkpoints in the cell cycle
- Cyclin-dependent kinases
- Inhibitors of cyclin-dependent kinase
- Cell Death
- Necrosis, Apoptosis, atrophy and terminal differentiation, genetic control of programmed cell death
- Apoptosis and disease
<table>
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<tbody>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain physical activity under “normal” and “abnormal” conditions.</td>
</tr>
<tr>
<td></td>
<td>• Explain and evaluate exercise and exercise stress testing.</td>
</tr>
<tr>
<td></td>
<td>• Explain the effect of the environment on the above.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Work and exercise under “normal” conditions.</td>
</tr>
<tr>
<td></td>
<td>• Temperature acclimatization.</td>
</tr>
<tr>
<td></td>
<td>• Work in rarified atmospheres e.g. at high heights. (Mountaineering, aviation and space physiology)</td>
</tr>
<tr>
<td></td>
<td>• Underwater physiology (breath holding, SCUBA, submarine escape)</td>
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<tr>
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<td>• Exercise stress testing.</td>
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<th>Timetable Requirement per week</th>
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<th>Continuous Assessment (CA): 50%</th>
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<table>
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<tr>
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<th>Continuous and Final Assessment (CFA)</th>
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| Pre-requisite modules | None |
| Co-requisite modules  | None |
| Prohibited module     | None |
| Combination            | None |

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<th>Other teaching modes that does not require time-table</th>
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Practicals: 0  Tutorials p.w.  
Tutorials: 0  
Tests & Examinations: 15  
Selfstudy: 27  
Other: 8  
Total Learning Time 100  
Methods of Student Assessment  
- Continuous Assessment (CA): 50%  
- Final Assessment (FA): 50%  
Assessment Module type Continuous and Final Assessment (CFA)  

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<tr>
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<tr>
<td>Year level</td>
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</table>
| Main Outcomes            | On completion of this module students should be able to:  
  - Demonstrate a sound theoretical knowledge of cardiovascular control mechanisms at the cellular and molecular level.  
  - Explain and Evaluate the cellular and molecular mechanisms underlying some cardiac abnormalities.  
  - Demonstrate competence in the analysis and evaluation of scientific journal articles.  
| Main Content             | The Cellular basis of cardiovascular disease  
  - Diabetes and cardiovascular diseases  
  - Syndrome X and other relevant syndromes |  
| Pre-requisite modules    | None                     |  
| Co-requisite modules     | None                     |  
| Prohibited module        | None                     |  
| Combination              | None                     |  
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |  
| Contact with lecturer / tutor: | 40 Lectures p.w. | 3 |  
| Assignments & tasks:     | 20 Practical p.w.        | 0 |  
| Practicals:              | 0                        |  
| Tutorials:               | 0                        |  
| Tests & Examinations:    | 15                       |  
| Selfstudy:               | 25                       |  
| Other:                   | 8                        |  
| Total Learning Time      | 100                      |  
| Methods of Student Assessment | Continuous Assessment (CA): 50% |  
| Assessment Module type   | Continuous and Final Assessment (CFA) |  

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<td>Second Semester</td>
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</tbody>
</table>

| Programmes in which the module will be offered | BSc Hons (Medical Biosciences) (3721) |
| Year level | 7 |

| Main Outcomes | On completion of this module, students should be able to:  
- Explain the importance of normal development during fetal life and the consequences of in utero compromise (e.g. due to lifestyle) on the future health of the individual. |

| Main Content |  
- The “fetal origins hypothesis”.  
- The role of the placenta in fetal programming: Maternal nutrition and fetal programming. Placental weight and long-term outcomes. Fetal adaptations and developmental plasticity.  
- The placenta and fetal cardiovascular adaptations. The placenta and fetal body composition. The placenta and fetal endocrinology and metabolism. Maternal influences on the placenta  
- Placental insufficiency and inheritance vs. maternal malnutrition.  
- Impact of life style e.g. alcohol abuse, smoking, socio-economic factors |

| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
<p>| Assessment Module type | Continuous and Final Assessment (CFA) |</p>
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<td>Home Department</td>
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<tr>
<td>Module Topic</td>
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<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate a sound knowledge of basic reproductive anatomy and physiology.</td>
</tr>
<tr>
<td></td>
<td>• Interpret the concepts of reproductive health.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate, in terms of infertility, the role of reproductive habits and disease.</td>
</tr>
<tr>
<td></td>
<td>• Appraise the assisted reproductive strategies and implications there off.</td>
</tr>
<tr>
<td></td>
<td>• Recognize the importance of various strategies in terms of family planning and future directions.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Structural and functional considerations of the male and the female reproductive systems</td>
</tr>
<tr>
<td></td>
<td>The concept of ‘Reproductive Health’</td>
</tr>
<tr>
<td></td>
<td>The problem of infertility in females and males</td>
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<td>Infertility and disease/HIV/endometriosis</td>
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<td></td>
<td>Assisted reproduction: Advances and problems</td>
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<td>Family planning and contraception</td>
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<td>Year level</td>
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</table>

**Main Outcomes**

On completion of this module, students should be able to:
- Demonstrate a sound knowledge of pathways involved with immune responses.
- Evaluate the role of the immune system in fighting intracellular and extracellular pathogens and cancers.
- Explain and evaluate of the impacts of pharmaceuticals, pollutants and natural products on immune pathways and the effect on the immune defences.
- Demonstrate competencies in immunology techniques such as antibody production, ELISA, western blotting and lymphocyte stimulation assays.

**Main Content**

The Immune Pathways including:
- Phagocytosis
- The complement pathways
- Inflammation
- Humoral immunity
- Cell mediated immunity

Immune defences against:
- Extracellular pathogens
- Intracellular pathogens
- Cancers

The effect of immune pathways modulation on immune defences

Laboratory techniques in Immunology

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

| Contact with lecturer / tutor: | 50 | Lectures p.w. | 4 |
| Assignments & tasks:           | 5  | Practicals p.w. | 2 |
| Practicals:                    | 20 | Tutorials p.w.  | 0 |
| Tutorials:                     | 0  |                |   |
| Tests & Examinations:          | 5  |                |   |
| Selfstudy:                     | 15 |                |   |
| Other:                         | 5  |                |   |

**Total Learning Time** 100

**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)
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<tr>
<td>On completion of this module students should be able to:</td>
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<tr>
<td>• Be exposed to the world of telecommunication.</td>
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</tr>
<tr>
<td>• Be given a chance to use their physics skills in that field.</td>
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<tr>
<td>• Be able to understand and apply the knowledge gained in all areas of signals and telecommunications.</td>
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<tr>
<td><strong>Experimental laboratory: students will</strong></td>
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</tr>
<tr>
<td>• Be introduced to a research environment.</td>
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</tr>
<tr>
<td>• Be able to run a specific experiment or measurement linked to one of the running research programmes in the department.</td>
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</tr>
<tr>
<td>• Be able to use advanced equipment, to run an unknown measurement or analysis, to connect the information with published data and present it in a research report.</td>
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<tr>
<td><strong>Main Content</strong></td>
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<tr>
<td>Communication and electronics:</td>
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<tr>
<td>• Detectors and Electronics: A detailed discussion of the mathematics of signals, including Fourier transform methods</td>
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<tr>
<td>• An introduction to the field of data transmission</td>
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</tr>
<tr>
<td>• A discussion of computers, computer networks etc.</td>
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</tr>
<tr>
<td>• Data – its coding compression and transmission</td>
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<tr>
<td>• A discussion of the Internet, Broadband networks</td>
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</tr>
<tr>
<td>• Some practical work related to the above</td>
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<td><strong>Experimental laboratory:</strong></td>
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<td>• One selected experiment in advance experimental analysis from the following fields:</td>
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<td>• Materials Science,</td>
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<td>• Semiconductors,</td>
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<td>• Photovoltaics,</td>
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<td>• Superconductors</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CFA)

---

**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Applied and Computational Physics

**Generic Module Name**
- Physics 720

**Alpha-numeric Code**
- PHY720

**NQF Level**
- 8

**NQF Credit Value**
- 30

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Physical Science) (3714)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - **Quantum Physics:**
    - Apply the general ideas of Quantum Mechanics in various fields of modern physics and chemistry.
  - **Mathematical Methods:**
    - Apply the required advanced mathematical methods to solve physical problems.
  - **Electromagnetism:**
    - Apply the general ideas of EM theory in various fields of physics.
  - **Computational physics:**
    - Write and develop computer codes for calculation of physical data analysis, and generate computer simulations of physical models.

**Main Content**
- **Quantum Physics:**
  - Foundations of Classical Mechanics, Lagrange and Hamilton formalism.
  - Schrödinger equation.
  - Quantum amplitudes and state vectors.
  - Perturbation theory.
  - Particle scattering.
  - Angular momentum, spin.
- **Math Methods: A selection of mathematical functions applied in physics such as:**
  - Fourier transforms, matrices,
  - Legendre functions, Bessel functions, Eigen functions,
• Green’s functions, 
• Calculus of Variations, Tensor analysis. 
• Binomial, Poisson and Gaussian distributions.

**Electromagnetism**
- Electromagnetism: Potential formulations of electrodynamics 
- Gauge transformations 
- EM waves in conducting and non-conducting media 
- Electromagnetic radiation.

**Computation Physics:**
- Spreadsheet physics. 
- Numerical analysis using Fortran 77, 
- ordinary differential equation, 
- boundary values and eigenvalue problems, 
- Gaussian quadrature, 
- matrix operations, Monte Carlo methods 
- Numerical analysis using packages such as Mathematica

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>Prior mathematical knowledge of differential equations, calculus and integration and complex numbers</th>
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<tbody>
<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 25% 
- Final Assessment (FA): 75%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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<td>Home Department</td>
<td>Physics and Astronomy</td>
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<tr>
<td>Module Topic</td>
<td>Accelerator Science</td>
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<td>Generic Module Name</td>
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<td>Programmes in which the module will be offered</td>
<td>BSc Hons (Physical Science) (3714)</td>
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<tr>
<td>Year level</td>
<td>7</td>
</tr>
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</table>
| Main Outcomes | On completion of this module students should be able to: 
- Solve qualitative and quantitative problems associated with accelerators. |
- Solve and fix problems relate to accelerators and accelerator applications.
- Explain the various types of accelerators and how each of them operates.

**Main Content**
- Overview of Accelerators
- Maxwell equations
- AC optics
- Beam Diagnostics
- Linear Accelerators
- Beam Optics
- Ion Sources
- RF Systems
- Vacuum System
- Injection
- Extraction
- Application of Accelerators

**Pre-requisite modules**
- PHY720

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
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<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- Physics and Astronomy

**Module Topic**
- Quantum and Statistical Physics

**Generic Module Name**
- Physics 722

**Alpha-numeric Code**
- PHY722

**NQF Level**
- 8

**NQF Credit Value**
- 20

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- BSc Hons (Physical Science) (3714)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Explain the relationship between the generalised principles of Thermodynamics and the detailed postulates of Statistical Mechanics.
• Implement advanced quantum concepts and approximations to complex systems.

Main Content
• Thermodynamic probability
• Equation of state for a perfect gas
• Legendre Transforms
• Bose-Einstein and Fermi-Dirac distributions
• Two Electron Systems
• Scattering
• WKB and Born Approximations
• Transition Probabilities
• X-ray Emission and Absorption Spectra

Pre-requisite modules
PHY720

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time

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<th>Hours</th>
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Total Learning Time | 300 |

Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment

Faculty
Natural Sciences

Home Department
Physics and Astronomy

Module Topic
Nuclear Physics

Generic Module Name
Physics 723

Alpha-numeric Code
PHY723

NQF Level
8

NQF Credit Value
30

Duration
Semester

Proposed semester to be offered.
First Semester

Programmes in which the module will be offered
BSc Hons (Physical Science) (3714)

Year level
7

Main Outcomes
This is an introduction to the theoretical and experimental aspects of nuclear physics.
On completion of this module, students should be able to:
• Understand and apply the nuclear physics knowledge gained in nuclear physics application areas, such as research, isotope manufacturing or medical applications.
• Apply ethical issues related to nuclear physics.
• Do some nuclear experiments.
• Apply the theoretical knowledge of nuclear physics.
### Main Content
- Introduction to Nuclear Physics: Nuclear Models: Shell model, Collective Model and experimental methods
- Scattering theory
- Experimental research at the National Accelerator Centre and elsewhere
- Applied nuclear physics Radiation protection, Medical applications of isotopes The use of radioactivity Nuclear issues in society
- Selected topics in bulk nuclear properties, nucleon structure
- The nuclear force and two-nucleon system
- Nuclear structure models
- Nuclear decay and excitation, nuclear reactions
- Applied nuclear physics
- Social impacts of nuclear physics.
- Applied Nuclear Physics: Reactor Physics
- Advance Topics in a selected field (eg: environmental radioactivity, Radon, etc)

### Pre-requisite modules
None

### Co-requisite modules
PHY720

### Prohibited module
None

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<tr>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment (CFA)

### Faculty
Natural Sciences

### Home Department
Physics and Astronomy

### Module Topic
Theoretical Materials Science

### Generic Module Name
Physics 724

### Alpha-numeric Code
PHY724

### NQF Level
8

### NQF Credit Value
30

### Duration
Semester

### Proposed semester to be offered.
First Semester

### Programmes in which the module will be offered
BSc Hons (Physical Science) (3714)

### Year level
7

### Main Outcomes
On completion of this module students should be able to:

- **Solid State Physics:**
  - Apply the basics of modern theory of crystals.
  - Apply experimental methods to study crystals and know
the important electronic properties of metals and semiconductors.

- Do literature searches in related subjects and to know the main research tools in the field.

**Statistical Physics:**

- Be able to apply the basics of statistical mechanics.
- Know various applications in kinetic theory of gases, phonon and electron systems in solids.
- Be able to apply the basis of thermal electromagnetic radiation.
- Be able to explain the general ideas of entropy, statistical distribution functions.
- Be able to use the principles in various research fields.

**Semiconductor Physics:**

- Be able to apply the basic concepts of semiconductor theory and electronic characteristics.
- Be able to apply the physics concepts of amorphous material and amorphous semiconductors.
- Be able to understand the electronic processes occurring in semiconductor material and its relation to the characteristics of semiconductors.

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<thead>
<tr>
<th>Main Content</th>
<th>Solid State Physics:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Crystal structures, Bravais lattices, elements of crystal symmetry</td>
</tr>
<tr>
<td></td>
<td>• Reciprocal lattice and X-ray diffraction</td>
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<tr>
<td></td>
<td>• Phonons and inelastic neutron scattering</td>
</tr>
<tr>
<td></td>
<td>• Electron energy bands in metals and semiconductors.</td>
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<tr>
<td></td>
<td>• Free-electron model.</td>
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<td><strong>Statistical Physics:</strong></td>
</tr>
<tr>
<td></td>
<td>• Statistical mechanics:</td>
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<tr>
<td></td>
<td>• Combinatorics, distribution function, partition function, entropy.</td>
</tr>
<tr>
<td></td>
<td>• Equipartition of energy.</td>
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<tr>
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<td>• Ideal gas.</td>
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<td>• Paramagnetics.</td>
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<td>• Phonons. Photons and black-body radiation.</td>
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<td>• Planck formula.</td>
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<td>• Fermi-Dirac statistics of conducting electrons.</td>
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<td><strong>Semiconductor Physics:</strong></td>
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<tr>
<td></td>
<td>• Crystalline and amorphous semiconductors,</td>
</tr>
<tr>
<td></td>
<td>• doping, band theory.</td>
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<tr>
<td></td>
<td>• Electronic transport, mobility, resistivity.</td>
</tr>
<tr>
<td></td>
<td>• Recombination.</td>
</tr>
<tr>
<td></td>
<td>• Poisson equation, Ohm’s law, continuity equation.</td>
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<tr>
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<td>• P-N Junctions.</td>
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<td>• Application: photovoltaic solar cell</td>
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<table>
<thead>
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<th>Pre-requisite modules</th>
<th>PHY720</th>
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<tr>
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Practicals: 32  Tutorials p.w.: 0
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Tests & Examinations: 10
Selfstudy: 96
Other: 0
Total Learning Time: 200

Methods of Student Assessment:
- Continuous Assessment (CA): 40%
- Final Assessment (FA): 60%
Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Physics and Astronomy
Module Topic: Applied Materials Science
Generic Module Name: Physics 725
Alpha-numeric Code: PHY725
NQF Level: 8
NQF Credit Value: 20
Duration: Semester
Proposed semester to be offered: Second Semester
Programmes in which the module will be offered: BSc Hons (Physical Science) (3714)
Year level: 7

Main Outcomes:
On completion of this module students should be able to:

**Materials Science:**
- Apply advanced concepts in Materials Science and engineering.
- Apply the theoretical understanding to industrial applications.

Main Content:

**Material Science:**
- Diffusion mechanisms.
- Phase diagrams.
- Mechanical properties of solids
- Metals
- Polymers and composites
- Nanmaterials
- Advance topics (eg Magnetic materials, superconductors, photovoltaics, etc)

Pre-requisite modules: PHY724
Co-requisite modules: None
Prohibited module Combination: None

Breakdown of Learning Time:

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| Methods of Student Assessment | Continuous Assessment (CA): 40%  
Final Assessment (FA): 60% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

**Faculty**  
Natural Sciences

**Home Department**  
Physics and Astronomy

**Module Topic**  
Advance Analytic Techniques

**Generic Module Name**  
Physics 726

**Alpha-numeric Code**  
PHY726

**NQF Level**  
8

**NQF Credit Value**  
30

**Duration**  
Semester

**Proposed semester to be offered.**  
Second Semester

**Programmes in which the module will be offered**  
BSc Hons (Physical Science) (3714)

**Year level**  
7

**Faculty**  
On completion of this module students should be able to:  
**Photon based techniques:**  
- Obtain and analyse spectra from Rutherford backscattering spectroscopy.  
- Obtain and analyse spectra from Elastic Recoil Detection Analysis.  
- Obtain and analyse spectra from PIXIE spectroscopy.  

**Photon based:**  
- Explain the optical and electronic reaction of materials when exposed to electromagnetic waves in the range from ultra violet to infrared.  
- Know what material characteristics are determined from these reactions.  
- Understand the processes and theory of absorption, reflection and transmission of EM waves in dielectric materials.  
- Obtain and analyse X-ray diffraction spectra.  
- Obtain and analyse Raman and Infrared spectra.

**Electronmicroscopy:**  
- Know the theoretical concepts of electron diffraction and electron interaction with matter.  
- Apply it to the use of transmission and scanning electron microscopy.  
- Use the scanning and transmission electron microscopes.  
- Extract all the information contained in the images and spectra obtained using these instruments.

**Mechanical / electrical techniques:**  
- Set up the equipment and obtain and analyse the results from STM, AFM, 4-point probes, Hall effect and profilometry.

**Main Content**  
**Ion Based Techniques:**  
- Rutherford Back Scattering spectroscopy RBS  
- Elastic recoil detection analysis ERDA
Photon based techniques (XRD, Raman, Infrared, UV Vis, laser techniques):
- Lattice vibrations, Specific heat theory.
- Debye model phonons, lattice waves, dispersion.
- Semiconductor p-n junction and diode equation.
- Macroscopic optical properties, Lorentz oscillator.
- Absorption, dispersion and application dielectric theory.
- Infrared spectrometry

Electron based: Electron Microscopy:
- Electron interaction with matter,
- Basics of SEM, detectors,
- Resolution, magnification, depth of focus, depth of field.
- Basics of EDS analysis, detectors, qualitative and quantitative analysis.
- Basics of TEM, electron diffraction, imaging.
- Sample preparation techniques.

Mechanical/Electrical based
- Scanning Tunneling Microscopy STM
- Atomic Force Microscopy AFM
- Hall effect measurements
- Profilometry

Pre-requisite modules: PHY724
Co-requisite modules: None
Prohibited module Combination: None

<table>
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Methods of Student Assessment:
- Continuous Assessment (CA): 40%
- Final Assessment (FA): 60%

Assessment Module type: Continuous and Final Assessment (CFA)

Faculty: Natural Sciences
Home Department: Statistics and Population Studies
Module Topic: Official Statistics
Generic Module Name: Population Studies 703
Alpha-numeric Code: POP703
NQF Level: 8
NQF Credit Value: 15
Duration: Term
Proposed semester to be offered: First Term
Programmes in which the module will be offered: BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737)
Year level: 7
Main Outcomes
On completion of this module students should be able to:

- Appreciate the extent to which official statistics dominate the lives of citizens on a daily basis.
- Describe the processes of data collection, processing, analysis, and dissemination by Statistics South Africa.
- Learn some important calculations techniques used by Statistics South Africa that are not taught in other courses in the Department of Statistics.

Main Content
- History of Official Statistics; Why should governments gather statistics; The future of statistics; Census 1996 and Census 2001; Vital statistics in South Africa; Labor Force and General Household Surveys in South Africa; Economic and Industrial Surveys; Population projections; Index numbers; Development and poverty.

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time

<table>
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<tr>
<th>Time</th>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Statistics and Population Studies

Module Topic
Survey Methods

Generic Module Name
Population Studies 706

Alpha-numeric Code
POP706

NQF Level
8

NQF Credit Value
15

Duration
Term

Proposed semester to be offered.
First Term

Programmes in which the module will be offered
BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737)

Year level
7

Main Outcomes
On completion of this module students should be able to:
- Interpret and explain surveys and census.
- Draw questionnaires.
- Conduct a demographic survey.

Main Content
- Data collection processes
- How to conduct a survey
- Design of questionnaire
- Practical case
<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Assignments &amp; tasks:</td>
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| Assessment Module type | Continuous and Final Assessment (CFA) |

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<tr>
<td>Home Department</td>
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<tr>
<td>Module Topic</td>
<td>Demographic Analysis</td>
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<td>Population Studies 707</td>
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<td>Year</td>
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<td>Programmes in which the module will be offered</td>
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</table>

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Calculate a rate, Calculate proportion and ratios, Draw a “Lexis’Diagram”.</td>
</tr>
<tr>
<td></td>
<td>• Analyze mortality.</td>
</tr>
<tr>
<td></td>
<td>• Analyze any demographic event.</td>
</tr>
<tr>
<td></td>
<td>• Read and construct any demographic event tables.</td>
</tr>
<tr>
<td></td>
<td>• Know how to prepare and analyze data.</td>
</tr>
<tr>
<td></td>
<td>• Know how to evaluate quality of secondary data.</td>
</tr>
<tr>
<td></td>
<td>• Know how to respond to any demographic event.</td>
</tr>
<tr>
<td></td>
<td>• Prepare policy statements on any demographic issue.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Introduction to demography; Calculation of rate, ratios and proportions, Lexis’Diagram</td>
</tr>
<tr>
<td></td>
<td>• Demographic analysis of mortality</td>
</tr>
<tr>
<td></td>
<td>• Direct and indirect methods of analysis</td>
</tr>
<tr>
<td></td>
<td>• Deep analysis of any demographic events</td>
</tr>
<tr>
<td></td>
<td>• Transversal and longitudinal analysis</td>
</tr>
<tr>
<td></td>
<td>• Advanced demographic analysis of mortality</td>
</tr>
<tr>
<td></td>
<td>• Analysis of families and parity ratios; Analysis of fertility and fecundity</td>
</tr>
<tr>
<td></td>
<td>• Overview of migrations issues</td>
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</table>

| Pre-requisite modules | None |

509
<table>
<thead>
<tr>
<th><strong>Co-requisite modules</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Prohibited module Combination</strong></td>
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<td><strong>Breakdown of Learning Time</strong></td>
<td><strong>Hours</strong></td>
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<td>Tutorials</td>
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<td>Tests &amp; Examinations</td>
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<td>Selfstudy</td>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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</table>

**Faculty**
- Natural Sciences

**Home Department**
- Statistics and Population Studies

**Module Topic**
- Gender Issues and Reproductive Health

**Generic Module Name**
- Population Studies 708

**Alpha-numeric Code**
- POP708

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Term

**Proposed semester to be offered**
- Fourth Term

**Programmes in which the module will be offered**
- BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Know and interpret how to analyze gender issues.
  - Know how to analyze contraception’s questions.
  - Know how to analyze maternal and infant issues.
  - Know how to analyze reproductive health data.
  - How to provide policies on those questions.

**Main Content**
- Direct analysis of gender equity
- Direct and indirect analysis of maternal and child mortality and morbidity
- Direct analysis of contraception
- Critical analysis of data on reproductive health
- Use of available data (surveys)
- Use of demographic and health surveys (DHS)

**Pre-requisite modules**
- POP707 or equivalent knowledge

**Co-requisite modules**
- None

**Prohibited module Combination**
- None
<table>
<thead>
<tr>
<th>Tutorials:</th>
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<tbody>
<tr>
<td>Tests &amp; Examinations:</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

---

**Faculty**
- Natural Sciences

**Home Department**
- Statistics and Population Studies

**Module Topic**
- Social Demography

**Generic Module Name**
- Population Studies 709

**Alpha-numeric Code**
- POP709

**NQF Level**
- 8

**NQF Credit Value**
- 15

**Duration**
- Term

**Proposed semester to be offered.**
- Fourth Term

**Programmes in which the module will be offered**
- BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Examine linkages between demographic and social issues from an analytical perspective.
  - Up-dated examination of contemporary debates on the relationships between population and employment, education, elderly and social exclusion variables.
  - In-depth knowledge of theoretical perspectives on the social dimensions of demographic variables such as fertility, mortality and migration.

**Main Content**
- Background and importance of social demography

- Structural approach to social issues from a demographic perspective (age structures and education, employment, elderly)

- The demography of socially excluded

- Analytical approaches to social demography (persistence of high fertility, health and demographic transition, migration and urbanization)

**Pre-requisite modules**
- POP707 or equivalent knowledge

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor</td>
<td>21</td>
<td>Lectures p.w.</td>
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</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>30</td>
<td>Practicals p.w.</td>
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511
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<tbody>
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<td>Statistics and Population Studies</td>
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<tr>
<td>Module Topic</td>
<td>Mathematical Demography and Population Modeling</td>
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<tr>
<td>Year level</td>
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</tbody>
</table>
| Main Outcomes      | On completion of this module students should be able to:  
|                    | • Use mathematics to analyze demographic events from discrete to continuous forms.  
|                    | • Propose models of integrating population variables into development planning.  
|                    | • Use population models for prospective demographic analysis.  |
|                    | • Fertility functions. Selected applications. Instantaneous crude birth and death rates.  
|                    | • Population dynamics functions (exponential, stable, Malthusian, stationary) and applications. Population modeling and development planning. Applications to sectoral development.  |
| Pre-requisite modules | POP707 and some mathematical background in differential and integral calculus. |
| Co-requisite modules | None                     |
| Prohibited module Combination | None |

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Tutorials p.w.</td>
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<td>Tests &amp; Examinations:</td>
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### Methods of Student Assessment

<table>
<thead>
<tr>
<th>Assessment Module type</th>
<th>Continuous and Final Assessment (CFA)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Final Assessment (FA):</td>
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<tr>
<td>Faculty</td>
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</tr>
<tr>
<td>-------------------------</td>
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<tr>
<td>Module Topic</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Develop a short research proposal from a research question in the field of Population Studies or Demography.</td>
</tr>
<tr>
<td></td>
<td>• Conduct a literature review on current research trends in the field of study.</td>
</tr>
<tr>
<td></td>
<td>• Perform the relevant data analyses required to address the research question at the Honours level.</td>
</tr>
<tr>
<td></td>
<td>• Report the research outcomes in a format suitable for publication including critical evaluations of the data's significance and contextual relevance.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Development of a research proposal under the guidance of a research supervisor(s);</td>
</tr>
<tr>
<td></td>
<td>• Exposure to research in the field of Population Studies or Demography including the completion of a research project report under the guidance of the supervisor(s).</td>
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<tr>
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<td>Co-requisite modules</td>
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<td>Prohibited module</td>
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<td>Breakdown of Learning Time</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to: • Analyze a multivariate data set using an appropriate statistical technique required by the research hypothesis and execute various techniques to check for the assumption of normality.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Data summaries and graphical techniques, analysis and covariance structures, inferences about multivariate and linear models, multivariate normality, discrimination and classification</td>
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<td>Pre-requisite modules</td>
<td>STA331; STA332; Matrix Methods STA734 or equivalent; knowledge of SAS</td>
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| Faculty | Natural Sciences |
| Home Department | Statistics and Population Studies |
| Module Topic | Theoretical Statistics |
| Generic Module Name | Statistics 705 |
| Alpha-numeric Code | STA705 |
| NQF Level | 8 |
| NQF Credit Value | 15 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |
| Programmes in which the module will be offered | BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739) |
| Year level | 7 |
### Main Outcomes

On completion of this module students should be able to:
- Apply knowledge of statistical inference.

### Main Content

- Consistency of estimators; method of moments and maximum likelihood estimation; the delta method; confidence intervals; power and relative efficiency; likelihood ratio tests

### Pre-requisite modules

- STA331; STA332; MAT211; or equivalent

### Co-requisite modules

- None

### Prohibited module Combination

- None

### Breakdown of Learning Time

| Contact with lecturer / tutor: | 21 | Lectures p.w. | 3 |
| Assignments & tasks: | 60 | Practical p.w. | 2 |
| Practical: | 0 | Tutorials p.w. | 4 |
| Tests & Examinations: | 5 |
| Selfstudy: | 60 |
| Other: | 4 |
| **Total Learning Time** | **150** |

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

### Faculty

- Natural Sciences

### Home Department

- Statistics and Population Studies

### Module Topic

- Experimental Design I

### Generic Module Name

- Statistics 710

### Alpha-numeric Code

- STA710

### NQF Level

- 8

### NQF Credit Value

- 15

### Duration

- Term

### Proposed semester to be offered.

- First Term

### Programmes in which the module will be offered

- BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739)

### Year level

- 7

### Main Outcomes

On completion of this module students should be able to:
- Apply knowledge of principles in experimental design. Acquisition of advanced skills in statistical analysis of data from experiments (chemistry, physics, industry, environment, biochemistry, medical science, pharmacy, education). Examination of different techniques of experimental design such as completely randomized design, randomized complete block design, Latin square design, split-plot design, means separation. Exposure to practical examples drawn from different disciplines where such techniques are widely applied. Use of Chi-square in experimental data. Use of analysis of variance in assessing the robustness and fitness in regression analysis.
<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction and principles in experimental design</td>
<td></td>
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<td>• General considerations one one-way and two-way analysis of variance</td>
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<td>• The randomized complete block design</td>
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<td>• Mean separation methods</td>
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<td>• Latin square design; Split plot design</td>
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<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<td></td>
<td>• Explain various terms used in Bio statistical analyses and apply various statistical techniques applicable to medical related data.</td>
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<td>Main Content</td>
<td>Study design in medical related research; exploratory medical research including risk ratio’s, odds ratio’s, mortality and morbidity rates; Inferential medical research including non-parametric analyses, survival analysis and meta-analysis; regression analysis; and the analyses of a Bio statistical dataset using a statistical package</td>
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### Breakdown of Learning Time

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**Total Learning Time**: 150

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

---

**Faculty**: Natural Sciences

**Home Department**: Statistics and Population Studies

**Module Topic**: Matrix Methods

**Generic Module Name**: Statistics 734

**Alpha-numeric Code**: STA734

**NQF Level**: 8

**NQF Credit Value**: 15

**Duration**: Semester

**Proposed semester to be offered**: First Semester

**Programmes in which the module will be offered**: BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739)

**Year level**: 7

**Main Outcomes**: On completion of this module students should be able to:
- Deal with matrix operations in the statistical context.

**Main Content**
- Vector and matrix theory, linear transformations, systems of linear transformations

**Pre-requisite modules**: STA211; STA221, MAT 211; MAT221 or equivalent

**Co-requisite modules**: None

**Prohibited module Combination**: None

### Breakdown of Learning Time

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**Total Learning Time**: 150

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)
### Statistical Genetics in Human Traits

- **Faculty**: Natural Sciences
- **Home Department**: Statistics and Population Studies
- **Module Topic**: Statistical Genetics in Human Traits
- **Generic Module Name**: Statistics 736
- **Alpha-numeric Code**: STA736
- **NQF Level**: 8
- **NQF Credit Value**: 15
- **Duration**: Semester
  - **Proposed semester to be offered**: Second Semester
- **Programmes in which the module will be offered**:
  - BSc Hons (Statistical Science) (3737)
- **Year level**: 7
- **Main Outcomes**: On completion of this module students should be able to:
  - Report scientifically on knowledge and skills pertaining to a selection of Statistics/Demographical or Computational Finance topics not covered by any existing module.
- **Main Content**: Special topics as determined by the lecturer, visiting academic or industrial partner.
- **Pre-requisite modules**: None
- **Co-requisite modules**: None
- **Prohibited module Combination**: None
- **Breakdown of Learning Time**:

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- **Methods of Student Assessment**: Continuous Assessment (CA): 50%
  - Final Assessment (FA): 50%
- **Assessment Module type**: Continuous and Final Assessment (CFA)

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### Note

- **Faculty**: Natural Sciences
- **Home Department**: Statistics and Population Studies
- **Module Topic**: Statistical Genetics in Human Traits
- **Generic Module Name**: Statistics 736
- **Alpha-numeric Code**: STA736
- **NQF Level**: 8
- **NQF Credit Value**: 15
- **Duration**: Semester
  - **Proposed semester to be offered**: Second Semester
- **Programmes in which the module will be offered**:
  - BSc Hons (Statistical Science) (3737)
- **Year level**: 7
### Main Outcomes
On completion of this module students should be able to:
- Apply introductory knowledge on the development of statistical genetics. Practical application and interpretation of linkage analysis, variance components methods and association analysis.

### Main Content
- Introduction to relevant aspects of human genetics; Mendelian inheritance,
- Linkage analysis,
- Association analysis of dichotomous and quantitative traits for case-control and family based study designs,
- Introduction to software for human genetical analyses.

### Pre-requisite modules
STA701, STA733 and COF712

### Co-requisite modules
None

### Prohibited module Combination
None

### Breakdown of Learning Time

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### Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

### Assessment Module type
Continuous and Final Assessment

### Faculty
Natural Sciences

### Home Department
Statistics and Population Studies

### Module Topic
Statistical Modelling I

### Generic Module Name
Statistical Modelling

### Alpha-numeric Code
STA737

### NQF Level
8

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
First Semester

### Programmes in which the module will be offered
BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739)

### Year level
7

### Main Outcomes
On completion of this module students should be able to:
- Understand concepts of statistical modeling.
- Compare variable selection techniques.
- Apply and test linear and non-linear modeling.
- Evaluate and select classification methods.
- Understand sampling methods.
- Assess statistical models.
Main Content

- Prepare data for modelling (missing data imputation, transformations, resampling, parsing)
- Explore variable selection techniques
- Data modelling and assessment

Pre-requisite modules
None

Co-requisite modules
None

Prohibited module Combination
None

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<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Statistics and Population Studies

Module Topic
Data Mining 1

Generic Module Name
Statistics 760

Alpha-numeric Code
STA760

NQF Level
8

NQF Credit Value
15

Duration
Semester

Proposed semester to be offered
Second Semester

Programmes in which the module will be offered
BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739)

Year level
7

Main Outcomes
On completion of this module students should be able to:
- Design and execute various Data Mining techniques, from extraction of huge data repositories to modeling of the data.
- Techniques covered would include:
  - Decision tree analyses, clustering, visual data analyses, regression and classification.

Main Content
- Data management and processing;
- Statistical inference techniques explored, Classification, association and clustering, post-processing of discovered structures.

Pre-requisite modules
STA331; STA332 or equivalent

Co-requisite modules
None

Prohibited module Combination
None
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**Methods of Student Assessment**
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

**Assessment Module type**
- Final Assessment (FA)

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**Faculty**
- Natural Sciences

**Home Department**
- Statistics and Population Studies

**Module Topic**
- Research Project

**Generic Module Name**
- Honors Project

**Alpha-numeric Code**
- STA761

**NQF Level**
- 8

**NQF Credit Value**
- 30

**Duration**
- Year

**Proposed semester to be offered.**
- Both Semesters

**Programmes in which the module will be offered**
- BSc Hons (Population Studies) (3738); BSc Hons (Statistical Science) (3737); BSc Hons (Computational Finance) (3739)

**Year level**
- 7

**Main Outcomes**
- On completion of this module students should be able to:
  - Make a small contribution with limited scope to knowledge in the field of Statistics, Population Studies and Demography or Computational Finance and its interaction with another field or discipline, following upon a research question with the potential to make such a satisfactory contribution.
  - Carry out and report on this research in a format suitable for publication.
  - Concomitant outcomes will normally include personal skills development supporting the required research and writing activities under the guidance of the supervisor(s).

**Main Content**
- The primary task is to develop the research proposal towards its envisaged goal(s), conducting the research and preparing the research project under the guidance of the supervisor(s), before submitting it for assessment;
- Research proposals may derive from any area of Statistics, Population Studies and Demography or Computational Finance in interaction with another field or discipline, and may include substantial historical and/or comparative studies.

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**Pre-requisite modules**
- None

**Co-requisite modules**
- None
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<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Use the appropriate projective methods for the estimation of future growth of population by age, urban/rural population, households, labour force and school enrolments.</td>
</tr>
<tr>
<td></td>
<td>• Incorporate past demographic trends in the elaboration of projective outputs.</td>
</tr>
<tr>
<td></td>
<td>• Relate the projective methods learned in class with those applied in the world reports produced by international organizations such as UNFPA, UN, WHO.</td>
</tr>
<tr>
<td></td>
<td>• Use software to produce projective computations.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Scope and data for population projections, projections by sex and age, projection of urban and rural population, projection of labour force, projection of households for local planning, projection of school level enrolments and projection by level of education, selected topics, computerized-assisted applications.</td>
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| Methods of Student Assessment | | |
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| Continuous Assessment (CA): 50% | Final Assessment (FA): 50% |

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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Conduct an original review and critique of the application of IWRM in a water resources management project.</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the extent to which the principles of IWRM have been applied in practice (provide a well-reasoned reflective write-up).</td>
</tr>
<tr>
<td></td>
<td>• Integrate an understanding of various aspects of water resources management in evaluating management practice in the water sector.</td>
</tr>
<tr>
<td></td>
<td>• Write a well-reasoned, clear, coherent and professionally formatted report on the application of IWRM in practice.</td>
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</table>

<table>
<thead>
<tr>
<th>Main Content</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• The National Water Strategy, Catchment Management Agencies and Management Plans.</td>
</tr>
<tr>
<td></td>
<td>• Tools in IWRM (Resource-Directed Measures, water conservation and demand management strategies, communication, public participation, water pricing, water economics).</td>
</tr>
<tr>
<td></td>
<td>• Water demand and use: Water use license applications.</td>
</tr>
<tr>
<td></td>
<td>• Culture and organisations: Values, norms, practices, perceptions</td>
</tr>
<tr>
<td></td>
<td>• Stakeholder engagement perspective of organisations.</td>
</tr>
<tr>
<td></td>
<td>• Power &amp; decision making in organisations: roles &amp; responsibilities.</td>
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<tr>
<td></td>
<td>• Leadership challenges in complex organisations.</td>
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<p>| Pre-requisite modules | None |
| Co-requisite modules | None |</p>
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<tr>
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<td>Assessment Module type</td>
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Faculty: Natural Sciences
Home Department: Institute for Water Studies, Department of Earth Sciences
Module Topic: Integrated Water Resources Management (IWRM)
Generic Module Name: Water Resources Management
Alpha-numeric Code: WAT732
NQF Level: 8
NQF Credit Value: 20
Duration: Semester
Proposed semester to be offered: First Semester
Programmes in which the module will be offered: Postgraduate Diploma in Integrated Water Resources Management (IWRM) (3880)
Year level: 1

Main Outcomes:
On completion of this module students should be able to:
- Describe how the water resources system works (processes, principles, interactions, functions, components, approaches)
- Explain water resources planning, implementation and information
- Assess various methods for protecting water resources
- Explain and conduct water resources assessment and monitoring
- Evaluate principles and approaches for water demand and use
- Evaluate water resources allocation, authorisation and licensing
- Assess water management institutions and water governance

Main Content:
- Water resources system including hydrological cycle
- Water resources information, planning, and implementation
- Water resources protection, water policy implementation
- Water resources assessment and monitoring
- Water demand and use in various sectors
- Water resources allocation, authorization and licensing
- Water management institutions and water governance

Pre-requisite modules: None
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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**Faculty** Natural Sciences  
**Home Department** Institute for Water Studies, Department of Earth Sciences  
**Module Topic** Integrated Water Resources Management (IWRM)  
**Generic Module Name** Spatial Analysis for IWRM  
**Alpha-numeric Code** WAT733  
**NQF Level** 8  
**NQF Credit Value** 20  
**Duration** Semester  
**Proposed semester to be offered.** First Semester  
**Programmes in which the module will be offered** Postgraduate Diploma in Integrated Water Resources Management (IWRM) (3880)  
**Year level** 1  

**Main Outcomes**  
On completion of this module students should be able to:  
- Conduct a fully-integrated spatial analysis to support water management in a selected study area, and to use the spatial analysis products to describe and illustrate the physiographic setting of the area, and to identify and characterise spatial aspects of water resources management.  
- Apply GIS and remote sensing concepts and analysis tools to investigate spatial aspects of surface water processes, groundwater processes, geomorphology, and land cover / use.  
- Develop GIS-based models of Earth surface processes and spatial decision-making processes.  

**Main Content**  
- Introductory GIS and remote sensing tutorials, on data capture, management and storage, preparation, analysis, and display.  
- Terrain analysis for analytical hydrology / geomorphology models.  
- Remote sensing; spectral indices for vegetation, surface water, groundwater, and fire mapping.  
- Analytical modelling of physical processes.  
- Modelling the environmental decision making process (suitability mapping).
Pre-requisite modules
None

Co-requisite modules
None

Prohibited module
Combination
None

Breakdown of Learning Time

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Total Learning Time 200

Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type
Continuous and Final Assessment (CFA)

Faculty
Natural Sciences

Home Department
Institute for Water Studies, Department of Earth Sciences

Module Topic
Integrated Water Resources Management (IWRM)

Generic Module Name
Environmental Management & Water Regulations

Alpha-numeric Code
WAT734

NQF Level
8

NQF Credit Value
20

Duration
Semester

Proposed semester to be offered
First Semester

Programmes in which the module will be offered
Postgraduate Diploma in Integrated Water Resources Management (IWRM) (3880)

Year level
1

Main Outcomes
On completion of this module students should be able to:
• Explain management tools for managing natural resources.
• Assess management practices for natural resources using appropriate techniques/approaches.
• Describe environmental governance including frameworks, policies, regulations and institutions.
• Evaluate various methods for prevention and remediation of environmental problems.
• Explain the relations between water and the constitution.
• Explain the role of legal instruments in protecting and using water.
• Evaluate water management strategies and enforcement mechanisms using legal tools including criminal and civil regulations.

Main Content
• Environmental management tools and management practices.
• Environmental impact assessment and environmental governance.
• Methods for preventing and remediating water pollution.
• Water and the constitution for water protection and use.
• Water management strategies and enforcement mechanisms.

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<tr>
<td>Module Topic</td>
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<tr>
<td>Generic Module Name</td>
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<td>Second Semester</td>
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<td>Year level</td>
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<table>
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<tbody>
<tr>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td>• Present a comprehensive conceptual understanding of water quality, including the major processes responsible for governing and modifying water quality.</td>
</tr>
<tr>
<td>• Plan and conduct water quality analyses based on project objectives, and implement data quality assessment and data quality control procedures.</td>
</tr>
<tr>
<td>• Apply expertise in field and laboratory data interpretation to quantify the water quality of surface and groundwater.</td>
</tr>
<tr>
<td>• Develop a scientific report evaluating and interpreting the results of water quality analyses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>• Theoretical background for surface and groundwater quality.</td>
</tr>
<tr>
<td>• Chemical, physical and biological processes responsible for water quality variation.</td>
</tr>
<tr>
<td>• Water quality classification.</td>
</tr>
</tbody>
</table>
- Designing sampling strategies, setting up field equipment, field data collection, and analyses.
- QA and QC Reporting, data interpretation, and report writing.

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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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<td>Institute for Water Studies, Department of Earth Sciences</td>
</tr>
<tr>
<td>Module Topic</td>
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<td>Generic Module Name</td>
<td>Aquatic Ecosystems Management</td>
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</tr>
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<td>Year level</td>
<td>7</td>
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</table>

**Main Outcomes**
- On completion of this module students should be able to:
  - Distinguish between and classify different types of river and wetland ecosystem.
  - Describe and evaluate fundamental hydrogeomorphological controls on the dynamics of rivers and wetlands.
  - Undertake basic assessments of ecological integrity and ecosystem service provision for a river or wetland in South Africa, and develop a management plan based on these assessments.

**Main Content**
- Ecosystem classification systems theory, and classification systems for South African river and wetland types.
- Applied fluvial geomorphology; river and wetland dynamics in dryland environments, the hydrological and geomorphological basis of river and wetland ecological integrity.
• Bioindicators of ecological integrity.
• Ecological integrity assessment approaches for rivers and wetlands.
• Ecosystem services in river and wetland environments; description, measurement and management.

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Faculty Natural Sciences
Home Department Institute for Water Studies, Department of Earth Sciences
Module Topic Integrated Water Resources Management (IWRM)
Generic Module Name Environmental Education & Water Security
Alpha-numeric Code WAT737
NQF Level 8
NQF Credit Value 20
Duration Semester
Proposed semester to be offered Second Semester
Programmes in which the module will be offered Postgraduate Diploma in Integrated Water Resources Management (IWRM) (3880)
Year level 7
Main Outcomes On completion of this module students should be able to:
• Apply the philosophy, principles and practices of Environmental Education in a water education and awareness project.
• Explain the link between water and security, human security and water security and be able to communicate these ideals to a broad audience.
• Demonstrate the role of water for health and water for food from the perspective of water as a human security indicator.
• Evaluate various mechanisms for ensuring peaceful management and utilization of transboundary water resources for development.

Main Content Philosophy, principles and practice of environmental education.
- Environmental education and the community: public participation, sustainable living.
- Water security, human security and development.
- Water in development including water and gender.
- Water for health and water for food.
- Rural water and water for cities: Water access related issues.

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None

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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Institute for Water Studies, Department of Earth Sciences

**Module Topic**
Integrated Water Resources Management (IWRM)

**Generic Module Name**
Water Demand Management for Sustainable Development

**Alpha-numeric Code**
WAT738

**NQF Level**
8

**NQF Credit Value**
20

**Duration**
Semester

**Proposed semester to be offered**
Second Semester

**Programmes in which the module will be offered**
Postgraduate Diploma in Integrated Water Resources Management (IWRM) (3880)

**Year level**
7

**Main Outcomes**
On completion of this module students should be able to:
- Conduct a critical review of the processes and context of international, national and local agendas for achieving the UN Sustainable Development Goals using IWRM principles.
- Apply principles of SMART and SWOT analysis in designing, implementing, motoring, evaluating and managing water projects.
- Develop a proposal for a ‘water and development’, ‘water in development’ or ‘water for development’ project.
- Conduct a basic assessment on feasibility of water demand management strategies, interventions, options, innovations, and technologies in different settings.
• Explain inter-relationships between socio-political processes, technical processes and hydrological processes in shaping access to water in urban areas.

Main Content
• The concept and principles of sustainable development.
• Water development programmes and projects.
• Water allocation and water resource assessment.
• Water demand and use: Sectors and methods.
• Water demand management: Concept, definitions and principles.

Pre-requisite modules None
Co-requisite modules None
Prohibited module combination None

Breakdown of Learning Time

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Total Learning Time 200

Methods of Student Assessment
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

Assessment Module type Continuous and Final Assessment (CFA)
<table>
<thead>
<tr>
<th>Prohibited module Combination</th>
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<tbody>
<tr>
<td><strong>Breakdown of Learning Time</strong></td>
<td><strong>Hours</strong></td>
</tr>
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<tr>
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<td>Tutorials:</td>
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<td>Tests &amp; Examinations:</td>
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<tr>
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<td>Other:</td>
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<td><strong>Total Learning Time</strong></td>
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<tr>
<td><strong>Methods of Student Assessment</strong></td>
<td>Continuous Assessment (CA): 0%</td>
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<tr>
<td></td>
<td>Final Assessment (FA): 100%</td>
</tr>
<tr>
<td><strong>Assessment Module type</strong></td>
<td>Final Assessment (FA)</td>
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**Faculty**  
Natural Sciences  
**Home Department**  
Mathematics - AIMS  
**Module Topic**  
Communication skills, computing and LaTeX  
**Generic Module Name**  
Communication skills, computing and LaTeX 811  
**Alpha-numeric Code**  
AIM811  
**NQF Level**  
8  
**NQF Credit Value**  
7  
**Duration**  
Semester  
**Proposed semester to be offered.**  
First Semester  
**Programmes in which the module will be offered**  
MSc (Mathematical Science) (3849)  
**Year level**  
1  
**Main Outcomes**  
On completion of this module students should be able to:  
- Demonstrate the ability to communicate their work, both verbally and through writing.  
- Be able to write and present objectively.  
- Understand and know the importance of effective science report writing and referencing.  
- Understand the aims computing facilities; good security practice; acceptable use policies.  
- Understand ubuntu desktop and google apps; netiquette.  
- Work efficiently learning latex, texmaker, and graphics programs for typesetting scientific reports, command line and software development skills.  
- Understand professional and ethical issues in the scientific environment.  
**Main Content**  
- This course introduces the students to the essentials of English communication, writing and presentation in a scientific environment, and also to the AIMS computing facilities and packages.  
- The course covers an introduction to LaTeX using texmaker, followed by working through the book: http://en.wikibooks.org/wiki/LaTeX, and associated documents such as the American Mathematical Society.
Time is spent on scientific writing and presentation. General queries about the Ubuntu desktop, Google Apps, and using various science software, interpreters, or compilers via a simple text editor and terminal, a language specific interpreter, and optionally a full front-end for some languages (notebook for SAGE, rstudio for R) are dealt with.

- The course also covers how to install Ubuntu and maintain one's own computer with Free Software scientific applications added, in a similar way the AIMS desktops are managed and updated. It explores the Ubuntu ecosystem, release schedules, security, software sources. If time allows: installing from source in various programming languages. We cover using cloud services for backups and syncing preferences, plus recovering a lost password. We end with a brief look at possible futures of technology.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module Combination
None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>22</td>
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<td>Selfstudy:</td>
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<td>Other:</td>
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<td><strong>Total Learning Time</strong></td>
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| Methods of Student Assessment | | | |
|-------------------------------|------------------|------------------|
| Continuous Assessment (CA): | 100% | Final Assessment (FA): | 0% | |

<table>
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<th>Assessment Module type</th>
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<table>
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<th>Natural Sciences</th>
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</thead>
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<tr>
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</tr>
<tr>
<td>Module Topic</td>
<td>Mathematical problem solving</td>
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<tr>
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<td>Alpha-numeric Code</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>MSc (Mathematical Science) (3849)</td>
</tr>
<tr>
<td>Year level</td>
<td>5</td>
</tr>
</tbody>
</table>
| **Main Outcomes** | On completion of this module students should be able to:  
• Understand and gain practical experience of different approaches to problem solving and research. |
| **Main Content** | • The consideration of a variety of elementary, but challenging problems in different branches of pure mathematics. Investigations, comparisons of different methods of attack, literature searches, solutions and generalisations of the problems will arise in discussions in class. |
| **Pre-requisite modules** | None |
| **Co-requisite modules** | None |
| **Prohibited module Combination** | None |
| **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| Contact with lecturer: / tutor: | 22 | Lectures p.w. | 0 | No Timetable Requirements. |
| Assignments & tasks: | 12 | Practicals p.w. | 0 | |
| Practicals: | 0 | Tutorials p.w. | 0 | |
| Tutorials: | 0 | | | |
| Tests & Examinations: | 8 | | | |
| Selfstudy: | 32 | | | |
| Other: | 0 | | | |
| **Total Learning Time** | 74 | | | |
| **Methods of Student Assessment** | Continuous Assessment (CA): 100% |
| | Final Assessment (FA): 0% |
| **Assessment Module type** | Continuous Assessment (CA) |
| **Faculty** | Natural Sciences |
| **Home Department** | Mathematics - AIMS |
| **Module Topic** | Problem solving in Physics |
| **Generic Module Name** | Problem solving in Physics 813 |
| **Alpha-numeric Code** | AIM813 |
| **NQF Level** | 8 |
| **NQF Credit Value** | 7 |
| **Duration** | Semester |
| **Proposed semester to be offered.** | First Semester |
| **Programmes in which the module will be offered** | MSc(Mathematical Science) (3849) |
| **Year level** | 5 |
| **Main Outcomes** | On completion of this module students should be able to:  
• Understand that Physics describes the real world using the language of mathematics.  
• Gain practical experience of different approaches to problem solving and research. |
<p>| <strong>Main Content</strong> | • Problem solving techniques in a variety of physics areas. This includes using different reference frames, estimating orders of magnitude, dimensional analysis, and numerical approaches will be used. Examples will be taken from physics of moving objects electrodynamics, gravity, movement of molecules in gases and elementary particle physics. |
| <strong>Pre-requisite modules</strong> | None |</p>
<table>
<thead>
<tr>
<th>Co-requisite modules</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Prohibited module</td>
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<tr>
<td>Combination</td>
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Tests &amp; Examinations:</td>
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<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
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<tr>
<td>Total Learning Time</td>
<td>74</td>
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</table>

| Methods of Student         | Continuous Assessment (CA): 100% | Final Assessment (FA): 0% |
| Assessment                 |                                    |                           |

| Assessment Module type     | Continuous Assessment (FA)         |

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<th>Natural Sciences</th>
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<tbody>
<tr>
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<td>Mathematics - AIMS</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Scientific software development in Python</td>
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<td>Duration</td>
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<td>Proposed semester to be</td>
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<td>Programmes in which the</td>
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<td>module will be offered</td>
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<td>Year level</td>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Demonstrate the ability to craft simple computational</td>
</tr>
<tr>
<td></td>
<td>models.</td>
</tr>
</tbody>
</table>

| Main Content               | The students will be presented the fundamentals of        |
|                            | imperative programming, that is, sequential, conditional  |
|                            | and iterative flow structures. This will allow students  |
|                            | to solve simple problems by means of the computer.        |
|                            | Modularity will be introduced as the tool that will allow |
|                            | students to tackle larger problems by decomposing them   |
|                            | into smaller ones. Once this basis is well established,  |
|                            | several higher level concepts will be introduced such as  |
|                            | the use of files, strings, and an overview of the scipy   |
|                            | library.                                                |

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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<tr>
<td>Prohibited module</td>
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</tr>
<tr>
<td>Combination</td>
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</table>

<table>
<thead>
<tr>
<th>Breakdown of Learning</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
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<td>Time</td>
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<td></td>
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<td>Contact with lecturer / tutor:</td>
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<td>Assignments &amp; tasks:</td>
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<td>Selfstudy:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)

---

**Faculty**
- Natural Sciences

**Home Department**
- Mathematics - AIMS

**Module Topic**
- Experimental mathematics with SAGE

**Generic Module Name**
- Experimental mathematics with SAGE 815

**Alpha-numeric Code**
- AIM815

**NQF Level**
- 8

**NQF Credit Value**
- 7

**Duration**
- Semester

**Proposed semester to be offered.**
- First Semester

**Programmes in which the module will be offered**
- MSc (Mathematical Science) (3849)

**Year level**
- 5

**Main Outcomes**
- On completion of this module students should be able to:
  - Understand a short contextual history of computing have gained an introduction to the sage interface and programming skills needed for working in the scientific environment.

**Main Content**
- Emphasis is placed on how one would explore and analyse mathematical problems involving computation and the tools and methods needed for doing this quickly.
- Problems of various kinds from analysis, number theory and linear algebra are investigated.

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<td>Tutorials:</td>
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<td></td>
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<td></td>
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<tr>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)
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<tr>
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<tr>
<td>Module Topic</td>
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<td>Duration</td>
<td>Semester</td>
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<tr>
<td>Proposed semester to be offered.</td>
<td>First Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>MSc (Mathematical Sciences) (3849)</td>
</tr>
<tr>
<td>Year level</td>
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</tr>
<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Gain an understanding of a mathematical/ statistical area which builds on and complements the problem solving and computational courses.</td>
</tr>
<tr>
<td></td>
<td>• This course is designed to lead on to the advanced topics in mathematical sciences.</td>
</tr>
<tr>
<td>Main Content</td>
<td>Areas covered include concepts in analysis, geometry, discrete mathematics and statistics</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
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</tr>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
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<td>Prohibited module Combination</td>
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<td>Breakdown of Learning Time</td>
<td>Hours: 22 Time Table Requirement per week: Lectures p.w. 0 No Timetable Requirements.</td>
</tr>
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<td>74</td>
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<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA):100% Final Assessment (FA):0%</td>
</tr>
<tr>
<td>Assessment Module type</td>
<td>Continuous Assessment (CA)</td>
</tr>
</tbody>
</table>

537
• Be introduced to selected employability, business entrepreneurship and presentation skills.

**Main Content**

These skills include a selection from:

**Employability:**
- CV writing, business communications, presentations, interviewing, career search strategies, leadership and negotiation.

**Business skills:**
- Building basic business skills such as financial analysis, management and leadership, problem analysis, with ongoing focus on communication and presentation skills.

**Entrepreneurial skills:**
- Developing project management, business planning, budgeting, marketing and presentation skills based on a relevant country/development issue.

<table>
<thead>
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<th>None</th>
</tr>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

**Assessment Module type**
- Continuous Assessment (CA)

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<tr>
<td>Home Department</td>
<td>Mathematics – AIMS</td>
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<tr>
<td>Module Topic</td>
<td>Advanced topics in the mathematical sciences A: Mathematics and its applications</td>
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<td>First Semester</td>
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</tr>
<tr>
<td>Year level</td>
<td>1</td>
</tr>
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</table>

**Main Outcomes**
- On completion of this module students should be able to:
  - Demonstrate an independent, inquiring approach to contemporary mathematics.
  - Demonstrate the ability to embark on advanced graduate work in a cutting edge area of mathematics.
- Understand the steps in and evaluate the suitability of modelling physical systems.
- Demonstrate the ability to employ abstract structures and forms of reasoning to understand novel mathematical behaviour.

### Main Content

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Time Description</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>198</td>
<td>Lectures p.w.</td>
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<tr>
<td>Assignments &amp; tasks:</td>
<td>132</td>
<td>Practicals p.w.</td>
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<tr>
<td>Practicals:</td>
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<td>Tutorials p.w.</td>
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</tr>
<tr>
<td>Tutorials:</td>
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<td></td>
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<tr>
<td>Tests &amp; Examinations:</td>
<td>88</td>
<td></td>
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</tr>
<tr>
<td>Self-study:</td>
<td>352</td>
<td></td>
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</tr>
<tr>
<td>Other:</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
<td><strong>770</strong></td>
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</tbody>
</table>

### Methods of Student Assessment
- Continuous Assessment (CA): 100%
- Final Assessment (FA): 0%

### Faculty
- Natural Sciences

### Home Department
- Mathematics – AIMS

### Module Topic
- Advanced topics in the mathematical sciences B: Physics, Mathematics and its applications

### Generic Module Name
- Advanced topics in the mathematical sciences B: Physics, Mathematics and its applications 819

### Alpha-numeric Code
- AIM819

### NQF Level
- 9

### NQF Credit Value
- 77

### Duration
- Semester

### Proposed semester to be offered
- First Semester

### Programmes in which the module will be offered
- MSc (Mathematical Science) (3849)

### Year level
- 1

### Main Outcomes
- On completion of this module students should be able to:
  - Understand the steps in an independent, inquiring approach to contemporary Physics.
  - Demonstrate the ability to embark on advanced graduate work in a cutting edge area of Physics.
  - Understand the steps in and evaluate the suitability of modelling physical systems.
  - Demonstrate the ability to apply mathematical methods.
| Main Content | Selected topics from:  
| | • Electromagnetism, Relativity, Quantum mechanics, Quantum computing, Quantum field theory, Non-linear waves, Topology and Geometry, Robotics, Statistical inference, Complex systems, Modelling discrete and continuous systems |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer: / tutor: | 198 | Lectures p.w. | 0 | No Timetable Requirements. |
| Assignments & tasks: | 132 | Practicals p.w. | 0 |
| Practicals: | 0 | Tutorials p.w. | 0 |
| Tutorials: | 0 |
| Tests & Examinations: | 88 |
| Selfstudy: | 352 |
| Other: | 0 |
| Total Learning Time | 770 |
| Methods of Student Assessment | Continuous Assessment (CA):100% |
| | Final Assessment (FA):0% |
| Assessment Module type | Continuous Assessment (CA) |
| Faculty | Natural Sciences |
| Home Department | Mathematics – AIMS |
| Module Topic | Advanced topics in the mathematical sciences C: Applied and Computational Mathematics and its applications |
| Generic Module Name | Advanced topics in the mathematical sciences C: Applied and Computational Mathematics and its applications 820 |
| Alpha-numeric Code | AIM820 |
| NQF Level | 9 |
| NQF Credit Value | 77 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |
| Programmes in which the module will be offered | MSc (Mathematical Science) (3849) |
| Year level | 1 |
| Main Outcomes | On completion of this module students should be able to:  
| | • Demonstrate an independent, inquiring approach to Applied and Computational, Mathematics and its applications.  
| | • Show evidence of a proficiency in constructing mathematical models.  
| | • Demonstrate the ability to embark on advanced graduate work in a cutting edge area of Applied and Computational Mathematics and its applications.  
<p>| | • Demonstrate the ability to employ appropriate computational methods to understand mathematical behaviour. |</p>
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<th><strong>Main Content</strong></th>
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| **Pre-requisite modules** | None |
| **Co-requisite modules** | None |
| **Prohibited module Combination** | None |

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<th><strong>Hours</strong></th>
<th><strong>Timetable Requirement per week</strong></th>
<th><strong>Other teaching modes that does not require time-table</strong></th>
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<td>Practicals:</td>
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<td>Tutorials p.w. 0</td>
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<td>Tutorials:</td>
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</tr>
<tr>
<td>Tests &amp; Examinations:</td>
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<td>Selfstudy:</td>
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<th><strong>Faculty</strong></th>
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<tr>
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<td>Mathematics – AIMS</td>
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<tr>
<td><strong>Module Topic</strong></td>
<td>Advanced topics in the mathematical sciences D: Statistics, Mathematics and its applications</td>
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<tr>
<th><strong>Main Outcomes</strong></th>
<th>On completion of this module students should be able to:</th>
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<tbody>
<tr>
<td></td>
<td>• Demonstrate an independent, inquiring approach to Statistics, Mathematics and its applications.</td>
</tr>
<tr>
<td></td>
<td>• Show evidence of a proficiency in constructing models of, and analysing, discrete data.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate the ability to embark on advanced graduate work in a cutting-edge area of Statistics, Mathematics and its applications.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate the ability to employ appropriate computational techniques.</td>
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<table>
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<tr>
<th><strong>Main Content</strong></th>
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<tbody>
<tr>
<td></td>
<td>• Probability Theory and Statistics, Differential Equations, Algorithms, Applied Complex Analysis, Mathematical</td>
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<tr>
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<td>Co-requisite modules</td>
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<thead>
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<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
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<tr>
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<td>No Timetable Requirements.</td>
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<td>Assignments &amp; tasks:</td>
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<td>Practicals:</td>
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<td>Tutorials p.w. 0</td>
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<td>Tutorials:</td>
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<tr>
<td>Tests &amp; Examinations:</td>
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<td>Selfstudy:</td>
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Total Learning Time 770

| Methods of Student Assessment | Continuous Assessment (CA): 100% Final Assessment (FA): 0% |
| Assessment Module type | Continuous Assessment (CA) |

Faculty | Natural Sciences |
Home Department | Mathematics – AIMS |
Module Topic | Advanced topics in the mathematical sciences E: Computer Science, Mathematics and its applications |
Generic Module Name | Advanced topics in the mathematical sciences E: Computer Sciences, Mathematics and its applications 822 |
Alpha-numeric Code | AIM822 |
NQF Level | 9 |
NQF Credit Value | 77 |
Duration | Semester |
Proposed semester to be offered. | First Semester |
Programmes in which the module will be offered | MSc (Mathematical Science) (3849) |
Year level | 1 |
Main Outcomes | On completion of this module students should be able to: |
| | • Demonstrate an independent, inquiring approach to Computer Science, Mathematics and its applications. |
| | • Show evidence of a proficiency in designing and implementing algorithms for the efficient solution of computational problems. |
| | • Demonstrate the ability to embark on advanced graduate work in a cutting edge area of Statistics, Mathematics and its applications. |
| | • Demonstrate the ability to apply mathematical methods. |

Main Content | Selected topics from: |
<p>| | • Probability Theory and Statistics, Number Theory, Geometry, Algorithms, Applied Complex Analysis, Computer Algebra, Numerical Analysis, Algebraic Graph Theory, Robotics |</p>
<table>
<thead>
<tr>
<th><strong>Pre-requisite modules</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Co-requisite modules</strong></td>
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<td><strong>Prohibited module Combination</strong></td>
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<td><strong>Breakdown of Learning Time</strong></td>
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<td><strong>Contact with lecturer / tutor:</strong></td>
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<td><strong>Assignments &amp; tasks:</strong></td>
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<tr>
<td><strong>Other:</strong></td>
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<td><strong>Total Learning Time</strong></td>
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<tr>
<td><strong>Assessment Module type</strong></td>
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</table>

**Faculty**
Natural Sciences

**Home Department**
Earth Sciences

**Module Topic**
Applied Geology

**Generic Module Name**
Field work (Tanqua Karoo Basin)

**Alpha-numeric Code**
APG825

**NQF Level**
9

**NQF Credit Value**
30

**Duration**
Semester

**Proposed semester to be offered.**
Second Semester

**Programmes in which the module will be offered**
MSc (Applied Geology) (3891)

**Year level**

**Main Outcomes**
On completion of this module students should be able to:
- The candidate will understand the full breadth of the E & P aspects of Petroleum Geoscience in the field.

**Main Content**
- Field work (Tanqua Karoo Basin)
- A fieldtrip to the Tanqua Karoo Basin, an area of outstanding geological interest, will be conducted.
- The fieldtrip will illustrate the full breadth of the petroleum geoscience course, and will be used to consolidate the students' understanding by illustrating classroom-taught concepts in the field.

**Pre-requisite modules**
Honors Geology modules or equivalent

**Co-requisite modules**
None

**Prohibited module Combination**
None

| **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| **Contact with lecturer / tutor:** | 10 | Lectures p.w. | 2 |
| **Assignments & tasks:** | 10 | Practicals p.w. | 60 |
| **Practicals:** | 210 | Tutorials p.w. | 0 |
### Simulation

#### Faculty
Natural Sciences

#### Home Department
Statistics and Population Studies

#### Module Topic
Simulation

#### Generic Module Name
Computational Finance 817

#### Alpha-numeric Code
COF817

#### NQF Level
9

#### NQF Credit Value
15

#### Duration
Semester

#### Proposed semester to be offered.
First Semester

#### Programmes in which the module will be offered
MSc (Statistical Science) (3838); MSc(Computational Finance) (3093)

#### Year level
8

#### Main Outcomes
Students should be able to critically develop the ability to devise statistical simulation algorithms and Matlab skills

#### Main Content
Introduction to Matlab; generating random numbers from different distributions; cellular automata; systems of linear equations; modelling time series; simulating queues; bootstrapping.

#### Pre-requisite modules
STA211; STA221; MAT211; MAT221

#### Co-requisite modules
None

#### Prohibited module Combination
None

#### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
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<td>Tests &amp; Examinations:</td>
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</table>

#### Methods of Student Assessment
Continuous Assessment (CA): 0%
Final Assessment (FA): 100%

#### Assessment Module type
Continuous and Final Assessment (CFA)
Duration: Semester

Proposed semester to be offered: First Semester

Programmes in which the module will be offered: MSc (Computational Finance) (3093)

Year level: 8

Main Outcomes: On completion of this module students should be able to:
- Summarize and critically evaluate the international monetary system, foreign exchange markets, measurement of risk and return, foreign currency risk management.

Main Content: International monetary system, foreign exchange markets, measurement of risk and return, foreign currency risk management

Pre-requisite modules: None

Co-requisite modules: None

Prohibited module Combination: None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</table>

Methods of Student Assessment: Continuous Assessment (CA): 0%
Final Assessment (FA): 100%

Assessment Module type: Final Assessment (FA)

Faculty: Natural Sciences
Home Department: Statistics and Population Studies
Module Topic: Financial Computing
Generic Module Name: Computational Finance 821
Alpha-numeric Code: COF821
NQF Level: 9
NQF Credit Value: 15
Duration: Semester
Proposed semester to be offered: First Semester
Programmes in which the module will be offered: MSc (Computational Finance) (3093)
Year level: 8
Main Outcomes: On completion of this module students should be able to:
- Develop software for financial applications;
- Present data structures and algorithms;
- Critically evaluate results.
Main Content

- Programs for financial application;
- Data structures and algorithms;
- Project work.

Pre-requisite modules

- STA331 or equivalent

Co-requisite modules

- None

Prohibited module Combination

- None

Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Timetable Requirement per week</th>
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<tr>
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Methods of Student Assessment

- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

Assessment Module type

- Final Assessment (FA)

Faculty

- Natural Sciences

Home Department

- Statistics and Population Studies

Module Topic

- Theoretical Statistics

Generic Module Name

- Computational Finance 826

Alpha-numeric Code

- COF826

NQF Level

- 9

NQF Credit Value

- 15

Duration

- Semester

Proposed semester to be offered.

- First Semester

Programmes in which the module will be offered

- MSc (Population Studies) (3921); MSc (Statistical Science) (3838); MSc (Computational Finance) (3093)

Year level

- 8

Main Outcomes

On completion of this module students should be able to:

- Apply confident use of statistical inference techniques

Main Content

- Consistency of estimators; method of moments and maximum likelihood estimation; the delta method; confidence intervals; power and relative efficiency; likelihood ratio tests.

Pre-requisite modules

- STA331; STA332; MAT211; MAT221 or equivalent

Co-requisite modules

- None

Prohibited module Combination

- None

Breakdown of Learning Time

<table>
<thead>
<tr>
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<th>Faculty</th>
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<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Critically summarize knowledge and analyse risk management problems.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Risk measurement, analytical methods of risk management, value-at-risk methodologies, risk modelling.</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
<td>STA331 or equivalent</td>
</tr>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module Combination</td>
<td>None</td>
</tr>
<tr>
<td>Breakdown of Learning Time</td>
<td>Hours</td>
</tr>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>45</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>55</td>
</tr>
<tr>
<td>Practicals:</td>
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</tr>
<tr>
<td>Tutorials:</td>
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</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>3</td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>47</td>
</tr>
<tr>
<td>Other:</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
<td><strong>150</strong></td>
</tr>
<tr>
<td>Methods of Student Assessment</td>
<td>Continuous Assessment (CA): 0%</td>
</tr>
<tr>
<td></td>
<td>Final Assessment (FA): 100%</td>
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<tr>
<td>Assessment Module type</td>
<td>Final Assessment (FA)</td>
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<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Probability and Stochastic Processes</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Computational Finance 828</td>
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<td>Alpha-numeric Code</td>
<td>COF828</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
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547
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<tr>
<th>Proposed semester to be offered.</th>
<th>First semester</th>
</tr>
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<tbody>
<tr>
<td>Programmes in which the module will be offered</td>
<td>MSc (Statistical Science) (3838); MSc (Computational Finance) (3093)</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
</tbody>
</table>
| **Main Outcomes** | On completion of this module students should be able to:  
- Critically apply the laws of large numbers: the Weak Law of Large Numbers, the Central Limit Theorem.  
- Generate random observations from specified distributions, e.g. the inverse transform method, acceptance-rejection method. |
| **Pre-requisite modules** | STA331 or equivalent |
| **Co-requisite modules** | None |
| **Prohibited module** | None |
| **Combination** | None |
| **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| Contact with lecturer / tutor: | 45 | Lectures p.w. | 3 |
| Assignments & tasks: | 55 | Practicals p.w. | 2 |
| Practicals: | 0 | Tutorials p.w. | 4 |
| Tutorials: | 0 | | |
| Tests & Examinations: | 3 | | |
| Selfstudy: | 47 | | |
| **Total Learning Time** | **150** | | |
| **Methods of Student Assessment** | Continuous Assessment (CA): 0%  
Final Assessment (FA): 100% |
| **Assessment Module type** | Final Assessment (FA) |
| **Faculty** | Natural Sciences |
| **Home Department** | Statistics and Population Studies |
| **Module Topic** | Time Series Analysis |
| **Generic Module Name** | Computational Finance 829 |
| **Alpha-numeric Code** | COF829 |
| **NQF Level** | 9 |
| **NQF Credit Value** | 15 |
| **Duration** | Semester |
| **Proposed semester to be offered.** | Second Semester |
| **Programmes in which the module will be offered** | MSc (Statistical Science) (3838); MSc (Computational Finance) (3093); MSc (Population Studies) (3921); |
| **Year level** | 8 |
| **Main Outcomes** | On completion of this module students should be able to:  
- Critically apply a broad overview of time series methods and develop advanced analysis skills. |
### Main Content

- Classical time series methods; strong and weak stationarity, and non-stationarity; ARMA models – acf, pacf, stationarity and invertibility; evaluation of residuals; ARIMA models; seasonality in ARIMA models; estimation and prediction;
  - Spectral density functions; periodogram;
  - Example analyses using SPSS

### Pre-requisite modules
- STA211; STA221; MAT211; MAT221 or equivalent

### Co-requisite modules
- None

### Prohibited module combination
- None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that do not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Tests &amp; Examinations:</td>
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<td>Other:</td>
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**Total Learning Time**: 150

### Methods of Student Assessment
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type
- Final Assessment (FA)

### Faculty
- Natural Sciences

### Home Department
- Statistics and Population Studies

### Module Topic
- Credit Derivatives

### Generic Module Name
- Computational Finance 835

### Alpha-numeric Code
- COF835

### NQF Level
- 9

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered.
- Second Semester

### Programmes in which the module will be offered
- Masters (Computational Finance) (3093)

### Year level
- 8

### Main Outcomes
- On completion of this module, students should be able to:
  - Critically evaluate structural and intensity based or reduced form approach to the value of assets, pricing models.

### Main Content
- Structural and intensity based or reduced form approach to the value of assets, pricing models

### Pre-requisite modules
- STA331 or equivalent

### Co-requisite modules
- None

### Prohibited module combination
- None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that do not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
<td>3</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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<td>Practicals p.w.</td>
<td>2</td>
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### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activities</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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</tr>
<tr>
<td>Assignments &amp; tasks:</td>
<td>55</td>
<td>Practicals p.w.</td>
<td>2</td>
</tr>
<tr>
<td>Practicals:</td>
<td>0</td>
<td>Tutorials p.w.</td>
<td>4</td>
</tr>
<tr>
<td>Tutorials:</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests &amp; Examinations:</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfstudy:</td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>0</td>
<td></td>
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</tr>
<tr>
<td><strong>Total Learning Time</strong></td>
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</table>

### Methods of Student Assessment

- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type

Final Assessment (FA)

---

### Faculty

Natural Sciences

### Home Department

Statistics and Population Studies

### Module Topic

Linear Financial Models

### Generic Module Name

Computational Finance 836

### Alpha-numeric Code

COF836

### NQF Level

9

### NQF Credit Value

15

### Duration

Semester

### Proposed semester to be offered.

Second Semester

### Programmes in which the module will be offered

Masters (Computational Finance) (3093)

### Year level

8

### Main Outcomes

On completion of this module students should be able to: **Critically:** Apply regression analysis and linear models to equity portfolio management:

- Simple and multiple linear regression, model selection, residual analysis, diagnostics, detection of multi-collinearity, nonstandard conditions and transformations, principal components and factor analysis.

### Main Content

- Regression analysis and linear models with application to equity portfolio management: simple and multiple linear regression, model selection, residual analysis, diagnostics, detection of multi-collinearity, nonstandard conditions and transformations, principal components and factor analysis

### Pre-requisite modules

STA331 or equivalent

### Co-requisite modules

None

### Prohibited module Combination

None

---

### Contact with lecturer / tutor:

45

### Lectures p.w.:

3

### Assignments & tasks:

55

### Practicals p.w.:

2

### Tutorials p.w.:

4

### Tests & Examinations:

3

### Selfstudy:

47

### Other:

0

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550
<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Analytics and Machine Learning</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>Proposed semester to be offered.</td>
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</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>MCom in Information Management (1835)</td>
</tr>
<tr>
<td>Year level</td>
<td>1</td>
</tr>
</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:
- Know and apply the analytic lifecycle (CRISP) for solving analytic problems in e-Logistic business.
- Debate typical problems for business analytics and machine learning, differ it from traditional and combined approaches.
- Analyze the architecture of analytics information systems and the relationship to data warehouse.
- Discuss critical the main idea of learning by data, describe and apply different types of data based modeling in field of classification, pattern discovery, forecast and rule extraction.
- Select a suitable method and algorithm to create a model for a problem given by data set.
- Select right tools and use them to create a suitable model, select parameters of algorithms, apply it and interpret the results from the model.
- Understand and debate the basic ideas of optimization using genetic algorithms and apply it for problems in transport optimization.
- Articulate the challenges and opportunities to using big data for analytics in field of logistic.

**Main Content**

- Introduction to Advanced Analytics and Machine Learning.
- Main process of analytics lifecycle (CRIPS)
- Advanced Methods and Algorithms for Data Mining
- Special topics in Machine Learning
- Tools for Modeling

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
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<td>Contact with lecturer / tutor:</td>
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<td>Practicals:</td>
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<td>Tutorials p.w.</td>
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551
<table>
<thead>
<tr>
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<tbody>
<tr>
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<td><strong>Total Learning Time</strong></td>
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<table>
<thead>
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<th>Method of Student Assessment</th>
<th>Continuous Assessment (CA): 60%</th>
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<th>Continuous and Final Assessment (CFA)</th>
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<tbody>
<tr>
<td>Home Department</td>
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<tr>
<td>Module Topic</td>
<td>Big data technologies</td>
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<tr>
<td>Duration</td>
<td>Semester</td>
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<td>Proposed semester to be offered.</td>
<td>Second Semester</td>
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<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>MCom in Information Management (1835)</th>
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<tbody>
<tr>
<td>Year level</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module the student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Evaluate the computation models and execution frameworks for Big Data for e-Logistics such as Hadoop and MapReduce.</td>
</tr>
<tr>
<td></td>
<td>• Formulate a big data technology stack or framework for e-Logistics.</td>
</tr>
<tr>
<td></td>
<td>• Explain the impact of Internet of things on logistics.</td>
</tr>
<tr>
<td></td>
<td>• Use big data tools to solve logistics-related problems.</td>
</tr>
<tr>
<td></td>
<td>• Discuss how the different tools in the big data pool fit together in the stack.</td>
</tr>
<tr>
<td></td>
<td>• Define an environment for distributed big data processing.</td>
</tr>
<tr>
<td></td>
<td>• Deploy a cloud-based cluster for large scale Big Data Processing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Big data technology landscape/frameworks (including developments like data lake).</td>
</tr>
<tr>
<td></td>
<td>• Big data technology stack and architecture.</td>
</tr>
<tr>
<td></td>
<td>• Internet of things in Logistics.</td>
</tr>
<tr>
<td></td>
<td>• Data storage and file systems.</td>
</tr>
<tr>
<td></td>
<td>• Distributed file systems.</td>
</tr>
<tr>
<td></td>
<td>• Big data computation models and execution frameworks.</td>
</tr>
<tr>
<td></td>
<td>• Big data importation, transfer, loading and processing.</td>
</tr>
<tr>
<td></td>
<td>• Big data visualization technology.</td>
</tr>
<tr>
<td></td>
<td>• Distributed workflow management, configuration service, synchronization service, and naming registry services.</td>
</tr>
<tr>
<td></td>
<td>• Cloud-based big data cluster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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</tr>
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<tbody>
<tr>
<td>Co-requisite modules</td>
<td>None</td>
</tr>
<tr>
<td>Prohibited module Combination</td>
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### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Assignments &amp; tasks:</td>
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<tr>
<td>Practicals:</td>
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<td>Tutorials p.w. 0</td>
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<td>Assessments</td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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**Method of Student Assessment**
- Continuous Assessment (CA): 60%
- Final Assessment (FA): 40%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Physics and Astronomy/Chemistry/Medical Biosciences

### Module Topic
- Nanoscience

### Generic Module Name
- Nanoscience Research Project 803/804

### Alpha-numeric Code
- NSS803/NSS804

### NQF Level
- 9

### NQF Credit Value
- 100

### Duration
- Year

### Proposed semester to be offered.
- Both Semesters

### Programmes in which the module will be offered
- MSc (Nanoscience) 3089

### Year level
- 8

### Main Outcomes
- On completion of this module students should be able to:
  - Design, perform and report independent research work on nanobiomedical science, nanochemistry or nanophysics.
  - Use specialized nanoscience equipment to perform specific research work.
  - Use new or standard nanoscience techniques and procedures in performing the research work.

### Main Content
- Research project topics in biomedical sciences, chemistry or physics

### Pre-requisite modules
- None

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
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<tbody>
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<tr>
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<tr>
<td>Selfstudy</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

**Assessment Module type**
- Final Assessment (FA)
<table>
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<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
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<tr>
<td>Module Topic</td>
<td>Central Concepts in Nanoscience 809</td>
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<td>Year</td>
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<td>MSc (Nanoscience) 3089</td>
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<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Explain the structural basis of nanoscience.</td>
</tr>
<tr>
<td></td>
<td>• Classify nanomaterials.</td>
</tr>
<tr>
<td></td>
<td>• Identify journals and other sources of information on nanomaterials.</td>
</tr>
<tr>
<td></td>
<td>• Discuss applications of nanomaterials in chemistry, physics and nanomedicine and the basis of such applications.</td>
</tr>
<tr>
<td>Main Content</td>
<td><strong>Introduction:</strong></td>
</tr>
<tr>
<td></td>
<td>• What is nanoscience? History, nature and development of nanoscience. Properties of nanomaterials. Types of nanomaterials - nanotubes, nanorod, nanoparticles, etc. Different fields of nanoscience. Interdisciplinary aspects.</td>
</tr>
<tr>
<td></td>
<td><strong>Practical matters:</strong></td>
</tr>
<tr>
<td></td>
<td>• Sources of information and nanoscience literature. Principles and techniques of nanoscience - analytical approaches, synthetic approaches, research methodology, experimental protocols.</td>
</tr>
<tr>
<td></td>
<td><strong>Applications to nanoscience:</strong></td>
</tr>
<tr>
<td></td>
<td>• Devices and nanotechnology, South African landscape, current devices and possibilities.</td>
</tr>
<tr>
<td></td>
<td><strong>Mathematics for nanoscience:</strong></td>
</tr>
<tr>
<td></td>
<td>• Modelling and computation.</td>
</tr>
<tr>
<td></td>
<td><strong>Nanoscience and society:</strong></td>
</tr>
<tr>
<td></td>
<td>• Ethics, safety, toxicology, regulation and standards. This will include environmental protection, public awareness, government policy and monitoring, networks.</td>
</tr>
<tr>
<td></td>
<td><strong>Fundamentals of bionanotechnology:</strong></td>
</tr>
<tr>
<td></td>
<td>• Physiological, cellular, biological properties of nanobiosystems; nanoscience and systems for in-vivo and in-vitro procedures.</td>
</tr>
<tr>
<td></td>
<td><strong>Nanomedicine:</strong></td>
</tr>
<tr>
<td></td>
<td>• Techniques for nanomedicines which will include drug delivery systems, medical devices, regenerative medicine, biosensors and diagnostic systems; biological, physical and chemical characterization of nanosystems; in-vitro and in-vivo applications of nanobiosensor devices.</td>
</tr>
<tr>
<td>Pre-requisite modules</td>
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<tr>
<td><strong>Breakdown of Learning Time</strong></td>
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</tr>
<tr>
<td><strong>Hours</strong></td>
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<td><strong>Assessment Module type</strong></td>
<td>Continuous and Final Assessment (CFA)</td>
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<tr>
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<th>Natural Sciences</th>
</tr>
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<tbody>
<tr>
<td>Home Department</td>
<td>Chemistry</td>
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<tr>
<td>Module Topic</td>
<td>Management for Nanoscientists 810</td>
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<tr>
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<td>NSS810</td>
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<td>MSc (Nanoscience) 3089</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
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</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:
- Explain entrepreneurial process and its components.
- Explain the fundamental concepts, characteristics and criteria for successful small business development and entrepreneurial process.
- Discuss fundamental principles and procedures of successful project management.
- Discuss the requirements for managing new product development and innovation ventures.

**Main Content**

<table>
<thead>
<tr>
<th><strong>Entrepreneurship</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business concepts and models: services, innovative products and business growth.</td>
</tr>
<tr>
<td>Recognizing, assessing and testing opportunity.</td>
</tr>
<tr>
<td>The entrepreneurial management process.</td>
</tr>
<tr>
<td>Identification, protection and management of Intellectual property.</td>
</tr>
<tr>
<td>Patents</td>
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</table>

**Small Business Management**

- Principles and fundamental concepts of small business development and management; including pricing, credit, personal selling, advertising, sales promotion and product marketing and human resources management.
- Small business and e-commerce: planning, financing, marketing plan, operational plan and factors affecting the
- Project management
  - Project characteristics.
  - Project life cycle: initiation, planning, execution and closeout.
  - Managing new product development.
  - Principles of project management: application of knowledge; standards and regulations; understanding the project environment; management skills; interpersonal skills; influence; leadership; motivation; negotiation; and problem solving skills.
  - Managing innovation.
  - Networks for projects.

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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<th>Continuous and Final Assessment (CFA)</th>
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<th>Natural Sciences</th>
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<tr>
<td>Home Department</td>
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<tr>
<td>Module Topic</td>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
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<tr>
<td></td>
<td>The purpose is to provide students with courses in fundamental nano-biomedical sciences.</td>
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<tr>
<td></td>
<td>It consists of two major topics: Fundamentals of bionanotechnology and the study of nanomedicine.</td>
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<table>
<thead>
<tr>
<th>Main Content</th>
<th>This module includes an in depth study of:</th>
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<tr>
<td></td>
<td><strong>Fundamentals of bionanotechnology</strong></td>
</tr>
<tr>
<td></td>
<td>• Nanoparticles (NP)</td>
</tr>
<tr>
<td></td>
<td>• Synthesis, assembling and encapsulation of NP;</td>
</tr>
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</table>
isolation/ purification and characterization of NP
• Biomedical applications of nanomaterial devices
• Diagnostics (colorimetric, fluorometric, biosensors, surface Plasmon resonance), Therapeutics, Imaging
• Physiological response to nanomaterials
• Systematic and cellular immunological responses to different nanomaterials
• Development and linking the biological component to the nanomaterials

**Nanomedicine**
• Disease
Molecular origin of diseases, complexity of diseases (primary vs secondary manifestations), Disease diagnostics based on molecular changes
Using nanomaterials for diagnostics

<table>
<thead>
<tr>
<th>Pre-requisite modules</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Co-requisite modules</td>
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<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)

**Faculty**
Natural Sciences

**Home Department**
Medical Biosciences

**Module Topic**
Experimental Techniques in Nanobiomedical Sciences 812

**Generic Module Name**
Experimental Techniques in Nanobiomedical Sciences 812

**Alpha-numeric Code**
NSS812

**NQF Level**
9

**NQF Credit Value**
16

**Duration**
Year

**Proposed semester to be offered.**
Both Semesters

**Programmes in which the module will be offered**
MSc (Nanoscience) 3089

**Year level**
8

**Main Outcomes**
On completion of this module students should be able to:
• Perform experiments on the most recent developments in cloning, protein expression, purification, identification and quantification.
- Discuss the principles and applications of immunoassays.
- Perform experiments on flow cytometry: from basic concepts to multicolour analysis.
- Discuss the basic principles of PCR amplification, quantification and latest development in molecular biology.
- Perform experiments and analyse results on the most recent developments in different imaging techniques.
- Discuss the principles and relative merits of a range of techniques for the production of nanostructures including mono- and multilayers and encapsulation techniques.
- Explain the principles and relevance of nanoparticle biojunction.

After attending the course be able to identify the proper analysis tool for a particular problem.

**Main Content**

- The purpose of the course is to provide students with live demonstrations on research equipment used for nanoresearch. It consists of theoretical and practical exposure to:
  - Theoretical background and practical exposure to the most recent developments in protein expression, purification, identification and quantification; different imaging techniques; molecular biology, genomics; immunoassays.

**Pre-requisite modules** None

**Co-requisite modules** None

**Prohibited module Combination** None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type** Continuous and Final Assessment (CFA)

**Faculty** Natural Sciences

**Home Department** Medical Biosciences

**Module Topic** Foundations of Nanobiomedical Sciences for Non-Biologists

**Generic Module Name** Foundations of Nanobiomedical Sciences for Non-Biologists 813

**Alpha-numeric Code** NSS813

**NQF Level** 9

**NQF Credit Value** 4
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<td>Year level</td>
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<tr>
<td>Faculty</td>
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</tr>
<tr>
<td>On completion of this module students should be able to:</td>
<td></td>
</tr>
<tr>
<td>• Describe the interacting forces between molecules in a biological system.</td>
<td></td>
</tr>
<tr>
<td>• Describe the basic structure and function of each macromolecule.</td>
<td></td>
</tr>
<tr>
<td>• Describe the components of the cell, metabolic reactions of organelles such as respiration, interaction of molecules and transport mechanisms.</td>
<td></td>
</tr>
<tr>
<td>• Describe the principles of the basic assays used in the biological sciences.</td>
<td></td>
</tr>
<tr>
<td>Main Content</td>
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</tr>
<tr>
<td>Biological chemistry: Bonds, acids and bases, chemical reactions, enzymes</td>
<td></td>
</tr>
<tr>
<td>Macromolecules: Carbohydrates, lipids, proteins, nucleic acids</td>
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<tr>
<td>Cells and house-keeping functions: Cell structure and metabolic processes</td>
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<td>MSc (Nanoscience) 3089</td>
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<tr>
<td>Year level</td>
<td>8</td>
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</tbody>
</table>
| **Main Outcomes** | On completion of this module students should be able to:  
| | • Discuss the synthesis and characterisation techniques suitable for producing organic and inorganic nanomaterials.  
| | • Use simple models (e.g. particles in a box, tight binding, molecular orbitals) to describe the electronic structure of molecular and solid state nanosystems.  
| | • Use simple models and examples to describe how the electronic structure of nanosystems is influenced by electron-electron interactions (charge, spin) and coupling to the vibrations.  
| | • Explain electronic conduction through nanosystems and identify different regimes (Ballistic, Coulomb Blockade etc). |
| **Main Content** | **Advanced Nanochemistry Synthesis**  
| | • Synthetic methods: Electro synthesis, chemical, thermal and microwave synthesis. Thin Film Deposition Methods. Physical synthetic methods including carbon arc discharge, laser ablation, thermal chemical vapor deposition (CVD), catalytic synthesis and plasma synthesis.  
| | • Properties of nanomaterials: Chemical, electrochemical, spectroscopic, microscopic, mechanical, electrical and optical properties of materials  
| | • Synthetic nanomaterials: Ceramics, glasses, polymers, fullerenes, nanotubes, graphenes, carbon nanotubes, metal oxides and catalysts (PGMs etc), nanocrystals, nanocomposites, nano-alloys, quantum dots, zeolites, MOFs and dendrimers.  
| | **Group Theory for Chemists**  
| | • Symmetry groups, vibrational analysis, orbital Analysis and molecular spectroscopy.  
| | **Advanced Characterisation Techniques**  
| | • Spectroscopy, FTIR, Raman, liquid and SS-NMR, UV – VIS, XPS, XRD, XRF.  
| | • Microscopy: TEM, SEM, AFM.  
| | • Physical Techniques: Hall Effect, TGA, BET, Contact Angle, fluorescence, etc.  
| | • Electroanalysis and electrochemical technology: Voltammetry, scanning electrochemical microscopy, electrochemiluminescence, spectroelectrochemistry and electrochemical impedance spectroscopy.  
| | **Applications of nanomaterials**  
| | • Energy Devices (Fuel cells, ion batteries, Catalysis Supercapacitors, Photovoltaic cells).  
| | • Health (Sensors and biosensors; biomaterials; drug delivery; food preservation, spoilage and contaminants).  
| | • Catalysis (Reaction dynamics; adsorption isotherms, thermodynamics; homogeneous and heterogeneous catalysis)  
| | • Environmental Analysis (Mining and minerals; water and pollution)  
<p>| | • Beneficiation (Materials and manufacturing; chemical processes). |</p>
<table>
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<tr>
<th>Pre-requisite modules</th>
<th>CHE701 AND CHE704</th>
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<th>Timetable Requirement per week</th>
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Total Learning Time | 480 |

Methods of Student Assessment |
Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |

Assessment Module type |
Continuous and Final Assessment (CFA) |

Faculty | Natural Sciences |
Home Department | Chemistry |
Module Topic | Experimental Techniques in Nanochemistry |
Generic Module Name | Experimental Techniques in Nanochemistry 822 |
Alpha-numeric Code | NSS822 |
NQF Level | 9 |
NQF Credit Value | 16 |
Duration | Year |
Proposed semester to be offered. | Both Semesters |
Programmes in which the module will be offered | MSc (Nanoscience) 3089 |
Year level | 8 |

Main Outcomes |
On completion of this module students should be able to:  
• Synthesise, characterise and apply nanomaterials in sensor technology, development of biomaterials, drug delivery and in food preservation and food quality determination.  
• Use advanced characterisation techniques and instruments to study nanomaterials. |

Main Content |
• Chemical, electrochemical or physical synthesis of specific nanomaterials and catalysts and their characterization for applications in energy devices, sensors and catalysis.  
• The practicals should involve the use of spectroscopic (FTIR, Raman, liquid and SS-NMR, UV – VIS, XPS, XRD, XRF), microscopic (TEM, SEM, AFM) and physical techniques (Hall Effect, TGA, BET, Contact Angle, fluorescence, etc) in the analysis of nanomaterials. |

Pre-requisite modules | CHE 701 and CHE 705 |
Co-requisite modules | None |
Prohibited module Combination | None |
### Breakdown of Learning Time

<table>
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</tr>
<tr>
<td><strong>Tests &amp; Examinations:</strong></td>
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</tr>
<tr>
<td><strong>Selfstudy:</strong></td>
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<tr>
<td><strong>Total Learning Time</strong></td>
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</tbody>
</table>

### Methods of Student Assessment

- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type

- Continuous and Final Assessment (CFA)

---

### Faculty

- Natural Sciences

### Home Department

- Chemistry

### Module Topic

- Foundations of Nanochemistry for non-chemists 823

### Generic Module Name

- Foundations of Nanochemistry for non-chemists 823

### Alpha-numeric Code

- NSS823

### NQF Level

- 9

### NQF Credit Value

- 4

### Duration

- Semester

### Proposed semester to be offered.

- First Semester

### Programmes in which the module will be offered

- MSc (Nanoscience) 3089

### Year level

- 8

### Main Outcomes

On completion of this module students should be able to:
- Classify organic and inorganic nanomaterials and identify their various structural aggregations.
- Explain the structural, bonding, physical and chemical properties of classes of nanomaterials.
- Discuss the use of spectroscopic and microscopic techniques in structure and property elucidation.

### Main Content

- Nanomaterials: ceramics, glasses, polymers, fullerenes, graphene, carbon nanotubes, polymeric and inorganic nanostructures, metal oxides, nano-powders, nanocomposites, nano-alloys and quantum dots.
- Structural properties in nanochemistry: chemical crystallography (introduction to bonding, crystal structures and properties), reactivities of nanostructured materials, physical and chemical properties, processing nanostructured materials.
- Structural tools in nanochemistry: spectroscopy (FTIR, NMR, UV-Vis), microscopy (TEM, SEM, AFM) and physical methods (XRD, XPS, Auger).

### Pre-requisite modules

- None

### Co-requisite modules

- None

### Prohibited module Combination

- None
<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Tests &amp; Examinations:</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Department</td>
<td>Physics</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Advanced Nanophysics 831</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Advanced Nanophysics 831</td>
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<td>Alpha-numeric Code</td>
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<td>Duration</td>
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<tr>
<td>Programmes in which the module will be offered</td>
<td>MSc (Nanoscience) 3089</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
</tbody>
</table>

**Main Outcomes**
On completion of this module students should be able to:
- Explain basic physical phenomena on the nanoscale, basic principles, uses and limitations of a wide variety of materials, theory of characterisation techniques applicable to the elucidation of the structure, chemistry and properties of nanostructured materials.
- Identify the pertinent parameters amenable to characterisation, governing a general description of nanostructured materials and devices.
- Discuss the principles and relative merits of a range of techniques for the production of nanostructures including ultra-thin films and multilayers.
- Discuss the standard application of spectroscopic, microscopic and chemical characterization tools in literature, and after attending the course the student should be able to identify the proper analysis tool for a particular problem.

**Main Content**
The purpose is to provide students with information about fundamental nanophysics with regard to the study of the phenomena and concepts induced by the extreme smallness of size structures. It consists of two major topics: Fundamental nanophysics and nanoscientific methodologies. This module includes an in depth study of:
- Quantum mechanics
- The fundamentals of nanophysics
- The quantum nature and construction of atoms, molecules and nanoparticles
- Structural properties in nanophysics
- Crystallography of nanostructured materials, physical and chemical properties of nanoparticles and interfaces, processing of nanostructured materials.
- Nanomaterials for nanoscience and nanotechnology
  - Different nanomaterials (ceramics, semiconductors, glasses, polymers, fullerenes, graphene, carbon nanotubes, polymeric and inorganic nanostructures, metal oxides, nano-powders, nanocomposites, nano-alloys and quantum dots).
- Synthesis, nano-structures and nano-devices
- Nano-analytical characterisation methods (theory)
  - Analysis tools in nanophysics: spectroscopy (FTIR, UV-Vis, Raman), structural and analytical (TEM, EDS, EELS, SEM, WDS

### Pre-requisite modules
- PHY724, PHY725, PHY726

### Co-requisite modules
- None

### Prohibited module combination
- None

### Time requirements

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tr>
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<td>Tests &amp; Examinations:</td>
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### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)

### Faculty
- Natural Sciences

### Home Department
- Physics and Astronomy

### Module Topic
- Experimental Techniques in Nanophysics 832

### Generic Module Name
- Experimental Techniques in Nanophysics 832

### Alpha-numeric Code
- NSS832

### NQF Level
- 9

### NQF Credit Value
- 16

### Duration
- Year

### Proposed semester to be offered.
- Both Semesters

### Programmes in which the module will be offered
- MSc (Nanoscience) 3089

### Year level
- 8

### Main Outcomes
- On completion of this module students should be able to:
  - Discuss the basic principles, uses and limitations of a wide variety of characterisation techniques applicable to
the elucidation of the structure and properties of nanostructured materials.
- Identify the pertinent parameters, amenable to characterisation, governing a general description of nanostructured materials and devices.
- Explain the principles and relative merits of a range of techniques for the production of nanostructures including ultra-thin films and multilayers.
- Describe the standard application of spectroscopic, microscopic and physical characterisation tools in practice.
After attending the course be able to identify the proper analysis tool for a particular problem.

| Main Content | The purpose of the course is to provide students with live demonstrations on research equipment used for nanoresearch. It consists of theoretical and practical exposure to:
- Advanced high level synthesis
- Advanced high level analytical techniques
- Nano-analytical characterisation methods (experimental)
- Analysis tools in nanophysics: spectroscopy (FTIR, UV-Vis, Raman), structural and analytical (TEM, EDS, EELS, SEM, WDS, EBSD, AFM, STM, XRD, XPS, Auger). |

| Pre-requisite modules | PHY724, PHY725, PHY726 |
| Co-requisite modules | None |
| Prohibited module Combination | None |

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Tests &amp; Examinations:</td>
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<tr>
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</table>

| Methods of Student Assessment | Continuous Assessment (CA): 50% Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

<p>| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Foundations of Nanophysics for Non-Physicists 833 |
| Generic Module Name | Foundations of Nanophysics for Non-Physicists 833 |
| Alpha-numeric Code | NSS833 |
| NQF Level | 8 |
| NQF Credit Value | 4 |
| Duration | Semester |
| Proposed semester to be offered. | First Semester |</p>
<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>MSc (Nanoscience) 3089</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
<td>9</td>
</tr>
</tbody>
</table>
| **Main Outcomes**                             | **On completion of this module students should be able to:**  
  - Classify inorganic nanomaterials identifying their various structural aggregations and applications.  
  - Explain the structural, bonding, physical and chemical properties of different classes of nanomaterials.  
  - Discuss the use of spectroscopic, microscopic and analytical techniques in structure and property elucidation. |
| **Main Content**                              | **• Quantum physics: atoms, molecules and nanoparticles**  
  **• Nanomaterials: ceramics, semiconductors, glasses, polymers, fullerenes, graphene, carbon nanotubes, polymeric and inorganic nanostructures, metal oxides, nano-powders, nanocomposites, nano-alloys and quantum dots.**  
  **• Structural properties in nanophysics: crystallography (introduction to bonding, crystal structures and properties), reactivities of nanostructured materials, physical and chemical properties of nanoparticles and interfaces, processing of nanostructured materials.**  
  **• Analysis tools in nanophysics: spectroscopy (FTIR, NMR, UV-Vis), structural and analytical (TEM, EDS, EELS, SEM, WDS, EBSD, AFM, XRD, XPS, Auger).** |
| **Pre-requisite modules**                     | None                  |
| **Co-requisite modules**                      | None                  |
| **Prohibited module Combination**             | None                  |
| **Breakdown of Learning Time**                | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| Contact with lecturer / tutor:               | 14 | Lectures p.w. | 0 |
| Assignments & tasks:                         | 10 | Practicals p.w. | 2 |
| Practicals:                                  | 0 | Tutorials p.w. | 0 |
| Tutorials:                                   | 0 |                   |   |
| Tests & Examinations:                        | 6 |                   |   |
| Selfstudy:                                   | 10 |                   |   |
| Other:                                       | 0 |                   |   |
| **Total Learning Time**                      | **40** |                   |   |
| **Methods of Student Assessment**            | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
<p>| <strong>Assessment Module type</strong>                   | Continuous and Final Assessment (CFA) |
| <strong>Faculty</strong>                                  | Natural Sciences     |
| <strong>Home Department</strong>                          | School of Pharmacy   |
| <strong>Module Topic</strong>                             | Mini thesis in Regulatory Sciences |
| <strong>Generic Module Name</strong>                      | Mini Thesis803/804   |
| <strong>Alpha-numeric Code</strong>                       | PAR803/804           |
| <strong>NQF Level</strong>                                | 9                    |
| <strong>NQF Credit Value</strong>                         | 60                   |
| <strong>Duration</strong>                                 | Semester             |
| <strong>Proposed semester to be offered.</strong>         | Second Semester      |</p>
<table>
<thead>
<tr>
<th>Programmes in which the module will be offered</th>
<th>MSc (Pharmacy Administration and Policy Regulation) (3859)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
<tr>
<td><strong>Main Outcomes</strong></td>
<td><strong>Applied Research Project</strong></td>
</tr>
<tr>
<td></td>
<td>Research gives scientists, practitioners and policymakers essential knowledge to use in making decisions and thus it is an essential activity which encourages them to contribute to this process and practice it in their professional lives through the research activity that form a core component of the MSc. in Pharmacy Administration and Pharmacy Policy</td>
</tr>
<tr>
<td></td>
<td>On completion of this module, students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Comprehend the principle steps in pharmaceutical research and development based on incomplete and often contradictory data and objectives.</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the suitability of research methodologies for the purpose of undertaking research in pharmaceutical medicine.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate expertise in formulating, conducting and reporting an independent and ethical research project.</td>
</tr>
<tr>
<td></td>
<td>• Critically review and interpret the literature relating to drug research and development.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate the ability to formulate and employ effective and ethical leadership tools in Regulatory Science by completing a substantial body of research.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate the ability to analyse and evaluate data, information and/or surveyed opinions gathered (depending on the nature of the research project) and discuss findings at a level appropriate to a Level 9 research project.</td>
</tr>
<tr>
<td><strong>Main Content</strong></td>
<td><strong>Applied Research Project / minithesis</strong></td>
</tr>
<tr>
<td></td>
<td>• The general aims of the applied research project are to develop conceptual and academic rigour in applied research, and to develop participants’ ability in the identification, analysis and presentation of independent applied research through appropriate inferences and recommendations in one of the key subject areas within pharmaceutical medicine.</td>
</tr>
<tr>
<td></td>
<td>• Participants will conduct research and report through a written minithesis. The modules will encourage participants to contribute towards this process and practice it in their professional lives through the research and other activities that form a core component of the MSc. in Regulatory Sciences.</td>
</tr>
<tr>
<td><strong>Pre-requisite modules</strong></td>
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<tr>
<td><strong>Co-requisite modules</strong></td>
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<td><strong>Prohibited module Combination</strong></td>
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<td><strong>Breakdown of Learning Time</strong></td>
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<td>Practicals:</td>
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Tutorials: 0
Tests & Examinations: 0
Selfstudy: 0
Other: 600
Total Learning Time 600

Methods of Student Assessment
Continuous Assessment (CA): 0%
Final Assessment (FA): 100%

Assessment Module type
Final Assessment (FA)

Faculty
Natural Sciences
Home Department
School of Pharmacy
Module Topic
Ethics for Pharmacists
Generic Module Name
Ethics for Pharmacists 811
Alpha-numeric Code
PAR811
NQF Level
9
NQF Credit Value
10
Duration
Semester
Proposed semester to be offered.
First Semester

Programmes in which the module will be offered
MSc (Pharmacy Administration and Policy Regulation) (3859)
Year level
8

Main Outcomes
On completion of this module students will be able to:
• Evaluate the ethical suitability of research methodologies for the purpose of undertaking research in pharmaceutical medicine especially with respect to vulnerable groups.
• Critically review the ethical issues involved in the undertaking of clinical research.
• Recognise the subjectivity in ethical issues which impact on the research of human and non-human subjects and construct reasonable arguments for their own or others opinion.
• Demonstrate the ability to formulate effective and ethical leadership tools in Pharmaceutical Medicine.

Main Content
• Current ethical issues that affect the pharmaceutical and health industries.
• Ethical Issues in medical research and their benefit to society.
• Humanitarian issues and Ethics

Pre-requisite modules
None
Co-requisite modules
None

Prohibited module Combination
None

Breakdown of Learning Time
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<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>0 Online Course. No Timetable requirements.</td>
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<tr>
<td>Assignments &amp; tasks:</td>
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<tr>
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</tr>
<tr>
<td>Tutorials:</td>
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<tr>
<td><strong>Faculty</strong></td>
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<td><strong>Home Department</strong></td>
<td>School of Pharmacy</td>
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<tr>
<td><strong>Module Topic</strong></td>
<td>Write and Evaluate a Common Technical Document (CTD)</td>
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<tr>
<td><strong>Generic Module Name</strong></td>
<td>Common Technical Document 812</td>
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<td><strong>Duration</strong></td>
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<td><strong>Programmes in which the module will be offered</strong></td>
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<tr>
<td><strong>Year level</strong></td>
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</table>

**Main Outcomes**

On completion of this module students should be able to:

- Write up a CTD with a view to submitting it to a regulatory authority for medicines’ registration and regulation.
- Evaluate and compare the elements that are specific to the pharmaceutical industry of South Africa with those in organisations such as ICH.
- Assist applicants in the preparation of their dossiers which are being developed for different types of medicines including New Chemical Entities and Generics.
- Contribute to discussions of various interest groups (such as ICH members) on changes to the current CTD.

**Main Content**

- A CTD is composed of various elements which are arranged in modules. Which address matters such as Administrative and prescribing Information; quality, Good Manufacturing Practice, various summaries, Non-clinical and clinical study reports.

**Breakdown of Learning Time**

| **Contact with lecturer / tutor** | 20 | **Lectures p.w.** | 0 | Online Course. No Timetable Requirements. |
| **Assignments & tasks:** | 35 | **Practicals p.w.** | 0 | |
| **Practicals:** | 0 | **Tutorials p.w.** | 0 | |
| **Tutorials:** | 10 | | |
| **Tests & Examinations:** | 0 | | |
| **Selfstudy:** | 0 | | |
| **Other:** | 35 | | |

| **Total Learning Time** | **100** |
| **Methods of Student Assessment** | Continuous Assessment (CA): 50% Final Assessment (FA): 50% |
| **Assessment Module type** | Continuous and Final Assessment (CFA) |
## Regulatory Sciences and Biosimilars

**Module Name:** Regulatory Sciences

**Alpha-numeric Code:** PAR813

**NQF Level:** 9

**NQF Credit Value:** 10

**Duration:** Semester

**Proposed semester to be offered:** First Semester

**Programmes in which the module will be offered:**
- MSc (Pharmacy Administration and Policy Regulation) (3859)

**Year level:** 8

**Main Outcomes:**
- Interpret the regulation of Generic medicines and Biosimilars.
- Contribute to the further development of the above-mentioned regulations.
- Provide valuable assistance to those applicants aiming to market these two groups of medicines.

**Main Content:**
- The study of the continual advancement and development of the legislation, regulations and science - especially of the Biosimilars
- The investigation of aspects of quality, safety and efficacy of these medicinal products and the effects of these factors on the access by patients of these agents and finished products

**Pre-requisite modules:** None

**Co-requisite modules:** None

**Prohibited module combination:** None

### Breakdown of Learning Time

<table>
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<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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</thead>
<tbody>
<tr>
<td><strong>Contact with lecturer / tutor:</strong></td>
<td>20</td>
<td>Lectures p.w. 0</td>
<td>Online Course. No Timetable Requirements.</td>
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<tr>
<td><strong>Assignments &amp; tasks:</strong></td>
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<td>Practicals p.w. 0</td>
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<td><strong>Practicals:</strong></td>
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<td>Tutorials p.w. 0</td>
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</tr>
<tr>
<td><strong>Tutorials:</strong></td>
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<td><strong>Other:</strong></td>
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<td><strong>Total Learning Time</strong></td>
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**Methods of Student Assessment:**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type:** Continuous and Final Assessment (CFA)
| **NQF Level** | 9 |
| **NQF Credit Value** | 10 |
| **Duration** | Semester |
| **Proposed semester to be offered.** | First Semester |
| **Programmes in which the module will be offered** | MSc (Pharmacy Administration and Policy Regulation) (3859) |
| **Year level** | 8 |

**Main Outcomes**

On completion of this module students should be able to:

- Understand complementary and traditional medicine.
- Understand the regulatory framework for such medicines globally.
- Critically examine international practices and what are the most important therapeutic, quality and safety issues to consider when regulating them.
- Understand the legal status of complementary and traditional medicines around the world.
- Analyze different approaches and evaluate possible best practices in this area.
- Critically examine herbal medicine, vitamins and minerals, nutritional supplements, homoeopathy, aromatherapy, African, Ayurvedic, Chinese, African and other traditional medicines.

**Main Content**

- The critical study of complementary and traditional medicines including their definition and use in their respective healing systems.
- The module will also explore the acceptable use of these medicines in today’s cultures especially where they are used with evidence-based medicines of Western origin.
- The module will also equip students to explore and to critically analyse the national and international legislation of these medicines.

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

| Contact with lecturer / tutor: | 20 | Lectures p.w. | 0 | Online Course. No Timetable Requirements. |
| Assignments & tasks: | 35 | Practicals p.w. | 0 | |
| Practicals: | 0 | Tutorials p.w. | 0 | |
| Tutorials: | 10 | | | |
| Tests & Examinations: | 0 | | | |
| Selfstudy: | 0 | | | |
| Other: | 35 | | | |
| **Total Learning Time** | **100** | | | |

**Methods of Student Assessment**

Continuous Assessment (CA): 50%

Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)
### Regulatory Sciences and Medical Devices 815

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<td>MSc (Pharmacy Administration and Policy Regulation) (3859)</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:

- Understand and contextualize major issues affecting the development of medical devices.
- The regulatory control of medical devices, with special reference to the EMA CE-Mark and other key international legislation.
- Review the key standards, conformity assessments, clinical issues, safety and risk assessment as well as medical devices containing drugs and the latest developments in diagnostics.

**Main Content**

- Major issues impacting medical devices and their regulatory control both national and internationally with special attention given to those medical devices containing drugs e.g. drug-eluting stents.

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

| Contact with lecturer / tutor | 20 | Lectures p.w. | 0 | Online Course. No Timetable Requirements. |
| Assignments & tasks | 35 | Practicals p.w. | 0 |
| Practicals | 0 | Tutorials p.w. | 0 |
| Tutorials | 10 |
| Tests & Examinations | 0 |
| Selfstudy | 0 |
| Other | 35 |
| **Total Learning Time** | **100** |

**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)
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</tr>
<tr>
<td><strong>Year level</strong></td>
<td>8</td>
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</tbody>
</table>
| **Main Outcomes**    | On completion of this module students should be able to:  
  - Appreciate the effect on patient safety and a product's licence by the different types of adverse events/reactions.  
  - Identify the key safety reporting requirements, according to the type of adverse event/reaction (in clinical research or in commercial products).  
  - Construct and evaluate benefit/risk assessments throughout the lifecycle of a medicine, with reference where applicable to issues around pre- and post-market authorization. |
| **Main Content**     | Pharmacovigilance deals with drugs and their safety. The topics include the prediction and analysis of the actions of drugs upon the body. Students will be taught to report signals, the different types of adverse drug events and lastly they are taught how to construct and evaluate benefit/risk assessments.  
  - This module will give participants a working knowledge of all aspects of drug safety monitoring and risk management and will enable them to predict and analyse drug interactions, and recognise the implications for prescribing and product licence. The participant will also be familiarized with pharmacovigilance best practice which includes monitoring strategies and action plans and be fully cognisant of regulatory reporting requirements. |
| **Pre-requisite modules** | None |
| **Co-requisite modules** | None |
| **Prohibited module Combination** | None |
| **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| **Contact with lecturer / tutor:** | 20 | Lectures p.w. | 0 | Online Course. No Timetable Requirements. |
| **Assignments & tasks:** | 35 | Practicals p.w. | 0 |
| **Practicals:** | 0 | Tutorials p.w. | 0 |
| **Tutorials:** | 10 |
| **Tests & Examinations:** | 0 |
| **Selfstudy:** | 0 |
| **Other:** | 35 |
| **Total Learning Time** | 100 |
| **Methods of Student Assessment** | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
<p>| <strong>Assessment Module type</strong> | Continuous and Final Assessment (CFA) |</p>
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### Programmes in which the module will be offered
- MSc (Pharmacy Administration and Policy Regulation) (3859)
- Year level: 8

#### Main Outcomes
On completion of this module students should be able to:
- Evaluate the regulatory issues affecting the pharmaceutical industry.
- Compare the regulation of medicines in different global markets.
- Develop and critically appraise product-related information to ensure adherence to ethical and legal provisions.
- Compare and evaluate the different roles of Regulatory and Medical Affairs departments in order to propose consistent strategies involving the marketing of pharmaceuticals, medical information, the role of a pharmaceutical company's country medical department and licensing agreements.

#### Main Content
- Regulatory Affairs covers the key regulatory and medical affairs issues including Good Manufacturing Practice (cGMP) affecting the national and international Industry today, from an overview of the major drug regulators and the requirements during finished medicinal product development to medical information and regulations including prescribing issues to life cycle management issues.

#### Pre-requisite modules
None

#### Co-requisite modules
None

#### Prohibited module Combination
None

### Breakdown of Learning Time

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#### Methods of Student Assessment
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

#### Assessment Module type
Continuous and Final Assessment (CFA)
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**Main Outcomes**

On completion of this module students should be able to:
- Understand the principle steps in pharmaceutical research and development based on incomplete and often contradictory data and objectives.
- Evaluate the suitability of research methodologies for the purpose of undertaking research in pharmaceutical medicine.
- Demonstrate expertise in formulating, conducting and reporting an independent and ethical research project.
- Critically review and interpret the literature relating to drug research and development.
- Demonstrate the ability to formulate and employ effective and ethical leadership tools in Regulatory.
- Science by completing a substantial body of research.
- Demonstrate the ability to analyse and evaluate data, information and/or surveyed opinions gathered (depending on the nature of the research project) and discuss findings at a level appropriate to a Level 9 research project.

**Main Content**

- The study of conceptual and academic rigour in applied research, and then to develop participants’ ability in the identification, analysis and presentation of independent applied research, through appropriate inferences and recommendations in one of the key subject areas (modules) within pharmaceutical medicine.

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

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**Other teaching modes that does not require time-table**

Online Course. No Timetable Requirements.

**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)
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<td>Year level</td>
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</table>

**Main Outcomes**

- Leadership and Negotiation
  - On completion of this module, students should be able to:
    - Demonstrate the ability to judge, select and/or formulate effective leadership tools.
    - Demonstrate mastery of a set of practical leadership skills.
    - Review, evaluate and propose solutions to scenarios typical for leaders in industry and arrive at possible solutions working in a team environment.
    - Recognise the subjectivity in ethical and leadership issues and construct reasonable arguments for one's opinion or recommendations.

[A limited number of places, 5 are also available on the onsite version of this course which takes place over five days at Harvard University. Additional travel, accommodation and other expenses are born by students who wish to attend the onsite course.]

**Main Content**

- Teaching and learning a set of practical leadership skills
- Leadership simulations.
- Analysis of case studies and discussion of articles on leadership, participants apply the lessons learned to ongoing, real-world cases.
- Theory and practice of negotiation in the context of organisational leadership and management.
- Development of a framework for diagnosing and intervening in organisational systems to generate adaptive work.

**Pre-requisite modules**

- None

**Co-requisite modules**

- None

**Prohibited module Combination**

- None

**Breakdown of Learning Time**

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Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

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</table>
| Programmes in which the module will be offered | MSc (Pharmacy Administration and Policy Regulation)  
(3859) |
| Year level | 1 |

**Main Outcomes**

On completion of this module, students should be able to:

**Statistics and Clinical Trial Management**

- Critically appraise the principle steps in the clinical trial phases that can often be based on incomplete and sometimes contradictory data and objectives.
- Evaluate the suitability of research methodologies for the purpose of undertaking clinical trials as adaptive as possible.
- Critically review the issues (including legal, ethical, clinical and/or commercial) involved when undertaking clinical trials.
- Demonstrate the ability to plan and develop clinical trials in accordance with legislative requirements and Good Clinical Practice (GCP) procedures.
- Critically interpret and manage statistical data used in clinical development and discriminate between relevant and non-relevant data and be able to justify such decisions.

**Main Content**

- The Clinical Trial Management module covers the practical management of the development of a medicinal product from Phase I to IV using the latest flexible and adaptive research techniques to optimise efficiency in the development process. It also teaches participants how to critically review and evaluate statistical data and to leverage the information and knowledge created to contribute to the competitive advantage of their organisation.
- It is a practical course on how to plan and manage clinical trials cognizant of the pharmacoeconomic conditions and leadership challenges the participant will need to address when leading clinical development programs.
- Practical exercises are presented on how to plan and manage clinical trials cognizant of the pharmacoeconomic conditions and leadership challenges the participant will need to address when leading clinical development programs.
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<th>Timetable Requirement per week</th>
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| Programmes in which the module will be offered | MSc (Pharmacy Administration and Policy Regulation) (3859) |

| Year level | 1 |

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<tr>
<td></td>
<td>• Evaluate the commercial and pharmaco-economic issues pertaining to drug development.</td>
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<tr>
<td></td>
<td>• Explain the principles of health economics and discuss their application in the development of medicines.</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the principles of economics and the methodology behind the statistical and/or data analysis tools used for health economics.</td>
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</table>

| Main Content | Economics affecting the individual and linked areas of the pharmaceutical industry with a special focus on the important stage of “drug to market” and |
|--------------|---------------------------------------------------------------------------------
|              | • Impact on healthcare on the economy of the country |
|              | • Functioning of the healthcare market and the health insurance market, |
|              | • Functioning of the pharmaceutical sector and the importance of innovation and the problems of incentives in both the supply and demand of healthcare and pharmaceutical products. |

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<thead>
<tr>
<th>Main Outcomes</th>
<th>Applied Research Project</th>
</tr>
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<tbody>
<tr>
<td>On completion of this module students should be able to:</td>
<td></td>
</tr>
<tr>
<td>• Comprehend the principle steps in pharmaceutical research and development based on incomplete and often contradictory data and objectives.</td>
<td></td>
</tr>
<tr>
<td>• Evaluate the suitability of research methodologies for the purpose of undertaking research in clinical pharmacy.</td>
<td></td>
</tr>
<tr>
<td>• Demonstrate expertise in formulating, conducting and reporting an independent and ethical research project.</td>
<td></td>
</tr>
<tr>
<td>• Critically review and interpret the relevant literature.</td>
<td></td>
</tr>
<tr>
<td>• Demonstrate the ability to formulate and employ effective and ethical tools in clinical pharmacy by completing a substantial body of research.</td>
<td></td>
</tr>
<tr>
<td>• Demonstrate the ability to analyse and evaluate data, information and/or surveyed opinions gathered (depending on the nature of the research project) and discuss findings at a level appropriate to a Level 9 research project.</td>
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<table>
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<tr>
<th>Main Content</th>
<th>Applied Research Project / minithesis</th>
</tr>
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<tbody>
<tr>
<td>The general aims of the applied research project are to develop conceptual and academic rigour in applied</td>
<td></td>
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</table>
research, and to develop participants’ ability in the identification, analysis and presentation of independent applied research through appropriate inferences and recommendations in one of the following key subject areas within clinical pharmacy:

- Paediatrics
- HIV/AIDS
- Oncology
- Critical Care

Participants will conduct research and report through a written minithesis.

<table>
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<tr>
<th>Pre-requisite modules</th>
<th>PHC810, PHC811, PHC812, PHC813, PHC814, PHC815</th>
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<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<td>Assessment Module type</td>
<td>Continuous Assessment (CA)</td>
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<table>
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<th>Faculty</th>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>Home Department</td>
<td>School of Pharmacy</td>
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<tr>
<td>Module Topic</td>
<td>Introduction to Clinical Pharmacy and Pharmaceutical Care</td>
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<tr>
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<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>On completion of this module students should be able to:</th>
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<tbody>
<tr>
<td></td>
<td>• Distinguish between the concepts of Clinical Pharmacy and Pharmaceutical Care.</td>
</tr>
<tr>
<td></td>
<td>• Describe how Clinical Pharmacy and Pharmaceutical Care can contribute to improving quality of care.</td>
</tr>
<tr>
<td></td>
<td>• Know the meaning of a profession, a practitioner, and a patient care practice.</td>
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</table>
• Know the components of a professional practice: its philosophy of practice, patient care process, and practice management system.
• Describe the meaning of a therapeutic relationship, the ethical issues involved, and the rights and responsibilities of the patient and practitioner throughout the patient care process.
• Read, interpret and evaluate general therapeutics literature.
• Integrate and apply general therapeutics information to simulated patient cases.
• Identify drug therapy problems for patients using a specific decision-making process.
• Design a pharmacy care plan for individual patients, including goals of therapy, pharmacotherapy plan and a monitoring plan, in order to solve and prevent drug therapy problems.
• Document a drug therapy problem and pharmacotherapy plan on patient charts and profiles.
• Communicate, both verbally and in writing, the rationale for the identification and resolution of the drug therapy problem and the pharmacy care plan.
• Acquire and apply patient-specific clinical and laboratory data to support therapeutic decisions.

**Main Content**
• Definitions and descriptions of Clinical Pharmacy and Pharmaceutical Care.
• Detailed information on the pharmaceutical care process, which includes patient assessment, medication history, medical history, identification of drug related needs and problems, implementation of the care plan, monitoring and follow-up.
• Laboratory and diagnostic investigations.

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<th>Pre-requisite modules</th>
<th>B.Pharm</th>
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<tbody>
<tr>
<td>Co-requisite modules</td>
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**Methods of Student Assessment**
Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**
Continuous and Final Assessment (CFA)
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<tbody>
<tr>
<td>Home Department</td>
<td>School of Pharmacy</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Evidence Based Medicine, Rational Medicine Use and Pharmacovigilance</td>
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<td>Master (Clinical Pharmacy) (3852)</td>
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<tr>
<td>Year level</td>
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</table>

**Main Outcomes**

On completion of this module students should be able to:

**Evidence Based Medicine:**
- Know the concept of evidence-based medicine and use such in justifying therapeutic interventions.
- Plan and carry out a search of the medical literature for the best external evidence.
- Appraise critically medical literature for clinical decision making.
- Integrate individual clinical care with the best available clinical evidence from systematic research.
- Know and apply the principles of biomedical statistics to assess therapeutic outcomes.

**Rational Medicine Use:**
- Define rational medicine use.
- Assess the problem of rational medicine use.
- Introduce systems and tool to improve rational medicine use.
- Describe how indicators can be used to identify medicine use problems.
- Perform a prescribing indicator study and identify medicine use problems.
- Discuss the use of aggregate data including defined daily dose (DDD) to analyze the consumption of medicines.
- Perform an ABC analysis and explain how it can be used to identify medicine use problems, reduce costs, and improve efficiency in the pharmaceutical supply system.
- Discuss how VEN system for setting priorities will assist in medicine selection, purchasing, and inventory management.
- Know the concept of MUE
- Understand the process for implementing and performing a MUE.
- Discuss the use of a MUE for improving pharmaceutical therapy.
- Prepare criteria and thresholds for a MUE.

**Pharmacovigilance:**
- Demonstrate an understanding of, and critically evaluate, issues surrounding the risks and benefits of drug use in humans including the cause, manifestations and
consequences of adverse drug effects (ADEs), the manner in which these are detected and monitored, and the related historic and legal frameworks.
- Know and apply the principles for adverse drug reactions and reporting systems in the health service.
- Assess the benefit, harm, effectiveness and risk of medicines.
- To maximize therapeutic outcomes.
- Detect and classify medicine-use problems and report findings timeously.
- Provide recommendations to optimize patient health outcomes.

### Main Content

**Evidence Based Medicine:**
- Basic and Clinical Biostatistics
- Review of study designs and therapeutic interventions
- Meta-analysis

**Rational Medicine Use:**
- Methods to Investigate Medicine Use
- Indicators for Health Care
- Prescribing Indicators
- Patient Care Indicators
- Complementary Indicators
- Methods to Investigate Medicine Use
- Defined Daily Dose
- VEN Analysis
- VEN Applications
- ABC Analysis
- Applications of ABC Analysis
- Steps in Performing ABC Analysis
- Identifying the need to perform an MUE
- Stepwise Approach to Performing a MUE

**Pharmacovigilance:**
- Relationship or Causality assessments
- Classification of Factors affecting susceptibility to adverse drug reactions
- Adverse drug reaction reporting systems

### Pre-requisite modules
- BPharm degree

### Co-requisite modules
- None

### Prohibited module
- None

### Breakdown of Learning Time

<table>
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<tr>
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### Methods of Student Assessment
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- Final Assessment (FA): 50%

### Assessment Module type
- Continuous and Final Assessment (CFA)
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<tr>
<td>Module Topic</td>
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<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to: Acquire skills in the following three areas:</td>
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<tr>
<td><strong>Pharmacoeconomics:</strong></td>
<td>Know the principles of pharmacoeconomics.</td>
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<tr>
<td></td>
<td>Apply different pharmacoeconomic methodologies (cost of illness analysis, cost utility analysis, cost effectiveness analysis &amp; cost minimisation analysis).</td>
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<td></td>
<td>Know how pharmacoeconomic analysis is conducted.</td>
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<tr>
<td></td>
<td>Know how to read and assess journal articles concerning an economic study.</td>
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<tr>
<td><strong>Pharmacoepidemiology:</strong></td>
<td>Be familiar with and compare fundamental statistical, economic and epidemiological concepts and methods.</td>
</tr>
<tr>
<td></td>
<td>Have knowledge of, and reflect critically upon, important pharmacoepidemiological concepts and methods and how these methods can be applied to specific drug issues and pharmaceutical risk management.</td>
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<td>Assess and critically analyse the results of pharmacoepidemiological studies (other investigators’), including critical appraisal of the study question, study design, methods and conduct, statistical analyses and interpretation.</td>
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<td>Cost-Effectiveness Analysis (CEA)</td>
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<td>Cost-Benefit Analysis (CBA)</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

**Faculty**
- Natural Sciences

**Home Department**
- School of Pharmacy

**Module Topic**
- Applied Pharmacokinetics

**Generic Module Name**
- Pharmacokinetics

**Alpha-numeric Code**
- PHC814

**NQF Level**
- 9

**NQF Credit Value**
- 25

**Duration**
- Semester

**Proposed semester to be offered.**
- Second Semester

**Programmes in which the module will be offered**
- Master (Clinical Pharmacy) (3852)

**Year level**
- 8

**Main Outcomes**
- On completion of this module students should be able to:
  - Identify key pharmacokinetics parameters necessary for therapeutic drug monitoring.
  - Identify clinically significant pharmacokinetic drug-drug interactions and design appropriate interventions.
  - Identify patient populations with clinically significant pharmacokinetic variability and design treatment interventions to manage such patients (e.g. neonates).
  - Adjust patient’s drug dosing and therapy using relevant pharmacokinetic data and principles.
  - Perform therapeutic drug monitoring (TDM) in relevant patients.

**Main Content**
- Basic principles of pharmacokinetics
- Pharmacokinetics of IV administration
- Pharmacokinetics of oral administration
- Biopharmaceutics
- Non-linear processes
- Pharmacokinetic Variation and Model-Independent relationships
- Absorption, distribution, metabolism and excretion of medicines in various patient populations (e.g. neonates, cystic fibrosis, etc.)

**Pre-requisite modules**
- BPharm

**Co-requisite modules**
- None
<table>
<thead>
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<th>Prohibited module Combination</th>
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**Main Outcomes**
On completion of this module students should be able to:
- Apply disease-orientated knowledge of the following areas:
- Demonstrate competence in the pharmacotherapy of listed medical diseases/problems.
- Review Standard Treatment Guidelines and pharmacotherapeutic options related to disorders in adults:
- Assess patient-specific medical problems.
- Evaluate patient-specific drug therapy and therapeutic problems.
- Design a comprehensive drug therapy plan for patient-specific problems.
- Justify recommendations based on patient-specific pharmacologic, pharmacokinetic, pharmacodynamic, pharmacogenomic, pharmacoeconomic, ethical, legal, and evidence-based information.
- Retrieve, interpret and integrate medical information
- Educate patients.

**Main Content**
The main content will be for the following disorders:
- Cardiovascular Disorders
- Respiratory Disorders
- Gastrointestinal Disorders
- Renal Disorders
### Neurologic Disorders
- Psychiatric Disorders
- Endocrinologic Disorders
- Gynecologic and Obstetric Disorders
- Urologic Disorders
- Immunologic Disorders
- Rheumatologic Disorders
- Ophthalmic and Otolaryngological Disorders
- Dermatologic Disorders
- Hematologic Disorders
- Infectious Diseases

**Content description:**
- Disease overview
- Epidemiology
- Etiology
- Pathophysiology
- Clinical presentation
- Diagnosis
- Laboratory and diagnostic investigations
- Prognosis
- Pharmacologic and Non-pharmacologic treatment
- Pharmacoeconomic considerations
- Evaluation of therapeutic outcomes

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<td>Combination</td>
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<th>Hours</th>
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<th>Methods of Student Assessment</th>
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<td></td>
<td>Final Assessment (FA): 50%</td>
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<table>
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<tr>
<th>Assessment Module type</th>
<th>Continuous and Final Assessment (CFA)</th>
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<table>
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<td>School of Pharmacy</td>
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<tr>
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### Year level

<table>
<thead>
<tr>
<th>Main Outcomes</th>
<th>8</th>
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<tbody>
<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Apply disease-orientated knowledge of anatomy, physiology, pathophysiology, epidemiology, etiology, risk factors, signs and symptoms, natural course and prognosis, and laboratory and diagnostic test interpretation.</td>
</tr>
<tr>
<td></td>
<td>• Demonstrate competence in the pharmacotherapy of listed medical diseases/problems.</td>
</tr>
<tr>
<td></td>
<td>• Review Standard Treatment Guidelines and pharmacotherapeutic options related to paediatric disorders.</td>
</tr>
<tr>
<td></td>
<td>• Monitor patients in the health care setting.</td>
</tr>
<tr>
<td></td>
<td>• Assess patient-specific medical problems.</td>
</tr>
<tr>
<td></td>
<td>• Evaluate patient-specific drug therapy and therapeutic problems.</td>
</tr>
<tr>
<td></td>
<td>• Design a comprehensive drug therapy plan for patient-specific problems.</td>
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<tr>
<td></td>
<td>• Justify recommendations based on patient-specific pharmacologic, pharmacokinetic, pharmacodynamic, pharmacogenomic, pharmacoeconomic, ethical, legal, and evidence-based information.</td>
</tr>
<tr>
<td></td>
<td>• Retrieve, interpret and integrate medical information.</td>
</tr>
<tr>
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<td>• Educate patients.</td>
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### Main Content

<table>
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<tr>
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<th>The main content will be for the following disorders:</th>
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<tr>
<td></td>
<td>• Gastrointestinal Disorders</td>
</tr>
<tr>
<td></td>
<td>• Cardiovascular System</td>
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<tr>
<td></td>
<td>• Central Nervous System</td>
</tr>
<tr>
<td></td>
<td>• Infectious Diseases</td>
</tr>
<tr>
<td></td>
<td>• Respiratory System</td>
</tr>
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</table>

**Content description:**

| | Disease overview |
| | Epidemiology |
| | Etiology |
| | Pathophysiology |
| | Clinical Presentation |
| | Diagnosis |
| | Laboratory and diagnostic investigations |
| | Prognosis |
| | Pharmacologic and Non-pharmacologic treatment |
| | Pharmacoeconomic considerations |
| | Evaluation of therapeutic outcomes |

### Pre-requisite modules

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<thead>
<tr>
<th>Main Content</th>
<th>PHC810, PHC811, PHC812, PHC813, PHC814, PHC815</th>
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### Co-requisite modules

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### Prohibited module

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### Breakdown of Learning Time

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<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>• Use second quantisation to perform nuclear structure calculations.</td>
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<tr>
<td></td>
<td>• Solve relativistic quantum problems.</td>
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<tr>
<td></td>
<td>• Calculate the scattering cross sections for simple systems.</td>
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Facility | Natural Sciences                  |
Home Department | Physics and Astronomy            |
Module Topic      | Nuclear Physics                  |
Generic Module Name | Nuclear Physics 830            |
Alpha-numeric Code | PHY830                          |
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<tr>
<td>Year level</td>
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</tbody>
</table>

**Main Outcomes**

On completion of this module students should be able to:
- Calculate the excitation in nuclei using different nuclear models.
- Use scattering codes to calculate the expected results in different types of experiments.
- Calculate the influence of the standard model on nuclear physics.

**Main Content**

- Nuclear models
- Nuclear reactions
- Interface between low energy nuclear physics and particle physics

**Pre-requisite modules**

None

**Co-requisite modules**

None

**Prohibited module Combination**

None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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**Methods of Student Assessment**

Continuous Assessment (CA): 50%
Final Assessment (FA): 50%

**Assessment Module type**

Continuous and Final Assessment (CFA)

---

**Faculty**

Natural Sciences

**Home Department**

Physics and Astronomy

**Module Topic**

Solid State Physics

**Generic Module Name**

Solid State Physics 840

**Alpha-numeric Code**

PHY840

**NQF Level**

9

**NQF Credit Value**

30

**Duration**

Semester

**Proposed semester to be offered.**

Second Semester

**Programmes in which the module will be offered**

MSc(Physical Science) (3081)

**Year level**

8

**Main Outcomes**

On completion of this module students should be able to:
- Use Green functions to solve problems.
• Calculate phonon properties of systems.
• Solve aspects of simple nano-systems.

| Main Content | • Many particle Physics  
• Phonons and Superconductivity  
• Low temperature physics  
• Electronic Properties of materials  
• Nano physics |
| Pre-requisite modules | None |
| Co-requisite modules | None |
| Prohibited module Combination | None |

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
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<th>Other teaching modes that does not require time-table</th>
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| Methods of Student Assessment | Continuous Assessment (CA): 50%  
Final Assessment (FA): 50% |
| Assessment Module type | Continuous and Final Assessment (CFA) |

| Faculty | Natural Sciences |
| Home Department | Physics and Astronomy |
| Module Topic | Physics Education |
| Generic Module Name | Physics Education 850 |
| Alpha-numeric Code | PHY850 |
| NQF Level | 9 |
| NQF Credit Value | 30 |
| Duration | Semester |
| Proposed semester to be offered. | Second Semester |
| Programmes in which the module will be offered | MSc(Physical Science) (3081) |
| Year level | 8 |

| Main Outcomes | On completion of this module students should be able to:  
• Explain the effect of the curriculum on students learning’.  
• Describe the differences between research methods used in Physics education.  
• Describe the insights that the study of metacognition gives to teaching. |
| Main Content | • Curriculum Design  
• Research Methodology in Physics education.  
• Metacognition |
<p>| Pre-requisite modules | None |
| Co-requisite modules | None |</p>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Use Tensor analysis to describe elasticity and the covariance of systems.</td>
</tr>
<tr>
<td></td>
<td>• Solve scattering problems using calculus of residues.</td>
</tr>
<tr>
<td></td>
<td>• Use orthogonal functions in quantum and classical systems.</td>
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<tr>
<td></td>
<td>• Solve differential equations using Green functions.</td>
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<tr>
<td>Main Content</td>
<td>• Tensor analysis</td>
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<td>• Complex analysis</td>
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<td>• Sturm Liouville theory</td>
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**Methods of Student Assessment**
- Continuous Assessment (CA): 50%
- Final Assessment (FA): 50%

**Assessment Module type**
- Continuous and Final Assessment (CFA)

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**Main Outcomes**

On completion of this module students should be able to:

- **Critically:**
  - Calculate rates, proportions and ratios.
  - Draw a "Lexis’Diagram”.
  - Critically analyze mortality and any demographic event.
  - Read and construct any demographic event tables.
  - Know how to prepare and analyze data.
  - Know how to evaluate quality of secondary data.
  - Know how to respond to any demographic event.
  - Prepare policy statements on any demographic issue.

**Main Content**

- Introduction to demography
- Calculation of rates, ratios and proportions
- Lexis’Diagram
- Demographic analysis of mortality
- Direct and indirect methods of analysis
- Deep analysis of any demographic events
- Transversal and longitudinal analysis
- Advanced demographic analysis of mortality
- Analysis of families and parity ratios
- Analysis of fertility and fecundity
- Overview of migrations issues

**Pre-requisite modules**
- None

**Co-requisite modules**
- None

**Prohibited module Combination**
- None

**Breakdown of Learning Time**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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### Methods of Student Assessment
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type
- Final Assessment (FA)

### Faculty
- Natural Sciences

### Home Department
- Statistics and Population Studies

### Module Topic
- Official Statistics

### Generic Module Name
- Population Studies 809

### Alpha-numeric Code
- POP809

### NQF Level
- 9

### NQF Credit Value
- 15

### Duration
- Term

### Proposed semester to be offered.
- First Term

### Programmes in which the module will be offered
- MSc (Population Studies) (3921); MSc (Statistical Science) (3838)

### Year level
- 8

### Main Outcomes
On completion of this module students should be able to:

**Critically:**
- Appreciate the extent to which official statistics dominate the lives of citizens on a daily basis.
- Describe the processes of data collection, processing, analysis, and dissemination by Statistics South Africa.
- Learn some important calculations techniques used by Statistics South Africa that are not taught in other courses in the Department of Statistics.

### Main Content
- History of Official Statistics;
- Why should governments gather statistics;
- The future of statistics;
- Census 1996 and Census 2001;
- Vital statistics in South Africa;
- Labor Force and General Household Surveys in South Africa;
- Economic and Industrial Surveys;
- Population projections;
- Index numbers;
- Development and poverty.

### Pre-requisite modules
- None

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

<table>
<thead>
<tr>
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### Faculty
- **Natural Sciences**

### Home Department
- **Statistics and Population Studies**

### Module Topic
- **Survey Methods**

### Generic Module Name
- **Population Studies 811**

### Alpha-numeric Code
- **POP811**

### NQF Level
- 9

### NQF Credit Value
- 15

### Duration
- Term

### Proposed semester to be offered.
- First Term

### Programmes in which the module will be offered
- MSc (Population Studies) (3921)

### Year level
- 8

### Main Outcomes
- On completion of this module students should be able to:
  - Critically:
    - Interpret and explain survey and census processes.
    - Develop questionnaires.
    - Conduct a demographic survey.

### Main Content
- Data collection processes
- How to conduct a survey
- Design of questionnaires
- Practical experience

### Pre-requisite modules
- None

### Co-requisite modules
- None

### Prohibited module Combination
- None

### Breakdown of Learning Time

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### Methods of Student Assessment
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type
- Final Assessment (CFA)
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<tr>
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</tbody>
</table>

**Main Outcomes**
On completion of this module students should be able to:

- Select the appropriate projective methods for the estimation of future growth of population by age, urban/rural population, households, labour force and school enrolments.
- Critically assess past demographic trends for their use as assumptions in the elaboration of projective outputs.
- Relate the projective methods learned in class with those applied in the world reports produced by international organizations.
- Use software to produce projective computations.
- Produce a research report.

**Main Content**
- Scope and data for population projections, projections by sex and age, projection of urban and rural population, projection of labour force, projection of households for local planning, projection of school level enrolments and projection by level of education, selected topics, computerized-assisted applications.

**Pre-requisite modules**
POP807 or equivalent only.

**Co-requisite modules**
None

**Prohibited module Combination**
None

**Breakdown of Learning Time**

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**Methods of Student Assessment**
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

**Assessment Module type**
- Final Assessment (FA)

**Faculty**
Natural Sciences

**Home Department**
Statistics and Population Studies

**Module Topic**
African Historical Demography 1

**Generic Module Name**
Population Studies 813

**Alpha-numeric Code**
POP813

**NQF Level**
9

**NQF Credit Value**
15

**Duration**
Term
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<tr>
<td>Year level</td>
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</table>
| Main Outcomes | On completion of this module students should be able to:  
  • Examine the background of African historical demography and migration patterns |
| Main Content | • Population in African history  
  • Growth and Regulation of Prehistoric Populations  
  • Demographic transition  
  • Special African mortality patterns  
  • Migration |
| Pre-requisite modules | POP807 or equivalent only |
| Co-requisite modules | None |
| Prohibited module Combination | None |
| Breakdown of Learning Time |  
  | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 21 | Lectures p.w. | 3 |
| Assignments & tasks: | 30 | Practicals p.w. | 0 |
| Practicals: | 30 | Tutorials p.w. | 0 |
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| Tests & Examinations: | 5 |
| Selfstudy: | 64 |
| Other: | 4 |
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 0%  
  Final Assessment (FA): 100% |
| Assessment Module type | Final Assessment (FA) |
| Faculty | Natural Sciences |
| Home Department | Statistics and Population Studies |
| Module Topic | Social Demography |
| Generic Module Name | Population Studies 814 |
| Alpha-numeric Code | POP814 |
| NQF Level | 9 |
| NQF Credit Value | 15 |
| Duration | Term |
| Proposed semester to be offered. | Fourth Term |
| Programmes in which the module will be offered | MSc (Population Studies) (3921); MSc (Statistical Science) (3838) |
| Year level | 8 |
| Main Outcomes | On completion of this module students should be able to:  
  • Critically examine the linkages between demographic and social issues from an analytical perspective.  
  • Up-dated examination of contemporary debates on the relationships between population and employment, education, elderly and social exclusion variables.  
  • The student will be able to gain critical knowledge of  |
theoretical perspectives on the social dimensions of demographic variables such as fertility, mortality and migration.

| Main Content | • Direct analysis of gender equity  
• Direct and indirect analysis of maternal and child mortality and morbidity  
• Direct analysis of contraception  
• Critical analysis of data on reproductive health  
• Use of available data (surveys)  
• Use of Demographic and Health Surveys (DHS) |
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<tr>
<td>Pre-requisite modules</td>
<td>POP807 or equivalent knowledge only</td>
</tr>
<tr>
<td>Co-requisite modules</td>
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<td>Prohibited module</td>
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<td>Gender Issues and Reproductive Health</td>
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<td>Duration</td>
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<tr>
<td>Year level</td>
<td>8</td>
</tr>
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</table>
| Main Outcomes | On completion of this module students should be able to:  
• Know how to critically analyze: gender issues; contraception questions; maternal and infant issues; reproductive health data.  
• Generate and structure draft policies on the above mentioned issues. |
| Main Content | • Direct analysis of gender equity  
• Direct and indirect analysis of maternal and child mortality and morbidity |
- Direct analysis of contraception
- Critical analysis of data on reproductive health
- Use of available data (surveys)
- Use of Demographic and Health Surveys (DHS)

**Pre-requisite modules**
POP 807 or equivalent knowledge only

**Co-requisite modules**
None

**Prohibited module Combination**
None

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**Total Learning Time** 150

**Methods of Student Assessment**
Continuous Assessment (CA): 0%
Final Assessment (FA): 100%

**Assessment Module type**
Final Assessment (FA)

**Faculty**
Natural Sciences

**Home Department**
Statistics and Population Studies

**Module Topic**
Mathematical Demography and Population Modelling

**Generic Module Name**
Population Studies 848

**Alpha-numeric Code**
POP848

**NQF Level**
9

**NQF Credit Value**
15

**Duration**
Term

**Proposed semester to be offered.**
Third Term

**Programmes in which the module will be offered**
MSc (Population Studies) (3921); MSc (Statistical Science) (3838)

**Year level**
8

**Main Outcomes**
On completion of this module students should be able to:
- Critically use mathematics to analyze demographic events from discrete to continuous forms.
- Make use of different models in researching the relationships between population and socio-economic variables.
- Investigate the adequacy of models of integrating population variables into development planning.
- Use population models for prospective demographic analysis.
- Produce a research report on the importance of population factors in development planning.

**Main Content**
- Instantaneous mortality function.
- Expression for expectancy of life.
- Analytical expression for mortality functions.
- Nuptiality function.
- Fertility functions.
- Selected applications.
- Instantaneous crude birth and death rates.
- Population dynamics functions (exponential, stable, Malthusian, stationary),
- Population modelling and development planning.
- Applications to sectoral development.

### Pre-requisite modules
- POP807 and some mathematical background in differential and integral calculus or equivalent

### Co-requisite modules
- None

### Prohibited module Combination
- None

<table>
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### Methods of Student Assessment
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type
- Final Assessment (FA)

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### Faculty
- Natural Sciences

### Home Department
- Statistics and Population Studies

### Module Topic
- Data Mining 11

### Generic Module Name
- Statistics 800

### Alpha-numeric Code
- STA800

### NQF Level
- 9

### NQF Credit Value
- 15

### Duration
- Semester

### Proposed semester to be offered.
- Second Semester

### Programmes in which the module will be offered
- MSc (Statistical Science) (3838); MSc (Computational Finance) (3093)

### Year level
- On completion of this module students should be able to:
  - Critically design and execute various Data Mining techniques, from extraction of huge data repositories to modeling of the data.
  - Techniques covered would include:
    - Decision tree analyses, clustering, visual data analyses, regression and classification.
    - Students would produce a scientific report of the findings.

### Main Content
- Data management and processing; statistical inference techniques explored, classification, association and clustering, post-processing of discovered structures.

### Pre-requisite modules
- STA331; STA332 or equivalent

### Co-requisite modules
- None
Prohibited module
Combination

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Methods of Student Assessment
- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

Assessment Module type
- Final Assessment (FA)

Faculty
Natural Sciences

Home Department
Statistics and Population Studies

Module Topic
Full Master’s Thesis

Generic Module Name
Statistics 801

Alpha-numeric Code
STA801

NQF Level
9

NQF Credit Value
180

Duration
Years

Proposed semester to be offered.
Both Semesters

Programmes in which the module will be offered
- MSc (Statistical Science) (3838)
- MSc (Computational Finance) (3093)
- MPhil (Population Studies) (3921)

Year level
8

Main Outcomes
On completion of this module students should be able to:
- Make a worthy contribution to knowledge in the field of Statistics, Population Studies and Demography or Computational Finance and its interaction with another field or discipline, following upon a research question with the potential to make such a satisfactory contribution.
- Carry out and report on this research in a format suitable for publication.
- Concomitant outcomes will normally include personal skills development supporting the required research and writing activities under the guidance of the supervisor(s).

Main Content
- The primary task is to develop the research proposal towards its envisaged goal(s), conducting the masters research and preparing the master’s thesis under the guidance of the supervisor(s), before submitting it for assessment;
- Research proposals may derive from any area of Statistics, Population Studies and Demography or Computational Finance in interaction with another field or discipline, and may include substantial historical and/or comparative studies.

Pre-requisite modules
- STA810 or equivalent

Co-requisite modules
As required by department
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**Faculty**
- Natural Sciences

**Home Department**
- Statistics and Population Studies

**Module Topic**
- Full Master's Thesis

**Generic Module Name**
- Statistics 802

**Alpha-numeric Code**
- STA802

**NQF Level**
- 9

**NQF Credit Value**
- 180

**Duration**
- Year

**Proposed semester to be offered.**
- Both Semesters

**Programmes in which the module will be offered**
- MSc (Statistical Science) (3838); MSc (Computational Finance) (3093); MPhil (Population Studies) (3921)

**Year level**
- 8

**Main Outcomes**
- On completion of this module students should be able to:
  - Make a worthy contribution to knowledge in the field of Statistics, Population Studies and Demography or Computational Finance and its interaction with another field or discipline, following upon a research question with the potential to make such a satisfactory contribution.
  - Carry out and report on this research in a format suitable for publication.
  - Concomitant outcomes will normally include personal skills development supporting the required research and writing activities under the guidance of the supervisor(s).

**Main Content**
- The primary task is to develop the research proposal towards its envisaged goal(s), conducting the masters research and preparing the master's thesis under the guidance of the supervisor(s), before submitting it for assessment;
- Research proposals may derive from any area of Statistics, Population Studies and Demography or Computational Finance in interaction with another field or discipline, and may include substantial historical and/or comparative studies.

**Pre-requisite modules**
- STA810 or equivalent

**Co-requisite modules**
- As required by department
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<td>• Statistics, Population Studies and Demography or Computational Finance and its interaction with another field or discipline, following upon a research question with the potential to make such a satisfactory contribution.</td>
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<td>• Carry out and report on this research in a format suitable for publication.</td>
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<p>| Main Content                 | The primary task is to develop the research proposal towards its envisaged goal(s), conducting the research and preparing the mini-thesis under the guidance of the supervisor(s), before submitting it for assessment; |
|                              | • Research proposals may derive from any area of Statistics, Population Studies and Demography or Computational Finance in interaction with another field or discipline, and may include substantial historical and/or comparative studies. |
| Pre-requisite modules        | STA810 or equivalent |
| Co-requisite modules         | As required by department |</p>
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<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
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<tr>
<td></td>
<td>- Formulate a research problem and working hypotheses, conduct a focused and critical literature review, design a hypothesis-testing methodology and assess the validity and reliability of their measuring instruments.</td>
</tr>
<tr>
<td></td>
<td>- Produce a working proposal for research.</td>
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<tr>
<td></td>
<td>- Fully implement a research project.</td>
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<tr>
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<td>- Conduct a quantitative analysis with SPSS.</td>
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<tr>
<td></td>
<td>- Produce a research report.</td>
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<tr>
<td><strong>Main Content</strong></td>
<td>- Conceptual foundations of research, Theory in quantitative research, problem statement and hypotheses formulation, research design and measurement, validity and reliability of the research instruments, methods of observations, data processing and analysis, interpretive framework, research report writing up, ethics in scientific research, introductory qualitative research, SPSS applications to quantitative data analysis.</td>
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| Methods of Student Assessment | | |
|-----------------------------|---------------------------------------------------------------|
| Continuous Assessment (CA): 0% | Final Assessment (FA): 100% |

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<td>Year level</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to: • Report scientifically on knowledge and skills pertaining to selected topics in Statistics not covered in existing modules.</td>
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<tr>
<td>Main Content</td>
<td>• Special topics as determined by the lecturer, visiting academic or industrial partner.</td>
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<td>Pre-requisite modules</td>
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<th>Other teaching modes that does not require time-table</th>
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| Methods of Student Assessment | | |
|-----------------------------|---------------------------------------------------------------|
| Continuous Assessment (CA): 0% | Final Assessment (FA): 100% |

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</table>
| Main Outcomes    | On completion of this module students should be able to:  
|                  | • Critically analyze a multivariate data set using an appropriate statistical technique required by the research hypothesis and execute various techniques to check for the assumption of normality. |
| Main Content     | • Data summaries and graphical techniques, analysis and covariance structures, inferences about multivariate and linear models, multivariate normality, discrimination and classification |
| Pre-requisite modules | STA853 or equivalent and knowledge of SAS. |
| Co-requisite modules | None                   |
| Prohibited module Combination | None |
| Breakdown of Learning Time | Hours | Timetable Requirement per week | Other teaching modes that does not require time-table |
| Contact with lecturer / tutor: | 21 | Lectures p.w. | 3 |
| Assignments & tasks: | 30 | Practicals p.w. | 0 |
| Practicals: | 30 | Tutorials p.w. | 0 |
| Tutorials: | 0 |
| Tests & Examinations: | 5 |
| Selfstudy: | 60 |
| Other: | 4 |
| Total Learning Time | 150 |
| Methods of Student Assessment | Continuous Assessment (CA): 0% |
|                        | Final Assessment (FA):100% |
| Assessment Module type | Final Assessment (FA) |

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**Year level** | 8  
---|---
**Main Outcomes** | On completion of this module, students should be able to:  
- Apply advanced execution of principles in experimental design.  
- Critically apply skills in statistical analysis of data from experiments (chemistry, physics, industry, environment, biochemistry, medical science, pharmacy, education).  
- Examination of different techniques of experimental design such as completely randomized design, randomized complete block design, latin square design, split-plot design, means separation.  
- Exposure to practical examples drawn from different disciplines where such techniques are widely applied.  
- Use of Chi-square tests in experimental data.  
- Use of analysis of variance in assessing the robustness and fitness in regression analysis.

**Main Content** |  
---|---
- Introduction and principles in experimental design  
- General considerations one one-way and two-way analysis of variance  
- The completely randomized design  
- The randomized complete block design  
- Mean separation methods  
- Latin square design  
- Split plot design  
- Incomplete block designs

**Pre-requisite modules** | STA331, STA332 or equivalent  
---|---
**Co-requisite modules** | None  
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**Prohibited module Combination** | None

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**Methods of Student Assessment** | Continuous Assessment (CA): 0%  
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| Final Assessment (FA): 100%  
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**Assessment Module type** | Continuous and Final Assessment

**Faculty** | Natural Sciences  
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**Home Department** | Statistics and Population Studies  
---|---
**Module Topic** | Biostatistics  
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**Generic Module Name** | Statistics 835  
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**Alpha-numeric Code** | STA835  
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**NQF Level** | 9  
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**NQF Credit Value** | 15
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</table>
| **Main Outcomes** | On completion of this module students should be able to:  
  - Explain various terms used in Bio statistical analyses.  
  - Design and execute various statistical techniques applicable to medical related data and critically evaluate and interpret the results.  
  - Study design in medical related research; exploratory medical research including risk ratio’s, odds ratio’s, mortality and morbidity rates;  
  - Inferential medical research including non-parametric analyses, survival analysis and meta-analysis; regression analysis; and the analyses of a Bio statistical dataset using a statistical package. |
| **Pre-requisite modules** | STA331; STA332; or equivalent |
| **Co-requisite modules** | None |
| **Prohibited module** | None |
| **Combination** | None |
| **Breakdown of Learning Time** | **Hours** | **Timetable Requirement per week** | **Other teaching modes that does not require time-table** |
| Contact with lecturer / tutor: | 21 | Lectures p.w. | 3 |
| Assignments & tasks: | 30 | Practicals p.w. | 0 |
| Practicals: | 30 | Tutorials p.w. | 0 |
| Tutorials: | 0 | | |
| Tests & Examinations: | 5 | | |
| Selfstudy: | 60 | | |
| Total Learning Time | 150 | | |
| **Methods of Student Assessment** | Continuous Assessment (CA): 0%  
  Final Assessment (FA): 100% |
| **Assessment Module type** | Final Assessment (FA) |

**Faculty** | Natural Sciences  
**Home Department** | Statistics and Population Studies  
**Module Topic** | Statistical Genetics in Human Traits  
**Generic Module Name** | Statistics 837  
**Alpha-numeric Code** | STA837  
**NQF Level** | 9  
**NQF Credit Value** | 15  
**Duration** | Semester  
**Proposed semester to be offered.** | Second Semester  
**Programmes in which the module will be offered** | MSc (Statistical Science) (3838)  
**Year level** | 8  
**Main Outcomes** | On completion of this module students should be able to:  
  - Critically apply knowledge on the development of statistical genetics.
• Practical application and interpretation of linkage analysis, variance components methods and association analysis.

**Main Content**

• Introduction to relevant aspects of human genetics; Mendelian inheritance,
• Linkage analysis,
• Association analysis of dichotomous and quantitative traits for case-control and family based study designs,
• Software for human genetical analyses.

**Pre-requisite modules**
None

**Co-requisite modules**
None

**Prohibited module Combination**
None

<table>
<thead>
<tr>
<th>Breakdown of Learning Time</th>
<th>Hours</th>
<th>Timetable Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
</tr>
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<td>Tutorials p.w.</td>
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<td><strong>Tutorials:</strong></td>
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<td><strong>Tests &amp; Examinations:</strong></td>
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<td><strong>Selfstudy:</strong></td>
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**Total Learning Time**
150

**Methods of Student Assessment**
Continuous Assessment (CA): 0%
Final Assessment (FA):100%

**Assessment Module type**
Final Assessment (FA)

<table>
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<th>Faculty</th>
<th>Natural Sciences</th>
</tr>
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<tbody>
<tr>
<td>Home Department</td>
<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Research Project</td>
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<tr>
<td>Generic Module Name</td>
<td>Statistics 839</td>
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<td>Year</td>
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<td>Programmes in which the module will be offered</td>
<td>MSc (Statistical Science) (3838); MSc (Computational Finance) (3093); MPhil (Population Studies) (3921)</td>
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<tr>
<td>Year level</td>
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</tr>
<tr>
<td><strong>Main Outcomes</strong></td>
<td>On completion of this module students should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Make a contribution with limited scope to knowledge in the field of Statistics, Population Studies and Demography or Computational Finance and its interaction with another field or discipline, following upon a research question with the potential to make such a satisfactory contribution.</td>
</tr>
<tr>
<td></td>
<td>• Carry out and report on this research in a format suitable for publication.</td>
</tr>
<tr>
<td></td>
<td>• Concomitant outcomes will normally include personal skills development supporting the required research and writing activities under the guidance of the supervisor(s).</td>
</tr>
</tbody>
</table>
| Main Content | • The primary task is to develop the research proposal towards its envisaged goal(s), conducting the research and preparing the project report under the guidance of the supervisor(s), before submitting it for assessment;  
• Research proposals may derive from any area of Statistics, Population Studies and Demography or Computational Finance in interaction with another field or discipline, and may include substantial historical and/or comparative studies. |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Pre-requisite modules</td>
<td>STA810 or equivalent.</td>
</tr>
<tr>
<td>Co-requisite modules</td>
<td>As required by department</td>
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<tr>
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</tr>
<tr>
<td>Breakdown of Learning Time</td>
<td></td>
</tr>
<tr>
<td>Contact with lecturer / tutor:</td>
<td>0</td>
</tr>
<tr>
<td>Assignments &amp; tasks:</td>
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<td></td>
<td>Final Assessment (FA): 100%</td>
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<td>Assessment Module type</td>
<td>Final Assessment (FA)</td>
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<tr>
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<td>Natural Sciences</td>
</tr>
<tr>
<td>Home Department</td>
<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Business Intelligence</td>
</tr>
<tr>
<td>Generic Module Name</td>
<td>Business Intelligence 841</td>
</tr>
<tr>
<td>Alpha-numeric Code</td>
<td>STA841</td>
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<tr>
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<tr>
<td>Duration</td>
<td>Semester</td>
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<tr>
<td>Proposed semester to be offered.</td>
<td>First Semester</td>
</tr>
<tr>
<td>Programmes in which the module will be offered</td>
<td>MSc (Statistical Sciences)(Specialization in Data Science)</td>
</tr>
<tr>
<td>Year level</td>
<td>8</td>
</tr>
</tbody>
</table>
| Main Outcomes | On completion of this module student should be able to:  
• Manage data, set up databases, datamarts and data warehouses.  
• Prepare relational databases.  
• Access and clean data including further querying and reporting around these data.  
• Statistically analyse databases.  
• Use data mining software tools. |
| Main Content | • Business Intelligence techniques.  
• Ethical/professional data handling and communication.  
• Data management tools to prepare big data for statistical analysis and data mining. |
### Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
<th>Other teaching modes that does not require time-table</th>
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<tbody>
<tr>
<td>Contact with lecturer / tutor:</td>
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<td>Lectures p.w.</td>
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<td>Assignments &amp; tasks:</td>
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<td>Practicals:</td>
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#### Method of Student Assessment

- Continuous Assessment (CA): 0%
- Final Assessment (FA): 100%

### Assessment Module type

- Final Assessment (FA)

---

**Faculty**: Natural Sciences  
**Home Department**: Statistics and Population Studies  
**Module Topic**: Contemporary Business Analysis  
**Generic Module Name**: Contemporary Business Analysis 842  
**Alpha-numeric Code**: STA842  
**NQF Level**: 9  
**NQF Credit Value**: 15  
**Duration**: Semester  
**Proposed semester to be offered.**: First semester  
**Programmes in which the module will be offered**: MSc (Statistical Sciences)(Specialization stream in Data Science)  
**Year level**: 8

### Main Outcomes

On completion of this module students should be able to:
- Mine text
- Analyse web data
- Analyse geospatial data
- Analyse customer data.

### Main Content

- Marketing metrics for model assessment.
- Recency, Frequency, Monetary (RFM) segmentation.
- Customer lifetime value calculations.
- Effectively communication skills for model deployment.
- Ethical data handling.

### Pre-requisite modules

None

### Co-requisite modules

None

### Prohibited module Combination

None

---

A. Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time-table Requirement per week</th>
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<td>Assignments &amp; tasks:</td>
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612
### Faculty
Natural Sciences

### Home Department
Statistics and Population Studies

### Module Topic
Multicriteria Decision Making

### Generic Module Name
Multicriteria Decision Making 843

### Alpha-numeric Code
STA843

### NQF Level
9

### NQF Credit Value
15

### Duration
Semester

### Proposed semester to be offered.
First semester

### Programmes in which the module will be offered
MSc (Statistical Sciences)(Specialization in Data Science)

### Year level
8

### Main Outcomes
On completion of this module students should be able to:
- Use modeling and mathematical programming tools
- Demonstrate an competency in the language of multi-criteria decision making
- Apply techniques for multi-criteria decision making

### Main Content
- Mathematical optimization to formulate and solve decision making problems;
- Programming techniques including linear, integer, mixed-integer and non-linear scenarios;
- Model formulation and construction using multi-criteria decision making.

### Pre-requisite modules
None

### Co-requisite modules
None

### Prohibited module combination
None

### A. Breakdown of Learning Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<td></td>
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<tr>
<td>Selfstudy</td>
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### Method of Student Assessment
Continuous Assessment (CA): 0%
Final Assessment (FA): 100%

### Assessment Module type
Final Assessment (FA)
<table>
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<td>Statistics and Population Studies</td>
</tr>
<tr>
<td>Module Topic</td>
<td>Matrix Methods</td>
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<td>Generic Module Name</td>
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<td>Programmes in which the module will be offered</td>
<td>MSc (Statistical Science) (3838); MSc (Computational Finance) (3093); MPhil (Population Studies) (3921)</td>
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<tr>
<td>Main Outcomes</td>
<td>On completion of this module students should be able to: - Critically utilize matrix operations in a statistical context.</td>
</tr>
<tr>
<td>Main Content</td>
<td>• Vector and Matrix theory, Linear transformations, Systems of Linear transformations</td>
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<td>Pre-requisite modules</td>
<td>STA331; STA332; MAT211; MAT221 or equivalent</td>
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<td>Co-requisite modules</td>
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<td>Prohibited module Combination</td>
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<table>
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<th>Timetable Requirement per week</th>
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MODULES FROM OTHER FACULTIES

Refer to Faculty of Economic and Management Sciences Calendar

Undergraduate:
Economics ECO151/ ECO152/ ECO231/ ECO232/ ECO235/
ECO241/ ECO242/ ECO311/ ECO331/ ECO332/
ECO334/ ECO335/ ECO336
Information Systems IFS131/ IFS132/ IFS231/ IFS233/ IFS361/ IFS362
Management MAN131/ MAN132

Postgraduate:
Financial Accounting ACC781
Information Systems IFS711/ IFS712/ IFS721
Management MAN651/ MAN704/ MAN705/ MAN706/ MAN711/
MAN742/ MAN745/ MAN753/ MAN756/ MAN757/
MAN780/ MAN787

Refer to Faculty of Arts Calendar

Introduction to Afrikaans AFR002
English for Educational Development EED117/ EDD127
Introduction to Xhosa XHO002

EXPLANATION OF SYMBOLS AND REMARKS ON ACADEMIC TRANSCRIPT

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<td>A</td>
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<tr>
<td>B</td>
<td>70-74%</td>
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<td>F</td>
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<tr>
<td>G</td>
<td>39-0%</td>
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<tr>
<td>No Year mark</td>
<td>Absent from the examination: No results</td>
</tr>
<tr>
<td>SPG</td>
<td>Absent from the examination but with special permission to write the supplementary examination on medical or non-medical grounds.</td>
</tr>
<tr>
<td>SAG</td>
<td>Supplementary examination granted on academic grounds.</td>
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<tr>
<td>SUB</td>
<td>Failed to obtain the required sub minimum and have to repeat the course.</td>
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<tr>
<td>Ceased Programme</td>
<td>Ceased studying the programme.</td>
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<tr>
<td>DNQ</td>
<td>Did not qualify to write the examination</td>
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<td>ABS</td>
<td>Absent from the examination</td>
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<td>Senate Discretionary Assessment granted</td>
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<td>An external module completed at another institution deemed equivalent to be credited toward a qualification for which the student is registered.</td>
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<td>A module completed at this institution credited toward a qualification for which the student is registered.</td>
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