

# SCHOOL OF SCIENCE & TECHNOLOGY



**2020**  
**School Calendar**

## Medium of Instruction

The medium of instruction at the Sefako Makgatho Health Sciences University is English.

## Validity

This Calendar is valid for the year 2020. The University reserves the right to amend any rule or provision in this Calendar at any time without prior notice. No responsibility is accepted for possible inaccuracies.

## University Terms 2020

<b>FIRST SEMESTER</b>	:	06 January 2020	-	28 June 2020
<b>SECOND SEMESTER</b>	:	13 July 2020	-	15 December 2020
AUTUMN Recess (for students)	:	06 April 2020	-	09 April 2020 (inclusive)
WINTER Recess (for students)	:	29 July 2020	-	10 July 2020 (inclusive)
SUMMER Recess (Students Vacation)	:	18 December 2020	-	04 January 2021

## Correspondence

All correspondence to be addressed to:	The Dean Sefako Makgatho Health Sciences University School of Science & Technology Box 60 PO MEDUNSA 0204
Telegraphic address	Medunsa Campus
Telephone numbers:	+27(0) 12 521 4304 +27(0) 12 521 3362
Fax:	+27(0) 12 521 3070
Email:	<a href="mailto:Obi.Lawrence@smu.ac.za">Obi.Lawrence@smu.ac.za</a> ( Dean) <a href="mailto:Delene.Koeleman@smu.ac.za">Delene.Koeleman@smu.ac.za</a> (PA) <a href="mailto:Maseeng.Nkobeni@smu.ac.za">Maseeng.Nkobeni@smu.ac.za</a> (Admin Officer) <a href="mailto:Refilwe.Mashilwane@smu.ac.za">Refilwe.Mashilwane@smu.ac.za</a> (Admin Officer)

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	Admission Criteria			
	Bachelor of Science – Biotechnology	BSc	BSCG01	
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	Bachelor of Science – Environmental Management & Toxicology	BSc	BSCG01	
	Bachelor of Science – Life Sciences	BSc	BSCG01	
	Bachelor of Science – Mathematical Sciences	BSc	BSCH01	
	Bachelor of Science – Physical Sciences	BSc	BSCI01	
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	Honours Degree – Applied Mathematics	BSc	HSCT01	
	Honours Degree – Biochemistry	BSc	HSCP01	
	Honours Degree – Biology	BSc	HSCR01	
	Honours Degree – Chemistry	BSc	HSCN01	
	Honours Degree – Computer Information & Technology	BSc	HSCNCIT	
	Honours Degree – Mathematics	BSc	HSCU01	
	Honours Degree – Physics	BSc	HSCO01	
	Honours Degree – Statistics and Operations Research	BSc	HSCV01	
	<b>Masters of Science (Magister Scientiae)</b>	<b>ABBREVIATION</b>	<b>CODE</b>	209-216
	Master of Science – Applied Mathematics	BSc	MAMA090	
	Master of Science – Biochemistry	BSc	MBIA090	
	Master of Science – Botany	BSc	MBOA090	
	Master of Science – Chemistry	BSc	MCHA090	
	Master of Science – Mathematics	BSc	MPCB090	
	Master of Science – Physics	BSc	MPHA090	
	Master of Science – Statistics & Operations Research	BSc	MSTA090	
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	Doctor of Philosophy – Applied Mathematics	BSc	MAMA100	
	Doctor of Philosophy – Biochemistry	BSc	MBIA100	
	Doctor of Philosophy – Botany	BSc	MBOA100	
	Doctor of Philosophy – Chemistry	BSc	MCHA100	
	Doctor of Philosophy – Mathematic	BSc	MMAA100	
	Doctor of Philosophy – Physics	BSc	MPHA100	
	Doctor of Philosophy – Statistics & Operations Research	BSc	MSTA100	

## MESSAGE FROM THE DEAN

### SCHOOL OF SCIENCE & TECHNOLOGY

Hearty greetings and welcome to the School of Science and Technology, Sefako Makgatho Health Sciences University. The School is known for providing excellent educational opportunities in the areas of **Mathematical, Life, Physical, Occupational and Environmental Sciences** anchored on Entrepreneurship and Innovation. The School also offers an **Extended Curriculum Program (BSc-ECP)** over a four-year period as a way of enhancing student access and success. Recently, some major fields were approved by the Department of Higher Education and Training (DHET). They consist of Biotechnology, Environmental Biology, Environmental Toxicology as well as Honours streams in Information and Communication Technology.

The School provides strong articulation from ECP programmes to doctoral degrees. A pilot study was recently conducted in terms of an ultimate goal to entrench Work Integrated Learning (WIL) at the postgraduate level. In addition to the foregoing, we offer training in Science and Technology to students registered in the Schools of Oral Health Sciences, Health Care Sciences, Pharmacy and Medicine. Career/work related prospects for students registered in the various streams in the School of Science and Technology are as follows:-

1. **Brewery, Food and Dairy Industries:**  
(*Biochemistry, Chemistry, Biology, Biotechnology, ICT*).
2. **Research Institutes** such as Agricultural Research Council (ARC), Botanical Institute, Zoological Gardens, Medical Research Council (MRC), Water Research Commission (WRC), Council for Scientific and Industrial Research (CSIR), National Research Foundation (NRF).  
All streams (*Biology, Environmental Biology, Biochemistry, Chemistry, Statistics, Mathematics, Physics, Computer Science, ICT, Biotechnology, Environmental Management and Toxicology*).
3. **Government Departments:** Departments of Health, Environmental Affairs, Trade and Industry, Science and Technology, Communications, Public Enterprises, Transport, Education, Statistics South Africa.  
(*Mathematics, Biochemistry, Chemistry, Biotechnology, Biology, Statistics, Physics, ICT*).
4. **Financial Institutions:** Banks, Insurance Companies, Stock exchange, Business Analyst.  
(*ICT, Computer Science, Statistics, Mathematics*).
5. **Telecommunications:** Vodacom, Cell C, MTN.  
(*ICT, Computer Science, Physics, Mathematics, Statistics, Biotechnology*).
6. **Mining:**  
(*Chemistry, Biochemistry, Physics, ICT, Computer Science, Biology, Biochemistry, Environmental Biology, Statistics, Environmental Management and Toxicology, Biotechnology*).
7. **Retail:**  
(*Statistics, ICT, Computer Science, Biochemistry, Biology*).
8. **Artificial Intelligence:**  
(*Computer Science, ICT, Mathematics, Statistics, Physics, Chemistry, Biology, Biochemistry*).

To give impetus to innovation and Entrepreneurship, the School plans to establish a Centre for Entrepreneurship, predicated on multi-disciplinarity, internationalization and community engagement.

Our staff members are suitably qualified to deliver on the various disciplines and to produce well-rounded graduates that are in sync with the momentum of modern developments in Science, Technology and Innovation. A gradual move towards commercialisation of research findings or products is envisaged because it is the key hinge in the overlap between research and innovation.

Considering the array of opportunities and career prospects in the School, it is our pleasure to welcome you to the School of Science and Technology, the home for your future career.



**Prof. CL Obi**

Dean – School of Science & Technology

# UNIVERSITY VISION AND MISSION

## **VISION**

To be the benchmark institution providing holistic health sciences education that meets the health needs of the individual, the family, the community and the population.

## **MISSION**

- Provide high-quality primary health care-oriented health sciences research, education and services.
- Deploy educational approaches that include evidence-based methods for curriculum development and delivery that are rooted in the community.
- Promote interdisciplinary research, education and skills training that recognizes the cross-disciplinary nature of holistic health care provision
- Produce a cadre of health professionals with the transformative leadership capacity to identify, analyse and address the health needs of the individual, the family, the community and the population.
- Create an environment that supports innovation and harnesses the power of new technologies to address the health needs of the community.

This mission will be achieved through strengthening of human resources and research capacity, improved physical infrastructure and improved recruitment and selection of both students and staff.

# School Committees for Science & Technology

## Board of the School

**Chairperson** : Dean

**Members** :

Heads of academic departments in the School  
Professors and Associate professors in the School  
Permanently appointed senior lecturers in the School  
Permanently appointed lecturers in the School

## Executive Committee

**Chairperson** : Dean

**Members** :

All Heads of Academic Departments in the School

## Academic Planning Committee

**Chairperson** : Dean

**Members** :

Departmental Representatives

## Community Engagement and Marketing Committee

**Chairperson** : Dean

**Members** :

Departmental representatives  
Science outreach co-ordinator  
Marketing Department  
Student Representative

## Examinations Committee

**Chairperson** : Dean

**Members** :

All Heads of Academic Departments  
Departmental Representatives  
Assistant Registrar

## Occupational Health & Safety Committee

**Chairperson** : Dean

**Members** :

Departmental Representatives

**Quality Assurance**

**Chairperson :** Dean

**Members :**

Departmental Representatives

**School of Science & Research Committee**

**Chairperson :**

**Vice-Chairperson:**

**Ex Officio Members**

Vice-Chancellor and Principal

Director : Research

Dean (SST)

**Members:**

Departmental Representatives

**Student Selection & Admission**

**Chairperson :** Dean

**Members :**

All Heads of Academic Department in the school.

Head Student Enrolment

Administrative Officer from Student Enrolment

Administrative Officer from the School

Student Representative

**Student Support**

**Chairperson :**

**Members :**

Departmental Representatives

**DATES FOR SCHOOL BOARD MEETINGS**

Wednesday	19 February	2020	13h00
Wednesday	15 April	2020	13h00
Wednesday	22 July	2020	13h00
Wednesday	09 September	2020	13h00

## MEMBERS OF STAFF

### Office of the Dean

<b>Dean</b>	<b>Obi CL</b> , Prof
Secretary	Koeleman D, Ms
Administrative Officer	Nkobeni ML, Ms
Administrative Officer	Mashilwane RE, Ms
Mobile Science Bus	Seseng FC, Ms

### Academic Departments

#### Biochemistry

<b>Head of Department</b>	<b>Mogale MA</b> , MSc, PhD (MEDUNSA)
Senior Lecturer	Gololo S, MSc, PhD (SMU)
Lecturer	Kgopa AH, MSc (RU)PhD (SMU)
Lecturer	Makhubela SD, MSc (WITS)
Lecturer	Mathe EH, MSc (VENDA)
Laboratory Assistant	Mashigo PN,

#### Biology

<b>Head of Department</b>	<b>King PH</b> , PhD (UFS)
Professor	Olowoyo J, PhD (MEDUNSA)
Associate Professor	Welman J, PhD (STELLENBOSCH)
Senior Lecturer	Moema EBE, PhD (MEDUNSA)
Senior Lecturer	Middleton L, PhD (UP)
Senior Lecturer	Mugivhisa L, PhD(SMU)
Lecturer	Lion GN, MSc (UL)
Lecturer	Mavimbela C, MSc (UL)
Lecturer	Mkolo M, MSc (MEDUNSA)
Lecturer	Modise EM, MSc (MEDUNSA)
Senior Technical Officer	Mnisi NML, Hons (UL)
Technical Officer	Vacant
Senior Laboratory Assistant	Mooki KS, Hons (UL)

#### Chemistry

<b>Acting Head of Department</b>	<b>Maseko RB</b> , PhD (UNISA)
Senior Lecturer	Debeila MA, PhD (WITS)
Senior Lecturer	Vacant
Lecturer	Makhubela NFH, MSc (MEDUNSA)
Lecturer	Mofokeng MJ, MSc (UFH)
Lecturer	Mogane MG, MSc (UNISA)
Lecturer	Mosebo B, MSc (NWU)
Natural Scientist	Masilela ZI, MSc (WSU)
Natural Scientist	Sethoga LS, BSc (Hons) (UL) MSc (UNISA)
Senior Technical Officer	Semenya CJ, BSc (Hons) (UL)MSc( SMU)
Technical Officer	Kgasi AN, B.Tech (UNISA)
Laboratory Assistant	Mokose R

## Computer Science

<b>Head of Department</b>	<b>Dandadzi TA</b> , MSc (UNCC) PhD (UL)
Lecturer	Hungwe T, MSc (WITS)
Lecturer	Mafike S, MSc (Engineering) (Central South Univ.China)
Lecturer	Mathiba NS, MSc (Southern Univ. USA)
Junior Lecturer	Ndobe TV, BSc (Hons) (UNISA) MSc (WITS)
Laboratory Technician	Nkosi MI, BSc (UL)

## Language Proficiency

<b>Head of Department</b>	<b>Seleka ME</b> , MA. English (UNW) MA TESOL (Indiana Univ Pennsylvania) PhD (UNW)
Senior Lecturer	Nair P, PhD (Univ of Kerala, India)
Lecturer	Coetzer A, MA B.Ed (UNISA) PhD (UL)
Lecturer	Hungwe V, MA (WITS) PhD (UL)
Lecturer	Veldtman HD, MPA (UP)
Junior Lecturer	Diphofa SLA, B.Ed (VISTA)
Junior Lecturer	Lesufi RT, B.Ed (NWU)

## Mathematics and Applied Mathematics

<b>Head of Department</b>	<b>Aphane M</b> , PhD (UNISA)
Associate Professor	Gopalraj P, PhD (UP)
Senior Lecturer	Adem K, PhD (North West Univ.)
Senior Lecturer	Chin PWM, PhD (UP)
Lecturer	Bambe Moutsing CB, MSc (UP)
Lecturer	Thabane JL, BSc (Hons), MSc (WITS) PhD (SMU)
Lecturer	Vijayasenana D, MSc (MAHATMA GANDHI)

## Physics

<b>Acting Head of Department</b>	<b>Mhlongo MR</b> , MSc (UNISA)
Associate Professor	Sithole ME, PhD (UL)
Junior Lecturer	Moloi AN, B.ED (Hons) (UP)
Junior Lecturer	Selepe TL, BSc (Hons) (UL)
Natural Scientist	Rathagane CR, BSc (Hons) (UL)
Natural Scientist	Rambevha TR, BSc (Hons) (UL)
Technical Officer	Mphelane MN, BSc (Hons) (UL)

## Statistics and Operations Research

<b>Head of Department</b>	<b>Seeletse SM</b> , HDipEd (Rhodes), MSc (Stats) (UNISA), MSc (TDM) (BCUC, UK), DBA (Newport, USA), PhD (OR) (PU for CHO)
Lecturer	Lekganyane MM, BSc (Hons) (MEDUNSA), MSc (UL)
Lecturer	Miyambu GR, BSc (Hons) (UL) MSc (UL)
Lecturer	Sesale EL, BSc (Hons) MSc (SMU)
Lecturer	Ramarumo T, BSc (Hons) (UL) MSc (SMU)
Junior Lecturer	Rakale G, BSc (Hons) (SMU)
Junior Lecturer	Tshabalala KD, BSc (Hons) (UL)

# Sefako Makgatho Health Sciences University

## Rules of the School of Science & Technology

### School Rules in relation to the General Rules

The School Rules must be read together with the General Rules. Unless otherwise indicated, expressly or by necessary implication in the School Rules, the General Rules apply.

### Admission

**SST1** A candidate for a study programme must comply with the conditions and meet the selection criteria of the School.

### Summative Assessment

**SST2** To be admitted to the summative assessment for a module a student must have fulfilled the requirements set out in the General rules and must have a record of at least 75% attendance in scheduled formal contact session for the module.

### Supplementary Assessment (For Undergraduate Studies Only)

**SST3** Unless Senate determines otherwise supplementary assessment is flexibly arranged by the School after the standard summative assessment.

### Progression and Admission to subsequent Modules

#### SST4

SST4.1 Where a student fails a first semester module he/she will be allowed (a) to proceed with the second semester module in the subject and (b) to repeat the first semester module in the following year unless he/she has been refused readmission in the following year.

SST4.2 Subject to the General rules a student may only take a second-year module in the School if he or she has passed at least three (3) courses at academic first-year level and has completed all prerequisite module(s).

SST4.3 Subject to the General Rules a student may only take a third-year module in the School level if he or she has completed all modules prescribed for the first-year and at least 50% of the total credits prescribed for the second-year level and has completed all prerequisite modules.

### Composition of a Programme/Curriculum for a qualification

#### SST5

SST5.1 Each programme/curriculum is composed of a number of modules as determined by Senate and set out in the rules for the qualification.

SST5.2 The curriculum for an honours degree may prescribe papers, projects, extended essays, practicals, or combinations thereof.

SST5.3 The curriculum for a coursework master's programme must include a mini-dissertation and may include assessment papers, projects, research papers, practicals, or combinations thereof.

SST5.4 The School may permit a student to submit published work based on research while registered to supplement or replace a mini-dissertation for a course-work master's degree.

SST5.5 The School may permit a PhD candidate (a) to incorporate currently relevant material from the student's own published work in the thesis, with appropriate acknowledgement as to the source; and (b) if determined by his/her pre-approved research protocol to submit a collection of published works, or the full text of a monograph reporting on research work done while registered for the degree as his/her thesis monograph.

# Bachelor of Science

## *(Extended Curriculum Programme)*

### Programmes Offered

The School offers the following *extended BSc degree curriculum programmes*

COURSE CODE	PROGRAMME	MAJOR SUBJECTS*
BSCK01	Life Sciences	Biology, Chemistry, Biochemistry, Physiology
BSCL01	Mathematical Sciences	Mathematics, Statistics, Computer Science, Physics
BSCM01	Physical Sciences	Physics, Chemistry, Biochemistry, Mathematics
		* Any Two Majors in Final Year

### Admission to BSc-ECP (*Extended Curriculum Programme*)

#### SSTB 1

SSTB 1.1 An applicant must have obtained (a) an NSC with a Bachelor endorsement; (b) a minimum APS of **24** and (c) the following minimum APS per subject:

Subject	Score
English	4
Mathematics	4
Life Science	4
Physical Science	4
<i>Any two other NSC subjects with a minimum NSC score of 4 each</i>	

SSTB1.2 Admission criteria other than the above shall comply with Rules as described for the **BSc Programme**.

**SSTB 2** The curriculum for the **BSc-ECP Programme** shall extend over four years and be composed of a combination of modules that include two majors.

**SSTB 3** The Dean may in exceptional circumstances and on the recommendation of the head of Department exempt a student who is repeating a module from the practical component of that module.

**SSTB 4** A student enrolled in BSc-ECP must follow the prescribed structured curriculum in

(a) **Years 1 and 2:**

BSc Extended Curriculum Programme					
Year 1			Year 2		
Module Code	3 Core (C) + choice of 2 Electives (E)	Credits	Module Code	2 Core (C) + choice of 3 Electives (E)	Credits
MMTH000	C	24	MMTB000	C	24
MHEL000	C	24	MHEB000	C	24
MCHM000	C	24	MCHB000	E	24
MBIO000	E	24	MBIB000	E	24
MCSC000	E	24	MCSB000	E	24
MPHS000	E	24	MPHB000	E	24
MSTS000	E	24	MSTB000	E	24
<b>Total Credits</b>		<b>120</b>	<b>Total Credits</b>		<b>120</b>

(b) **Years 3 & 4:** the curricula of Year 2 and year 3 of the main stream **BSc Programme**.

(c) The **BSc Extended Curriculum Programme** carries a minimum of 480 SAQA credits, with at least 120 SAQA credits required at each year level.

**SSTB 5** To proceed to BSc-ECP 2, a student must have passed MMTH000 and two additional modules.

**SSTB 6** To proceed to BSc-ECP 3 (main stream BSc 2), a student must have passed MMTB000 and two additional modules from the second year of study.

**SSTB 7** To register for BSc-ECP 3 a student must have passed all prerequisites for BSc-ECP 3 module(s).

**SSTB 8** In exceptional cases a student may be allowed to register year 3 modules of the **BSc Extended Curriculum Programme** without the full complement of modules passed at year 1 and year 2, but then only on recommendation of the Head of Department and approval by the Dean of School, provided that all applicable rules and modular prerequisites are complied with.

## Modules in Bachelor of Science Programme

### *(Extended Curriculum Programme)*

Module code*	Module Name	Pre-requisites	Co-requisites
<b>BSc(ECP) Level 1</b>			
	<i>To be presented from 2013</i>		
MBIO000	Introduction to Life Science Studies I	Selection Criteria	Fixed Curriculum
MCHM000	Introduction to General Chemistry 1A		
MCSC000	Introduction to Computing Concepts and Algorithms		
MHEL000	Health Education and Life Competencies I		
MMTH000	Elementary set theory, Linear and Introductory Abstract Algebra and Elementary Statistics		

Module code*	Module Name	Pre-requisites	Co-requisites
MPHS000	Introduction to General Physics 1A		
MSTS000	Descriptive Statistics		
Module code*	Module Name	Pre-requisites	Co-requisites
<b>BSc(ECP) Level 2</b>		<i>To be presented from 2014</i>	
MBIB000	Introduction to Life Science Studies II	MBIO000	
MCHB000	General Chemistry 1B	MMTH000 MCHM000	
MCSB000	Introduction to Data Organization and Artificial Intelligence	MMTH000MCS C000	
MHEB000	Health Education and Life Competencies II	MHEL000	
MMTB000	Differential and Integral Calculus	MMTH000	
MPHB000	Introduction to General Physics 1B	MMTH000 MPHS000	
MSTB000	Introduction to Statistics and Statistical Inference	MMTH000 MSTS000	

## CURRICULUM – INFORMATION

### LIFE SCIENCES - BSCK01

CURRICULUM INFORMATION			
School:	School of Science & Technology	Qualification Code:	<b>BSC<u>K</u>01</b>
Qualification Name:	Bachelor of Science (Life Sciences)	Last Revision date:	2012
Campus:	SMU Campus	Is this a fixed Curriculum:	No
Total SAQA Credits for Qualification:	488		

PERIOD OF STUDY / YEAR LEVEL 1					
Year					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 5 module/s are <b>COMPULSORY</b>					
	MMTH000	Year	Y	24	0.1
	MHEL000	Year	N	24	0.1
	MBIO000	Year	Y	24	0.1
	MCHM000	Year	Y	24	0.1
	MPHS000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

PERIOD OF STUDY / YEAR LEVEL 2					
Year					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 5 of the following <b>ELECTIVES</b>					
	MMTB000	Year	Y	24	0.1
	MHEB000	Year	N	24	0.1
	MBIB000	Year	Y	24	0.1
	MCHB000	Year	Y	24	0.1
	MPHB000	Year	Y	24	0.1
	MSTB000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

## CURRICULUM INFORMATION

<b>School:</b>	School of Science & Technology	<b>Qualification Code:</b>	BSCK01
<b>Qualification Name:</b>	Bachelor of Science (Life Sciences)	<b>Last Revision date:</b>	2012
<b>Campus:</b>	SMU Campus	<b>Total SAQA Credits for Qualification:</b>	488
		<b>Is this a fixed Curriculum:</b>	No

PERIOD OF STUDY / YEAR LEVEL 3					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 3 of the following ELECTIVES					
	MBIA021	S1	Y	20	0.167
	MCHB021 and MCHA022	Q1 Q2	Y Y	10 10	0.083 0.083
	MPLA021	S1	Y	20	0.167
	MZOA021	S1	Y	20	0.167
<b>Total credits for Semester 1 modules</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 3					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 3 of the following ELECTIVES					
	MBIA022	S2	Y	20	0.167
	MCHA022 and MCHB022	Q3 Q4	Y Y	10 10	0.083 0.083
	MPLA022	S2	Y	20	0.167
	MZOB022	S2	Y	20	0.167
<b>Total credits for Semester 2 modules</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 4					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose at least 2 of the following ELECTIVES					
	MBIA031	S1	Y	32	0.25
	MZOA031	S1	Y	32	0.25
	MCHA031 and MCHB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MPLB031	S1	Y	32	0.25
	MZOA031	S1	Y	32	0.25
<b>Total credits for Semester 1 modules</b>				<b>64</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>				<b>128</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 4					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose at least 2 of the following ELECTIVES					
	MOL302M	S2	Y	32	0.25
	MZOB032	S2	Y	32	0.25
	MCHA032 and MCHB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MPLB032	S2	Y	32	0.125
	MZOA032	S2	Y	32	0.25
<b>Total credits for Semester 2 modules</b>				<b>64</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>				<b>128</b>	<b>1</b>

# MATHEMATICAL SCIENCES - BSC<sub>L</sub>01

## CURRICULUM INFORMATION

<b>School:</b> School of Science & Technology			
<b>Qualification Name:</b> Bachelor of Science (Mathematical Sciences)		<b>Qualification Code:</b> BSC <sub>L</sub> 01	
<b>Campus:</b> SMU Campus		<b>Last Revision date:</b> 2012	
<b>Total SAQA Credits for Qualification:</b>	488	<b>Is this a fixed Curriculum:</b>	No

PERIOD OF STUDY / YEAR LEVEL 1					
Year					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 5 module/s are <b>COMPULSORY</b>					
	MMTH000	Year	Y	24	0.1
	MHEL000	Year	N	24	0.1
	MCSC000	Year	Y	24	0.1
	MPHS000	Year	Y	24	0.1
	MSTT000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

PERIOD OF STUDY / YEAR LEVEL 2					
Year					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 5 module/s are <b>COMPULSORY</b>					
	MMTB000	Year	Y	24	0.1
	MHEB000	Year	N	24	0.1
	MCSB000	Year	Y	24	0.1
	MPHB000	Year	Y	24	0.1
	MSTB000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

PERIOD OF STUDY / YEAR LEVEL 3					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module is <b>COMPULSORY</b>					
	MMTA021	S1	Y	20	0.167
Choose <b>2</b> of the following <b>ELECTIVES</b>					
	MCOA021	S1	Y	20	0.167
	MSTA021	S1	Y	20	0.167
	MPHA 021 and MPHB021	Q1 Q2	Y Y	10 10	0.083 0.083
<b>Total credits for Semester 1</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 3					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module is <b>COMPULSORY</b>					
	MMTA022	S2	Y	20	0.167
Choose <b>2</b> of the following <b>ELECTIVES</b>					
	MCOA022	S2	Y	20	0.167
	MSTA022	S2	Y	20	0.167
	MPHA 022 and MPHB022	Q3 Q4	Y Y	10 10	0.083 0.083
<b>Total credits for Semester 2</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				<b>120</b>	<b>1</b>

### CURRICULUM INFORMATION

<b>School:</b> School of Science & Technology		
<b>Qualification Name:</b> Bachelor of Science (Mathematical Sciences)		<b>Qualification Code:</b> BSCL01
<b>Campus:</b> SMU Campus		<b>Last Revision date:</b> 2012
<b>Total SAQA Credits for Qualification:</b>	488	<b>Is this a fixed Curriculum:</b> No

PERIOD OF STUDY / YEAR LEVEL 4					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
	Choose 2 of the following <b>ELECTIVE/S</b>				
	MMTA031 and MMTB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MCOA031 and MCOB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MSTA031 and MSTB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MPHA031 and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
<b>Total credits for Semester 1 Year level 4</b>				<b>64</b>	<b>0.500</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>				<b>128</b>	<b>1.000</b>
<b>TOTAL CREDITS FOR QUALIFICATION</b>				<b>488</b>	<b>3.000</b>

PERIOD OF STUDY / YEAR LEVEL 4					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter Modules					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
	Choose 2 of the following <b>ELECTIVE/S</b>				
	MMTA032 and MMTB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MCOA032 and MCOB032	Q3 Q4	Y Y	16 16	0.125 0.125
	Two Electives	MSTA032	Q3	Y	16
		MSTB032	Q4 Q4	Y Y	16
		MSTC032			16
	MPHA032 and MPHB032	Q3 Q4	Y Y	16 16	0.125 0.125
<b>Total credits for Semester 2 Year level 4</b>				<b>64</b>	<b>0.500</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>				<b>128</b>	<b>1.000</b>
<b>TOTAL CREDITS FOR QUALIFICATION</b>				<b>488</b>	<b>3.000</b>

## PHYSICAL SCIENCES - BSCM01

### CURRICULUM INFORMATION

<b>School:</b> School of Science & Technology		
<b>Qualification Name:</b> Bachelor of Science (Physical Sciences)		<b>Qualification Code:</b> BSCM01
<b>Campus:</b> SMU Campus		<b>Last Revision date:</b> 2012
<b>Total SAQA Credits for Qualification:</b>	488	<b>Is this a fixed Curriculum:</b> No

PERIOD OF STUDY / YEAR LEVEL 1					
Year					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
	The following 5 modules are <b>COMPULSORY</b>				
	MMTH000	Year	Y	24	0.1
	MHEL000	Year	N	24	0.1
	MCHM000	Year	Y	24	0.1
	MPHS000	Year	Y	24	0.1
	MBIO000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

PERIOD OF STUDY / YEAR LEVEL 2					
Year					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
	The following 5 modules are <b>COMPULSORY</b>				
	MMTB000	Year	Y	24	0.1
	MHEB000	Year	N	24	0.1
	MCHB000	Year	Y	24	0.1
	MPHB000	Year	Y	24	0.1
	MBIB000	Year	Y	24	0.1
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>0.5</b>

## CURRICULUM INFORMATION

<b>School:</b> School of Science & Technology		
<b>Qualification Name:</b> Bachelor of Science (Physical Sciences)		<b>Qualification Code:</b> BSCM01
<b>Total SAQA Credits for Qualification:</b> 488	<b>Is this a fixed Curriculum:</b> No	

PERIOD OF STUDY / YEAR LEVEL 3					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following modules are <b>COMPULSORY</b>					
MCHA021 and MCHB021M	Q1 Q2	Y Y	10 10	0.083 0.083	
MPHA021 and MPHB021M	Q1 Q2	Y Y	10 10	0.083 0.083	
Choose 1 of the following <b>ELECTIVES</b>					
MMTA021	S1	Y	20	0.167	
MBIA021	S1	Y	20	0.167	
<b>Total credits for Semester 1</b>			<b>60</b>	<b>0.50</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>120</b>	<b>1.00</b>	

PERIOD OF STUDY / YEAR LEVEL 3					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following modules are <b>COMPULSORY</b>					
MCHA022 and MCHB022M	Q3 Q4	Y Y	10 10	0.083 0.083	
MPHA022 and MPHB022	Q3 Q4	Y Y	10 10	0.083 0.083	
Choose 1 of the following <b>ELECTIVES</b>					
MMTA021	S2	Y	20	0.167	
MBIA021	S2	Y	20	0.167	
<b>Total credits for Semester 2</b>			<b>60</b>	<b>0.50</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>120</b>	<b>1.00</b>	

PERIOD OF STUDY / YEAR LEVEL 4					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
Choose 2 or 3 of the following <b>ELECTIVES</b>					
MCHA031 and MCHB031	Q1 Q2	Y	16	0.125	
MPHA031 and MPHB031	Q1 Q2	Y	16	0.125	
MBIA031	S1	Y	32	0.25	
<i>Physics and Biochemistry cannot be paired</i>					
<b>Total credits for Semester 1</b>			<b>64</b>	<b>0.50</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>			<b>128</b>	<b>1.00</b>	

PERIOD OF STUDY / YEAR LEVEL 4					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
Choose 2 or 3 from the following <b>MODULES</b>					
MCHA032 and MCHB032	Q3 Q4	Y Y	16 16	0.125 0.125	
MPHA032 and MPHB032	Q3 Q4	Y Y	16 16	0.125 0.125	
MMBIA032	S2	Y	32	0.25	
<i>Physics and Biochemistry cannot be paired</i>					
<b>Total credits for Semester 2</b>			<b>64</b>	<b>0.50</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 4</b>			<b>128</b>	<b>1.00</b>	

# Bachelor of Science

## *(Baccalaureus Scientiae)*

### Programmes Offered

### Admission to BSc Programme

#### SSTB 9

COURSE CODE	PROGRAMME	MAJOR SUBJECTS*
BSCG01	Life Sciences	Biology, Chemistry, Biochemistry, Physiology
BSCH01	Mathematical Sciences	Mathematics, Applied Mathematics, Statistics, Computer Science, Physics
BSCI01	Physical Sciences	Physics, Chemistry, Biochemistry, Mathematics
BSCJ01	Occupational & environmental health Sciences	Environmental & Occupational Psychology, Pathophysiology
		* Any Two Majors in Final Year

An applicant must have obtained (a) an NSC with a Bachelor endorsement; (b) a minimum APS of **25** and (c) the following minimum APS per subject:

Subject	Score
English	4
Mathematics	5
Life Science	4
Physical Science	4
Any two other NSC subjects with a minimum NSC score of 4 each	

OR

A Senior Certificate with full University Exemption obtained prior to 2008 with a minimum APS (**A**dmission **P**oint **S**core) of **25** on the following scale:

Senior Certificate Higher Grade	Senior Certificate Standard Grade	APS points
<b>A</b>		7
<b>B</b>	A	6
<b>C</b>	B	5
<b>D</b>	C	4
<b>E</b>	D	3
<b>F</b>	E	2
<b>G</b>	F	1

## SSTB 10

Having satisfied the admission requirements in SSTB9, and subject to the availability of space, a student must meet the following minimum APS in a relevant subject to be admitted into a stream of choice:

BSc Stream	Course Code	Subject	Score
Life sciences	BSCG01	Life science	5
Mathematical Sciences	BSCH01	Mathematics	5
Physical Sciences	BSCI01	Physical Science	5
Occupational and Environmental Sciences	BSCJ01	Life Science	5

## Modules in Bachelor of Science Programme

### BSc Level 1

Module code	Module Name	Pre-requisites	Co-requisites
<b>MAPM011</b>	Introduction to Applied Mathematics	<b>Selection Criteria</b>	<b>MMTH011 / MMTH012</b>
<b>MAPM012</b>	Computational Mathematics and Mathematical Modelling		<b>MAPM011</b> <b>MMTH011 / MMTH012</b>
<b>MBIO011</b>	Introduction to Biological Studies	<b>Selection Criteria</b>	<b>MZOO012</b>
<b>MZOO012</b>	Animal Biology		<b>MBIO011</b>
<b>MCHM011</b>	General Chemistry 1A	<b>Selection Criteria</b>	<b>MMTH011 / MMTH012</b>
<b>MCHM012</b>	General Chemistry 1B		<b>CHM011</b> <b>MMTH011 / MMTH012</b>
<b>MCOA011</b>	Computing Concepts and Algorithms	<b>Selection Criteria</b>	<b>MMTH011</b> <b>MSTS011</b>
<b>MCOA012</b>	Data Organization and Artificial Intelligence		<b>MCOA011</b> <b>MMTH012</b> <b>MSTS012</b>
<b>MHEL011</b>	Health Education and Life Competencies I	<b>Selection Criteria</b>	<b>MHEL012</b>
<b>MHEL012</b>	Health Education and Life Competencies II		<b>MHEL011</b>
<b>MMTH011</b>	Differential and Integral Calculus	<b>Selection Criteria</b>	<b>MMTH012</b>
<b>MMTH012</b>	Set Theory, Linear and Abstract Algebra		<b>MMTH011</b>
<b>MPCL011</b>	Introduction to Psychology	<b>Selection Criteria</b>	<b>MPCL012</b>
<b>MPCL012</b>	Interpersonal Skills and Social Psychology		<b>MPCL011</b>
<b>MPHS011</b>	General Physics IA	<b>Selection Criteria</b>	<b>MMTH011</b> <b>MPHS012</b>
<b>MPHS012</b>	General Physics IB		<b>MMTH012</b> <b>MPHS011</b>

<b>BSc Level 2 / BSc ECP Level 3</b>			
<b>EHS201</b>	Fundamentals of Environmental Health Science	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	EHS202 MBIA021 / MBIA022
<b>EHS202</b>	Food borne Diseases and Human Parasitic Diseases	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	EHS201 MBIA021 / MBIA022
<b>MAPA022</b>	Numerical Analysis	MAPM011 / MAPM012 MMTH011 / MMTH012	MMTA022 MAPA021
<b>MBIA021</b>	Essential biomolecules, functions and signal transduction	MCHM011 / MCHM012 MBIO011 / MZOO012	MBIA022
<b>MBIA022</b>	Bioenergetics and intermediary metabolisms	MCHM011 / MCHM012 MBIO011 / MZOO012	MBIA021
<b>MZOA021</b>	Invertebrates and Botany	MBIO011 / MZOO012	MZOB022
<b>MZOB022</b>	Adaptive Biodiversity of Vertebrates	MBIO011 / MZOO012	MZOA021
<b>BTEC201</b>	Cellular Biology	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	BTEC202 / BTEC203 BTEC204 MBIA021 / MBIA022
<b>BTEC202</b>	Introduction to Biotechnology	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	BTEC201 / BTEC203 BTEC204 MBIA021 / MBIA022
<b>BTEC203</b>	Introduction to Microbiology	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	BTEC201 / BTEC202 BTEC204 MBIA021 / MBIA022
<b>BTEC204</b>	Immunology	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	BTEC201 / BTEC202 BTEC203 MBIA021 / MBIA022
<b>MCHA021</b> <b>MCHB021</b>	Organic Chemistry 2 Inorganic Chemistry 2	MCHM011 / MCHM012 MMTH011 / MMTH012	MCHA022 / MCHB022
<b>MCHA022</b> <b>MCHB022</b>	Analytical Chemistry 2 Physical Chemistry 2	MCHM011 / MCHM012 MMTH011 / MMTH012	MCHA021 / MCHB021
<b>MCOA021</b>	Data Structures	MCOA011 / MCOB011 MMTH011 / MMTH012	MCOA022
<b>MCOA022</b>	Computer Organisation and Architecture	MCOA011 / MCOB011 MMTH011 / MMTH012	MCOA021

# BSc Level 2 / BSc ECP Level 3

Module code	Module Name	Pre-requisites	Co-requisites
<b>EMT201</b>	Introduction to Environmental Science	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	EMT202 MBIA021 / MBIA022
<b>EMT202</b>	Environmental Management	MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	EMT201 MBIA021 / MBIA022
<b>MICB201</b>	Introduction to Microbiology	MBIO011 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	MICB202
<b>MICB202</b>	Environmental and Fungal Microbiology	MBIO011 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012	MICB201
<b>MMTA021</b>	Advanced Calculus	MMTH011 / MMTH012	MMTA022
<b>MMTA022</b>	Linear Algebra	MMTH011 / MMTH012	MMTA021
<b>MMTA023</b>	Calculus IIA	MMTH011 / MMTH012	MMTA024
<b>MMTA024</b>	Linear Algebra IIA	MMTH011 / MMTH012	MMTA023
<b>MPHA021</b>	Classical Mechanics	MPHS011 / MPHS012 MMTH011 / MMTH012	MPHB021 MPHA022 / MPHB022 MMTA023 / MMTA024
<b>MPHB021</b>	Modern Physics	MPHS011 / MPHS012 MMTH011 / MMTH012	MPHA021 MPHA022 / MPHB022 MMTA023 / MMTA024
<b>MPHA022</b>	Electrodynamics and Electronics	MPHS011 / MPHS012 MMTH011 / MMTH012	MPHA021 MPHA022 / MPHB022 MMTA023 / MMTA024
<b>MPHB022</b>	Waves and Physical Optics	MPHS011 / MPHS012 MMTH011 / MMTH012	MPHA021 MPHA022 / MPHB022 MMTA023 / MMTA024
<b>MPLA021</b> <b>MPLA022</b>	Systems Physiology I Systems Physiology II	MBIO011 / MZOO012 MCHM011 / MCHM012	MBIA021 / MBIA022
<b>MPSA021</b> <b>MPSA022</b> <b>MPSB022</b>	Research, Assessment, Developmental Psychology Personality Medical and Social Psychology Environmental and Occupational Psychology	MPCL011 / MPCL012 MPCL011 / MPCL012 MPCL011 / MPCL012	
<b>MSTA021</b>	Theory of Distribution	MSTS011 / MSTS012 MMTH011 / MMTH012	MMTA021 / MMTA022
<b>MSTA022</b>	Statistical Inference	MSTS011 / MSTS012 MMTH011 / MMTH012	MMTA021 / MMTA022

# BSc Level 3 / BSc ECP Level 4

Module code	Module Name	Pre-requisites	Co-requisites
<b>MCOA031</b>	Database Systems	COC201M / COC202M MCOA021 / MCOA022 MMTH011 / MMTH012	MCOB031 MCOA032 / MCOB032
<b>MCOB031</b>	Operating Systems	COC201M / COC202M MCOA021 / MCOA022 MAH101M / MAH102M MMTH011 / MMTH012	MCOA031 / MCOA032 MCOB032
<b>MAPA031</b>	Fluid Mechanics	ATM201M / ATM202M MAPA021 / MAPA022 MMTA021 / MMTA022	MAPA031
<b>MAPA032</b>	Mathematical Theory of Electromagnetism	ATM201M / ATM202M MAPA021 / MAPA022 MMTA021 / MMTA022	MAPA031
<b>MBIA031</b>	Proteins, enzymes and biochemical techniques	ATM201M / ATM202M MBIA021 / MBIA022	MMIA032
<b>MBIA032</b>	Gene structure, function and molecular biology techniques	ATM201M / ATM202M MBIA021 / MBIA022	MMIA031
<b>MZOA031</b>	Ecology	BLGY301 / BLGY302 MZOA021 / MZOB022	MZOB032
<b>MZOB032</b>	Conservation Genetics	BLGY301 / BLGY302 MZOA021 / MZOB022	MZOA031
<b>BTEC301</b>	Industrial and Environmental Biotechnology	MBIA021 / MBIA022 BTEC201 / BTEC202 BTEC203 / BTEC204	BTEC302 / BTEC303 BTEC304
<b>BTEC302</b>	Plant and Microbial Biotechnology	MBIA021 / MBIA022 BTEC201 / BTEC202, BTEC203 / BTEC204	BTEC301 / BTEC303 BTEC304
<b>BTEC303</b>	Biosensors and Biochips	MBIA021 / MBIA022 BTEC201 / BTEC202 BTEC203 / BTEC204	BTEC301 / BTEC302 BTEC304
<b>BTEC304</b>	Biotechnology and Health Care	MBIA021 / MBIA022 BTEC201 / BTEC202 BTEC203 / BTEC204	BTEC301 / BTEC302 BTEC303
<b>MCHA031</b>	Physical Chemistry 3	CHM201M MCHA021 / MCHB021 CHM202M MCHA022 / MCHB022	MCHB031 MCHA032 / MCHB032
<b>MCHB031</b>	Inorganic Chemistry 3	CHM201M MCHA021 / MCHB021 CHM202M MCHA022 / MCHB022	MCHA031 MCHA032 / MCHB032
<b>MCHA032</b>	Analytical Chemistry 3	CHM201M MCHA021 / MCHB021 CHM202M MCHA022 / MCHB022	MCHA031 / MCHB031 MCHB032

# BSc Level 3 / BSc ECP Level 4

Module code	Module Name	Pre-requisites	Co-requisites
MCHB032	Organic Chemistry 3	CHM201M MCHA021 / MCHB021 CHM202M MCHA022 / MCHB022	CHA031 / MCHB031 MCHA032
MCOA032	Artificial Intelligence	COC201M / COC202M MCOA021 / MCOA022 MAH101M / MAH102M MMTH011 / MMTH012	MCOA031 / MCOB031 MCOB032
MCOB032	Computer Networks	COC201M / COC202M MCOA021 / MCOA022 MAH101M / MAH102M MMTH011 / MMTH012	MCOA031 / MCOB031 MCOA032
EHS301	Human Nutrition in Health and Diseases	EHS201 / EHS202 MICB201 / MICB202	EHS302
EHS302	Occupational and Health Safety	EHS201 / EHS202 MICB201 / MICB202	EHS301
EMT301	Environmental Toxicology	EMT201 / EMT202	EMT302 / EMT303 EMT303
EMT302	Pollution Monitoring Techniques and Control	EMT201 / EMT202	EMT301 / EMT303 EMT304
EMT303	Natural Resources Management	EMT201 / EMT202	EMT301 / EMT302 EMT303
EMT304	Environmental Education	EMT201 / EMT202	EMT301 / EMT302 EMT303
EPS301	Community Health and Development	EHS201 / EHS202 MICB201 / MICB202	EPS302
EPS302	Environment Epidemiology	EHS201 / EHS202 MICB201 / MICB202	EPS301
MMTA031	Mathematical Analysis I	MAH201M / MAH212M MMTA021 / MMTA022	MMTB031 / MMTA032 MMTB032
MMTB031	Abstract Algebra	MAH201M / MAH212M MMTA021 / MMTA022	MMTA031 / MMTA032 MMTB032
MMTA032	Complex Analysis	MAH201M / MAH212M MMTA021 / MMTA022	MMTA031 / MMTB031 MMTB032
MMTB032	Mathematical Analysis II	MAH201M / MAH212M MMTA021 / MMTA022	MMTA031 / MMTB031 MMTA032
MPHA031	Quantum Mechanics	PHS201M / PHS202M MPHA021 / MPHB021 PHS203M / PHS204M MPHA022 / MPHB022 MAH201M / MAH212M MMTA021 / MMTA022	MPHB031 / MPHA032 MPHB032

# BSc Level 3 / BSc ECP Level 4

Module code	Module Name	Pre-requisites	Co-requisites
<b>MPHB031</b>	Thermodynamics and Statistical Mechanics	PHS201M / PHS202M MPHA021 / MPHB021 PHS203M / PHS204M MPHA022 / MPHB022 MAH201M / MAH212M MMTA021 / MMTA022	MPHA031 / MPHA032 MPHB032
<b>MPHA032</b>	Solid State Physics	PHS201M / PHS202M MPHA021 / MPHB021 PHS203M / PHS204M MPHA022 / MPHB022 MAH201M / MAH212M MMTA021 / MMTA022	MPHA031 / MPHA031 MPHB032
<b>MPHB032</b>	Systems Theory and Electronics Electrodynamics and Electronics	PHS201M / PHS202M MPHA021 / MPHB021 PHS203M / PHS204M MPHA022 / MPHB022 MAH201M / MAH212M MMTA021 / MMTA022	MPHA031 / MPHA031 MPHA032
<b>PHYL300</b> <b>MPLC031</b> <b>MPLC032</b>	PHYL300 Pathophysiology Environmental + Occupational Physiology	PHYL200 MPLA021 / MPLA022	
<b>PCLY300</b> <b>MPSA031</b> <b>MPSA032</b>	PCLY300 Psychopathology and Community Psychology Stats, Therapeutic and Development Psychology	PCLY200 MPSA021 MPSA022 MPSB022	
<b>MSTA031</b>	Time Series Analysis	STT201M / STT202M MSTA021 / MSTA022 MAH212M / MMTA022	MSTB031 / MSTB032 MSTC032
<b>MSTB031</b>	Applied Linear Regression	STT201M / STT202M MSTA021 / MSTA022 MAH212M / MMTA022	MSTA031 / MSTB032
<b>MSTB032</b>	Multivariate Statistical Methods	STT201M / STT202M MSTA021 / MSTA022 MAH212M / MMTA022	MSTA031 / MSTB031 MSTC032
<b>MSTC032</b>	Sampling Theory	STT201M / STT202M MSTA021 / MSTA022 MAH212M / MMTA022	MSTB032 / MSTA031 / MSTB031

# BIOTECHNOLOGY – BSCG01

## SECTION E: CURRICULUM INFORMATION

<b>School:</b>	School of Science and Technology	<b>Qualification Code:</b>	BSCG01
<b>Qualification Name:</b>	Bachelor of Science (Biotechnology)	<b>Last Revision date:</b>	2019
<b>Campus:</b>	SMU Campus		

EXISTING PROGRAMMES					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
<b>TOTAL CREDITS FOR YEAR</b>					

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
<b>TOTAL CREDITS FOR YEAR 1</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 2					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	MBIA021	S1	Y	20	0.25
	MBIA022	S2	Y	20	0.25

PERIOD OF STUDY / YEAR LEVEL 3					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	BTEC301	S1	Y	30	0.25
	BTEC302	S1	Y	30	0.25

BTEC201	S1	Y	20	0.25
BTEC202	S1	Y	20	0.25
BTEC203	S2	Y	20	0.25
BTEC204	S2	Y	20	0.25
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	

BTEC303	S2	Y	30	0.25
BTEC304	S2	Y	30	0.25
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>120</b>	<b>1</b>

## ENVIRONMENTAL MANAGEMENT & TOXICOLOGY - BSCG01

### SECTION E: CURRICULUM INFORMATION REQUIRED

<b>School:</b>	Science & Technology		
<b>Qualification Name:</b>	Bachelor of Science (Environmental Management and Toxicology)	<b>Qualification Code:</b>	BSCG01
<b>Campus:</b>	SMU Campus	<b>Last Revision date:</b>	2019

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	MBIO011	S1	Y	12	0.1
	MZOO012	S2	Y	12	0.1
	MCHM011	S1	Y	12	0.1
	MCHM012	S2	Y	12	0.1
	MPHS011	S1	Y	12	0.1
	MPHS012	S2	Y	12	0.1
	MMTH011	S1	Y	12	0.1
	MMTH012	S2	Y	12	0.1
	MHEL011	S1	Y	12	0.1
	MHEL012	S2	Y	12	0.1
<b>TOTAL CREDITS FOR YEAR 1</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 2					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	EMT 201	S1		20	0.17
	EMT 202	S2		20	0.17
	EHS 201	S1		20	0.16
	EHS 202	S2		20	0.17
	MICB 201	S1		20	0.16
	MICB 202	S2		20	0.17
<b>TOTAL CREDITS FOR YEAR 2</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 3					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	EMT 301	S1	Y	30	0.25
	EMT 302	S2	Y	30	0.25
	EMT 303	S1	Y	30	0.25
	EMT 304	S2	Y	30	0.25
<b>TOTAL CREDITS FOR YEAR 3</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					

## ENVIRONMENTAL BIOLOGY – BSCG01

SECTION E: CURRICULUM INFORMATION REQUIRED			
<b>School:</b>	Science & Technology		
<b>Qualification Name:</b>	Bachelor of Science (Biology)	<b>Qualification Code:</b>	<b>BSCG01</b>
<b>Campus:</b>	SMU Campus	<b>Last Revision date:</b>	2019

EXISTING PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	MBIO011	S1	Y	12	0.1
	MZOO012	S2	Y	12	0.1
	MCHM011	S1	Y	12	0.1
	MCHM012	S2	Y	12	0.1
	MPHS011	S1	Y	12	0.1
	MPHS012	S2	Y	12	0.1
	MMTH011	S1	Y	12	0.1
	MMTH012	S2	Y	12	0.1
	MHEL011	S1	Y	12	0.1
	MHEL012	S2	Y	12	0.1
<b>TOTAL CREDITS FOR YEAR 1</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 2					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	EMT 201	S1		20	0.17
	EMT 202	S2		20	0.17
	EHS 201	S1		20	0.16
	EHS 202	S2		20	0.17
	MICB 201	S1		20	0.16
	MICB 202	S2		20	0.17
<b>TOTAL CREDITS FOR YEAR 2</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 3					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					
	EHS 301	S1	Y	30	0.25
	EHS 302	S2	Y	30	0.25
	EPS301	S1	Y	30	0.25
	EPS 302	S2	Y	30	0.25
<b>TOTAL CREDITS FOR YEAR 3</b>				<b>120</b>	<b>1</b>

PROPOSED NEW PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X <sup>1</sup>	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following module/s are <b>COMPULSORY</b>					

## LIFE SCIENCES - BSCG01

CURRICULUM INFORMATION			
School:	School of Science & Technology		
Qualification Name:	Bachelor of Science (Life Sciences)	Qualification Code:	<b>BSCG01</b>
Campus:	SMU Campus	Last Revision date:	2012
Total SAQA Credits for Qualification:	368	Is this a fixed Curriculum:	No

PERIOD OF STUDY / YEAR LEVEL 1					
1 <sup>st</sup> Semester					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 5 modules are <b>COMPULSORY</b>					
	MBIO011	S1	Y	12	0.1
	MCHM011	S1	Y	12	0.1
	MHEL011	S1	N	12	0.1
	MMTH011	S1	Y	12	0.1
	MPCL011	S1	Y	12	0.1
	MPHS011	S1	Y	12	0.1
<b>Total credits for Semester 1 modules</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 1					
2 <sup>nd</sup> Semester					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 5 modules are <b>COMPULSORY</b>					
	MCHM012	S2	Y	12	0.1
	MHEL012	S2	N	12	0.1
	MZOO012	S2	Y	12	0.1
	MMTH012	S2	Y	12	0.1
	MPCL012	S2	Y	12	0.1
	MPHS012	S2	N	12	0.1
<b>Total credits for Semester 2 modules</b>				<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				<b>120</b>	<b>1</b>

PERIOD OF STUDY / YEAR LEVEL 2					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose <b>at least 3 or 4</b> of the following <b>ELECTIVES</b>					
	MBIA021	S1	Y	20	0.167

PERIOD OF STUDY / YEAR LEVEL 2					
2 <sup>nd</sup> Semester / 3 <sup>rd</sup> & 4 <sup>th</sup> Quarter Modules					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose <b>at least 3 or 4</b> of the following <b>ELECTIVES</b>					
	MBIA022	S2	Y	20	0.167

MCHA021 and MCHB021	Q1 Q2	Y Y	10 10	0.083 0.083
MPLA021	S1	Y	20	0.167
MZOA021	S1	Y	20	0.167
MPSA021	S1	Y	20	0.167
<b>Total credits for Semester 1 modules</b>			<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	<b>1</b>

MCHA022 and MCHB022	Q3 Q4	Y Y	10 10	0.083 0.083
MPLA022	S2	Y	20	0.167
MZOB022	S2	Y	20	0.167
MPSA022	S2	Y	20	0.167
<b>Total credits for Semester 2 modules</b>			<b>60</b>	<b>0.5</b>
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	<b>1</b>

### CURRICULUM INFORMATION

<b>School:</b> Science & Technology	
<b>Qualification Name:</b> Bachelor of Science (Life Sciences)	<b>Qualification Code:</b> BSCG01
<b>Campus:</b> SMU Campus	<b>Last Revision date:</b> 2012
<b>Total SAQA Credits for Qualification:</b> 368	<b>Is this a fixed Curriculum:</b> No

PERIOD OF STUDY / YEAR LEVEL 3					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
Choose <b>at least 2</b> of the following <b>ELECTIVES</b>					
MBIA031	S1	Y	32	0.25	
MCHA031 and MCHA032	Q1 Q2	Y Y	16 16	0.125 0.125	
MPLB031	S1	Y	32	0.25	
MZOA031	S1	Y	32	0.25	
MPSA031	S1	Y	32	0.25	
<b>Total credits for Semester 1 modules</b>			<b>64</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>128</b>	<b>1</b>	

PERIOD OF STUDY / YEAR LEVEL 3					
2 <sup>nd</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
Choose <b>at least 2</b> of the following <b>ELECTIVES</b>					
MBIA032	S2	Y	32	0.25	
MCHB031 and MCHB032	Q3 Q4	Y Y	16 16	0.125 0.125	
MPLB032	S2	Y	32	0.25	
MZOB032	S2	Y	32	0.25	
MPSA032	S2	Y	32	0.25	
<b>Total credits for Semester 2 modules</b>			<b>64</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>128</b>	<b>1</b>	

## MATHEMATICAL SCIENCES - BSCH01

### CURRICULUM INFORMATION

<b>School:</b> Science & Technology	
<b>Qualification Name:</b> Bachelor of Science (Mathematical Sciences)	<b>Qualification Code:</b> BSCH01
<b>Campus:</b> SMU Campus	<b>Last Revision date:</b> 2012
<b>Total SAQA Credits for Qualification:</b> 368	<b>Is this a fixed Curriculum:</b> No

PERIOD OF STUDY / YEAR LEVEL 1					
1 <sup>st</sup> Semester					
Module Code	Offering Period	Possible major	SAQA Credit	Hemis Credit	
The following 2 modules are <b>COMPULSORY</b>					
MMTH011	S1	Y	12	0.1	
MHEL011	S1	Y	12	0.1	

PERIOD OF STUDY / YEAR LEVEL 1					
2 <sup>nd</sup> Semester					
Module Code	Offering Period	Possible major	SAQA Credit	Hemis Credit	
The following 2 modules are <b>COMPULSORY</b>					
MMTH012	S2	Y	12	0.1	
MHEL012	S2	Y	12	0.1	

Choose 3 of the following ELECTIVES					
MAPM011	S1	Y	12	0.1	
MCOA011	S1	Y	12	0.1	
MSTS011	S1	Y	12	0.1	
MPHS011	S1	Y	12	0.1	
Total credits for Semester 1			60	0.5	
TOTAL CREDITS FOR YEAR LEVEL 1			120	1	

Choose 3 of the following ELECTIVES					
MAPM012	S2	Y	12	0.1	
MCOA012	S1	Y	12	0.1	
MSTS012	S2	Y	12	0.1	
MPHS012	S2	Y	12	0.1	
Total credits for Semester 2			60	0.5	
TOTAL CREDITS FOR YEAR LEVEL 1			120	1	

CURRICULUM INFORMATION					
School: Science & Technology					
Qualification Name: Bachelor of Science (Mathematical Sciences)			Qualification Code: BSCH01		
Campus: SMU Campus			Last Revision date: 2012		
Total SAQA Credits for Qualification: 368			Is this a fixed Curriculum: No		

PERIOD OF STUDY / YEAR LEVEL 2					
1st Semester / 1st & 2nd Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 1 modules is <b>COMPULSORY</b>					
	MMTA021	S1	Y	20	0.167
Choose 2 of the following <b>ELECTIVES</b>					
	MAPA021	S1	Y	20	0.167
	MCOA021	S1	Y	20	0.167
	MSTA021	S1	Y	20	0.167
	MPHA021 and MPHB021	Q1 Q2	Y Y	10 10	0.083 0.083
Total credits for Semester 1				60	0.5
TOTAL CREDITS FOR YEAR LEVEL 2				120	1

PERIOD OF STUDY / YEAR LEVEL 2					
Semester / 1st & 2nd Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 1 modules is <b>COMPULSORY</b>					
	MMTA022	S2	Y	20	0.167
Choose 2 of the following <b>ELECTIVES</b>					
	MAPA022	S2	Y	20	0.167
	MCOA022	S2	Y	20	0.167
	MSTA022	S2	Y	20	0.167
	MPHA022 and MPHB022	Q3 Q4	Y Y	10 10	0.083 0.083
Total credits for Semester 2				60	0.5
TOTAL CREDITS FOR YEAR LEVEL 2				120	1

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 2 of the following <b>ELECTIVES</b>					
	MAPA031	S1	Y	32	0.250
	MMTA031 and MMTB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MCOA031 and MCOB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MSTA031 and MSTB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MPHA031 and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
Total credits for Semester 1				64	0.5
TOTAL CREDITS FOR YEAR LEVEL 3				128	1
TOTAL CREDITS FOR QUALIFICATION				368	3

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 2 of the following <b>ELECTIVES</b>					
	MAPA032	S2	Y	32	0.250
	MMTA032 and MMTB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MCOA032 and MCOB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MPHA032 and MPHB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MSTA032 and MSTB032	Q3 Q4 Q4	Y Y Y	16 16 16	0.125 0.125 0.125
Total credits for Semester 2				64	0.5
TOTAL CREDITS FOR YEAR LEVEL 3				128	1
TOTAL CREDITS FOR QUALIFICATION				368	3

# PHYSICAL SCIENCES - BSCI01

## CURRICULUM INFORMATION

School: Science & Technology	
Qualification Name: Bachelor of Science (Physical Sciences)	Qualification Code: BSCI01
Total SAQA Credits for Qualification: 368	Is this a fixed Curriculum: No

PERIOD OF STUDY / YEAR LEVEL 1					
1st Semester / 1st & 2nd Quarter					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 4 modules are <b>COMPULSORY</b>					
	MCHM011	S1	Y	12	0.100
	MPHS011	S1	Y	12	0.100
	MMTH011	S1	Y	12	0.100
	MHEL011	S1	N	12	0.100
Choose 1 of the following <b>ELECTIVES</b>					
	MSTS011	S1	N	12	0.100
	MAPM011	S1	N	12	0.100
	MCOA011	S1	N	12	0.100
	MBIO011	S1	N	12	0.100
Total credits for Semester 1				60	0.5
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				120	1.00

PERIOD OF STUDY / YEAR LEVEL 1					
2nd Semester / 3rd & 4th Quarter					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 4 modules are <b>COMPULSORY</b>					
	MCHM012	S2	Y	12	0.100
	MPHS012	S2	Y	12	0.100
	MMTH012	S2	Y	12	0.100
	MHEL012	S2	N	12	0.100
Choose 1 of the following <b>ELECTIVES</b>					
	MSTS012	S2	N	12	0.100
	MAPM012	S2	N	12	0.100
	MCOB011	S2	N	12	0.100
	MZOO012	S2	N	12	0.100
Total credits for Semester 2				60	0.50
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>				120	1.00

PERIOD OF STUDY / YEAR LEVEL 2					
1st Semester / 1st & 2nd Quarter					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 4 modules are <b>COMPULSORY</b>					
	MCHA021	Q1	Y	10	0.083
	MCHB021	Q2	Y	10	0.083
	MPHA021	Q1	Y	10	0.083
	MPHB021	Q2	Y	10	0.083
Choose 1 of the following <b>ELECTIVES</b>					
	MMTA021	S1	Y	20	0.167
	MBIA021	S1	Y	20	0.167
Total credits for Semester 1				60	0.50
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>				120	1.00

PERIOD OF STUDY / YEAR LEVEL 2					
2nd Semester / 3rd & 4th Quarter					
P	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
The following 4 modules are <b>COMPULSORY</b>					
	MCHA022	Q3	Y	10	0.083
	MCHB022	Q4	Y	10	0.083
	MPHA022	Q3	Y	10	0.083
	MPHB022	Q4	Y	10	0.083
Choose 1 of the following <b>ELECTIVES</b>					
	MMTA022	S2	Y	20	0.167
	MBIA022	S2	Y	20	0.167
Total credits for Semester 2				60	0.50
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>				120	1.00

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 2 or 3 of the following <b>ELECTIVES</b>					
	MCHA031 and MCHB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MPHA031 and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MBIA031	S1	Y	32	0.25
PHS and BIC cannot be paired					
Total credits for Semester 1				64	0.50
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				128	1.00
<b>TOTAL CREDITS FOR QUALIFICATION</b>				368	3

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter					
	Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>
Choose 2 or 3 of the following <b>ELECTIVES</b>					
	MCHA032 and MCHB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MPHA032 and MPHB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MBIA032	S2	Y	32	0.25
PHS and MOL cannot be paired					
Total credits for Semester 2				64	0.50
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>				128	1.00
<b>TOTAL CREDITS FOR QUALIFICATION</b>				368	3

# OCCUPATIONAL AND ENVIRONMENTAL SCIENCES - BSCJ01

CURRICULUM INFORMATION				
<b>School:</b>	Science & Technology	<b>Faculty:</b>	Faculty of Health Sciences	
<b>Qualification Name:</b>	Bachelor of Science	<b>Qualification Code:</b>	BSCJ01	
<b>Campus:</b>	SMU Campus	<b>Last Revision date:</b>	2012	
<b>Total SAQA Credits for Qualification:</b>	368	<b>Is this a fixed Curriculum:</b>	Y	

PERIOD OF STUDY / YEAR LEVEL 1					
1 <sup>st</sup> Semester					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 5 modules are <b>COMPULSORY</b>					
MBIO011	S1	Y	12	0.1	
MCHM011	S1	Y	12	0.1	
MHEL011	S1	N	12	0.1	
MPCL011	S1	Y	12	0.1	
MMTH011	S1	Y	12	0.1	
<b>Total credits for Semester 1 modules</b>			<b>60</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 1</b>			<b>120</b>	<b>1</b>	

PERIOD OF STUDY / YEAR LEVEL 2					
2 <sup>nd</sup> Semester					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 5 modules are <b>COMPULSORY</b>					
MCHM012	S2	Y	12	0.1	
MHEL012	S2	N	12	0.1	
MPCL012	S2	Y	12	0.1	
MMTH012	S2	Y	12	0.1	
MZOO012	S2	Y	12	0.1	
<b>Total credits for Semester 2 modules</b>			<b>60</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	<b>1</b>	

PERIOD OF STUDY / YEAR LEVEL 2					
1 <sup>st</sup> Semester					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 3 module/s are <b>COMPULSORY</b>					
MBIA021	S1	N	20	0.167	
MPLA021	S1	Y	20	0.167	
MPSA021	S1	Y	20	0.167	
<b>Total credits for Semester 1 modules</b>			<b>60</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	<b>1</b>	

PERIOD OF STUDY / YEAR LEVEL 2					
2 <sup>nd</sup> Semester					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 3 modules are <b>COMPULSORY</b>					
MPSB022	S2	N	20	0.167	
MPLA022	S2	Y	20	0.167	
MPSA022	S2	Y	20	0.167	
<b>Total credits for Semester 2 modules</b>			<b>60</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 2</b>			<b>120</b>	<b>1</b>	

PERIOD OF STUDY / YEAR LEVEL 3					
1 <sup>st</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 2 module/s are <b>COMPULSORY</b>					
MPLC031	S1	Y	32	0.25	
MPSA031	S1	Y	32	0.25	
<b>Total credits for Semester 1 modules</b>			<b>64</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>128</b>	<b>1</b>	
<b>TOTAL CREDITS FOR QUALIFICATION</b>			<b>368</b>	<b>3</b>	

PERIOD OF STUDY / YEAR LEVEL 3					
2 <sup>nd</sup> Semester / 1 <sup>st</sup> & 2 <sup>nd</sup> Quarter Modules					
Module Code	Offering Period <sup>2</sup>	Possible major <sup>3</sup>	SAQA Credit	Hemis Credit <sup>4</sup>	
The following 2 module/s are <b>COMPULSORY</b>					
MPLC031	S2	Y	32	0.25	
MPSA032	S2	Y	32	0.25	
<b>Total credits for Semester 2 modules</b>			<b>64</b>	<b>0.5</b>	
<b>TOTAL CREDITS FOR YEAR LEVEL 3</b>			<b>128</b>	<b>1</b>	
<b>TOTAL CREDITS FOR QUALIFICATION</b>			<b>368</b>	<b>3</b>	

# CURRICULUM INFORMATION

## DEPARTMENT: BIOCHEMISTRY

### MODULE INFORMATION

<b>Department:</b> Biochemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MBIA021</b>				
<b>Module Name:</b>	Essential biomolecules, functions and signal transduction				
<b>Module Content:</b>	pH, water and buffers; Ionization of water; weak acids and weak bases and their titration curves; Structure and function of amino acids and their side chains in relation to their surroundings; Proteins and their primary, secondary, tertiary and quaternary structures, which includes all the stabilizing forces involved, kinetics and vitamins ;Introduction of fundamental biochemical concepts of nucleic acids, lipids and carbohydrates; Chemistry of nucleic acids and their phosphorylated derivatives and their importance; Structure and functions of fatty acids, terpenoids, triacylglycerols, phospholipids and nature of biological membranes; Structure and functions of simple sugars and their properties; Signal transduction (mechanism and pathways to include nature of hormone action, signal transduction receptors, G-proteins, second messenger systems, steroid and intracellular receptors)				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Explain water as a component of living organisms, as universal solvent, and how it influences the properties of many important components of the cell</li> <li>• Explain the basis for the classification of amino acids according to whether the side chain group is aromatic, polar or non-polar; positively or negatively charged and know that amino acids have chemical functional groups that can participate in hydrogen bonding</li> <li>• Explain the structure of proteins in terms of peptide bonds and discuss the characteristics of primary, secondary, tertiary and quaternary structures of proteins, different types of protein stabilization and functions of proteins</li> <li>• Know the properties, functions, basic kinetics of enzymes and their applications</li> <li>• Discuss the structures, stereochemistry, reactions and functions of monosaccharides, polysaccharides and oligosaccharides</li> <li>• Describe the similarities and differences between the structures and functions of DNA and RNA</li> <li>• Demonstrate an understanding of lipid chemistry and structure</li> <li>• Demonstrate an understanding of the structure and composition of biological membranes</li> <li>• Demonstrate an understanding of the function of the membrane with regard to transport of molecules across the membrane and the role of the membrane and its various components in signal transduction</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

<b>Module Code:</b>	<b>MBIA021</b>				
<b>Module Name:</b>	Essential biomolecules, functions and signal transduction				
<b>Pre-requisite modules :</b>	MCHM011 & MCHM012				
<b>Co-requisite modules :</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### MODULE INFORMATION

<b>Department:</b>	<b>Biochemistry</b>	<b>School:</b>	Science & Technology		
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			

<b>Module Code:</b>	<b>MBIA022</b>				
<b>Module Name:</b>	Bioenergetics and intermediary metabolisms				
<b>Module Content:</b>	Standard free energy change; Coupling of production and use of energy; Calculations of free energies; Overview of the glycolytic pathway; Anaerobic reactions of pyruvate; Control of glycogen metabolism; Control mechanisms of carbohydrate metabolism; Oxidative and non-oxidative pathways; Control of pentose phosphate pathway; The role of the citric acid cycle in metabolism; Energetics and control of the citric acid cycle; The glyoxylate pathway; Catabolism of lipids; The energy yield from oxidation of fatty acids; Formation of ketone bodies; The anabolism of fatty acids; The anabolism of acylglycerols and compound lipids; The anabolism of cholesterol; The role of electron transport in metabolism; Electron transport from NADH to oxygen; The coupling of oxidation to phosphorylation; Respiratory inhibitors and uncouplers; Shuttle mechanisms between mitochondria and cytosol; The ATP yield from complete oxidation of glucose; Energy considerations in glycolysis; An overview of the Nitrogen Cycle; Regulation of Nitrogen Metabolism; Catabolism of Amino Acids; Biosynthesis of amino acids; Inborn Errors of Metabolism Involving Amino Acids and their Derivatives; Anabolism of Purine Nucleotides; Catabolism and Salvage Pathways for Purine Nucleotides; Metabolic Defects Associated with Purine Nucleotide Metabolism; Metabolic Defects Associated with Pyrimidine Nucleotide Metabolism; The Reduction of Ribonucleotides to Deoxyribonucleotides; Thymine Biosynthesis				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the principles of Thermodynamics</li> <li>• Know the metabolism of carbohydrates and lipids</li> <li>• Calculate ATP used/produced during metabolism</li> <li>• Know the metabolism of nitrogen and amino acids</li> <li>• Understand the biosynthesis and degradation of purine and pyrimidine ribonucleotides</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

<b>Module Code:</b>	<b>MBIA022</b>			
<b>Module Name:</b>	Bioenergetics and intermediary metabolisms			
<b>Pre-requisite modules :</b>	MCHM011 & MCHM012			
<b>Co-requisite module:</b>	MBIA021			
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment at the end of the module			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

### MODULE INFORMATION

<b>Department:</b>	<b>Biochemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>MBIA031</b>				
<b>Module Name:</b>	Proteins, enzymes and biochemical techniques				
<b>Module Content:</b>	Protein Primary structure; Protein secondary and tertiary structure; Overview of use of bioinformatics in protein structure and function; Quaternary Structure and Structure/Function Relationships; Enzymology, assays and kinetics; Enzyme Inhibition; Basic laboratory principles, safety and statistics; Basic laboratory techniques: fractionation; centrifugation; dialysis and ultrafiltration; photometry; Radioisotopes; Protein purification and characterisation techniques; Overview of modern protein structure determination techniques				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Master the information on protein structure and function and apply it to varying practical situations and problem solving</li> <li>• Use a multidisciplinary approach to evaluate information given on protein structure and function to give evidence for and against different theories</li> <li>• Communicate an understanding of the subject matter in both the oral and written forms</li> <li>• Create new information on protein structure and function using the concepts learnt</li> <li>• Holistically use the information in the module to solve problems on protein isolation and characterisation techniques</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	32		3		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 3 hrs	Per arrangement	0	10 hrs
<b>Pre-requisite modules :</b>	MBIA021 and MBIA022				
<b>Co-requisite modules :</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, assignments, short summative practical assessments, practical reports and summative theory assessment at the end of the module				

<b>Module Code:</b>	<b>MBIA031</b>			
<b>Module Name:</b>	Proteins, enzymes and biochemical techniques			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Biochemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	BIOC302

<b>Module Code:</b>	<b>MBIA032</b>			
<b>Module Name:</b>	Gene structure, function and molecular biology			
<b>Module Content:</b>	DNA Metabolism; Gene Expression and Regulation; Biochemistry of Viruses – Structure & function; Regulation of Eukaryotic Cell Cycle Controls; Genetic Basis of Cancer – An Introduction; Basic Molecular Biology Techniques; Recombinant DNA Technology; PCR and Applications; Sequencing Techniques			
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the chemistry and structure of DNA and RNA, and to understand their functional importance in biochemical reactions</li> <li>• Understand the complexity of DNA organization, replication, mutation, damage and repair, recombination &amp; transposition</li> <li>• Understand the meaning of genes and genomes</li> <li>• Understand and outline the flow (Central Dogma) and regulation of genetic information with particular emphasis on the events leading to RNA synthesis (transcription) and protein synthesis (translation) in both the prokaryotic and eukaryotic systems</li> </ul>			
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Understand all concepts regarding recombinant DNA technology i.e., gene cloning, cloning vectors, gene libraries and associated screening techniques</li> <li>• To discuss tumour viruses and oncogenes</li> <li>• To discuss different types of PCRs and their applications</li> <li>• To understand the molecular mechanisms of the regulation of eukaryotic cell division cycle.</li> <li>• Discuss different kinds of sequencing and sequence analysis using a GENE BANK</li> <li>• To understand the molecular mechanisms of cancer and the types of genetic change involved in carcinogenesis</li> <li>• Discuss the molecular biology advances that have potential for development of new cancer therapies</li> <li>• Describe nucleic acid isolation/purification and hybridization techniques</li> <li>• Demonstrate an understanding of some latest functional genomics techniques</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	32		3	
<b>Periods per Week:</b>	<b>Classes</b>		<b>Practicals</b>	
	4 x 45 min		2 x 3 hrs	
<b>Pre-requisite modules</b>	<b>Tutorial</b>		<b>Seminars</b>	
	Per arrangement		0	
	<b>Independent Learning</b>			
			10 hrs	
MBIA021 and MBIA022				

<b>Module Name:</b>	Gene structure, function and molecular biology			
<b>Co-requisite modules for</b>	None			
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, assignments, short summative practical assessments, practical reports and summative theory assessment at the end of the module			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

## DEPARTMENT - BIOCHEMISTRY & BIOTECHNOLOGY

### CURRICULUM INFORMATION

<b>Department:</b> Biochemistry and Biotechnology	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2019	<b>First Year Offered (New):</b> 2020
<b>Replace this Module existing module(s)?</b> NO	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MBIA 021</b>			
<b>Module Name:</b>	Essential biomolecules, functions and signal transduction			
<b>Module Content:</b>	pH, water and buffers; Ionization of water; weak acids and weak bases and their titration curves; Structure and function of amino acids and their side chains in relation to their surroundings; Proteins and their primary, secondary, tertiary and quaternary structures, which includes all the stabilizing forces involved, kinetics and vitamins ;Introduction of fundamental biochemical concepts of nucleic acids, lipids and carbohydrates; Chemistry of nucleic acids and their phosphorylated derivatives and their importance; Structure and functions of fatty acids, terpenoids, triacylglycerols, phospholipids and nature of biological membranes; Structure and functions of simple sugars and their properties; Signal transduction (mechanism and pathways to include nature of hormone action, signal transduction receptors, G-proteins, second messenger systems, steroid and intracellular receptors)			
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Explain water as a component of living organisms, as universal solvent, and how it influences the properties of many important components of the cell</li> <li>• Explain the basis for the classification of amino acids according to whether the side chain group is aromatic, polar or non-polar; positively or negatively charged and know that amino acids have chemical functional groups that can participate in hydrogen bonding</li> <li>• Explain the structure of proteins in terms of peptide bonds and discuss the characteristics of primary, secondary, tertiary and quaternary structures of proteins, different types of protein stabilization and functions of proteins</li> <li>• Know the properties, functions, basic kinetics of enzymes and their applications</li> <li>• Discuss the structures, stereochemistry, reactions and functions of monosaccharides, polysaccharides and oligosaccharides</li> <li>• Describe the similarities and differences between the structures and functions of DNA and RNA</li> <li>• Demonstrate an understanding of lipid chemistry and structure</li> <li>• Demonstrate an understanding of the structure and composition of biological membranes</li> <li>• Demonstrate an understanding of the function of the membrane with regard to transport of molecules across the membrane and the role of the membrane and its various components in signal transduction</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	20		3	
<b>Periods per Week:</b>	<b>Classes</b>		<b>Independent Learning</b>	
	4 x 45 min		8 hrs	
	<b>Practicals</b>		<b>Seminars</b>	
	1 x 3 hrs		0	
	<b>Tutorial</b>		<b>Per arrangement</b>	
	Per arrangement		Per arrangement	

<b>Module Code:</b>	<b>MBIA 021</b>				
<b>Module Name:</b>	Essential biomolecules, functions and signal transduction				
<b>Pre-requisite modules :</b>	MCHM011 & MCHM012				
<b>Co-requisite modules :</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Formative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

<b>MODULE INFORMATION</b>					
<b>Department:</b>	<b>Biochemistry &amp; Biotechnology</b>			<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2019			<b>First Year Offered (New):</b> 2020	
<b>Replace this Module existing module(s)?</b> No			<b>If YES, give the module codes:</b>		

<b>Module Code:</b>	<b>MBIA 022</b>				
<b>Module Name:</b>	Bioenergetics and intermediary metabolisms				
<b>Module Content:</b>	Standard free energy change; Coupling of production and use of energy; Calculations of free energies; Overview of the glycolytic pathway; Anaerobic reactions of pyruvate; Control of glycogen metabolism; Control mechanisms of carbohydrate metabolism; Oxidative and non-oxidative pathways; Control of pentose phosphate pathway; The role of the citric acid cycle in metabolism; Energetics and control of the citric acid cycle; The glyoxylate pathway; Catabolism of lipids; The energy yield from oxidation of fatty acids; Formation of ketone bodies; The anabolism of fatty acids; The anabolism of acylglycerols and compound lipids; The anabolism of cholesterol; The role of electron transport in metabolism; Electron transport from NADH to oxygen; The coupling of oxidation to phosphorylation; Respiratory inhibitors and uncouplers; Shuttle mechanisms between mitochondria and cytosol; The ATP yield from complete oxidation of glucose; Energy considerations in glycolysis; An overview of the Nitrogen Cycle; Regulation of Nitrogen Metabolism; Catabolism of Amino Acids; Biosynthesis of amino acids; Inborn Errors of Metabolism Involving Amino Acids and their Derivatives; Anabolism of Purine Nucleotides; Catabolism and Salvage Pathways for Purine Nucleotides; Metabolic Defects Associated with Purine Nucleotide Metabolism; Metabolic Defects Associated with Pyrimidine Nucleotide Metabolism; The Reduction of Ribonucleotides to Deoxyribonucleotides; Thymine Biosynthesis				
<b>Learning Outcomes:</b>	After successfully completing the module, the student should be able to: <ul style="list-style-type: none"> <li>• Understand the principles of Thermodynamics</li> <li>• Know the metabolism of carbohydrates and lipids</li> <li>• Calculate ATP used/produced during metabolism</li> <li>• Know the metabolism of nitrogen and amino acids</li> <li>• Understand the biosynthesis and degradation of purine and pyrimidine ribonucleotides</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

## MODULE INFORMATION

<b>Department:</b>	Biochemistry & Biotechnology			<b>School:</b>	Sciences & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			
<b>Module Code:</b>	BTEC201				
<b>Module Name:</b>	Cellular Biology				
<b>Content:</b>	Structure, function, and biosynthesis of cellular membranes and organelles; cell growth and oncogenic transformation; transport, receptors, and cell signaling; the cytoskeleton, the extracellular matrix, and cell movements and chromatin structure. Molecular mechanisms of DNA replication, repair, transcription, protein synthesis, and gene regulation in different organisms. genome editing techniques, RNA polymerase dynamics, and regulation of gene expression by different types of RNAs. Techniques and procedures commonly utilized in modern cell and molecular biology research				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information.</li> <li>• Appreciate that molecular biology is a dynamic and ever-changing experimental science.</li> <li>• Distinguish between different molecular biology techniques that are used to isolate, separate, and probe for specific proteins, nucleic acids, and their interactions. Identify limitations of these techniques.</li> <li>• Compare and contrast the mechanisms of bacterial and eukaryotic DNA replication, DNA repair, transcription, and translation.</li> <li>• Explain how DNA topology and chromatin structure affects the processes of DNA replication, repair, and transcription.</li> <li>• Give examples of DNA and histone modifications and predict how they will affect gene expression.</li> <li>• Describe mechanisms by which DNA can be damaged and describe the molecular mechanisms by which protein complexes repair different forms of DNA damage.</li> <li>• Explain how endogenous biological processes like site-specific recombination, transposition, and the bacterial CRISPR-Cas9 system are being used to modify eukaryotic genomes.</li> <li>• Describe how pre-mRNA splicing occurs and explain how alternative splicing generates protein diversity..</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
	20		2		130401
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		2/1 <sup>ST</sup> Sem
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3 hours	1		40 hours
<b>Pre-requisite modules for this module:</b>	MBIO011, MZOO012, MCHM011, MCHM012				
<b>Co-requisites modules for module:</b>	BTEC202. BTEC 203 and BTEC 204				
<b>Assessment</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>• Theoretical and Practical testing at end of Module with feedback.</li> <li>• Draft Portfolio of Cellular Biology Theory and Practice assessed mid-year.</li> </ul>				

		<b>Summative assessment:</b> Final Portfolio of Cellular Biology Theory and Practice assessed at end of programme.			
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information .</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Distinguish between different molecular biology techniques that are used to isolate, separate, and probe for specific proteins, nucleic acids, and their interactions. Identify limitations of these techniques.</li> </ul>			
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>During the programme students to develop a Portfolio of Cellular Biology Theory and Practice. A first draft of this portfolio (including completed pre- and post-module questionnaires with proof of Blackboard assessments) to be assessed mid-year; with formative feedback given for improvement.</li> </ul> <b>Summative assessment: Test and Practicals</b>			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

### MODULE INFORMATION

<b>Department:</b>	<b>Biochemistry &amp; Biotechnology</b>		<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>		

<b>Module Code:</b>	<b>BTEC202</b>
<b>Module Name:</b>	Introduction to Biotechnology
<b>Content:</b>	Definition, scope and development of Biotechnology, Bioethics and Bioinformatics. Use of in vitro genetic manipulations and recombinant DNA methods to genetically alter plants, animals and microbes. Use of biotechnology in health care, agriculture, environmental bioremediation and energy production as well as an ethics course that examines the social and legal ramifications of biotechnical advances
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Define Biotechnology and explain the scope Biotechnology</li> <li>Understand the concepts of Bioethics and Bioinformatics and their application in Biotechnology</li> <li>Understand the concept of genetic engineering</li> <li>Understand the principles of recombinant DNA technology</li> <li>Understand and explain the use of and recombinant DNA methods to genetically alter</li> </ul>

	plants, animals and microbes				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>	
	20		2	131101	
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Contact/Full Time		2/2 <sup>nd</sup> Sem
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3 hours	1		40 hours
<b>Pre-requisite modules for this module:</b>	MBIO011, MZOO012, MCHM011, MCHM012				
<b>Co-requisites modules for module:</b>	BTEC201. BTEC 203 and BTEC 204				
<b>Assessment</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>Draft Portfolio of Biotechnology Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.				
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand the scope Biotechnology</li> <li>Understand the concepts of Bioethics and Bioinformatics and their application in Biotechnology</li> </ul> Specific educational outcome: Explain how vaccines are distributed <ul style="list-style-type: none"> <li>Understand the concept of genetic engineering</li> <li>Understand the principles of recombinant DNA technology</li> </ul>				
<b>Assessment methods</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>During the programme students to develop a Portfolio of Biotechnology Theory and Practice. A first draft of this portfolio (including completed pre- and post-module questionnaires with proof of Blackboard assessments) to be assessed mid-year; with formative feedback given for improvement.</li> </ul> <b>Summative assessment: Test, Quiz and Practicals</b>				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%		
		% Formative Assessment Mark	60%		
		% Summative Assessment Mark	40%		
	Minimum final mark to pass (%)		50%		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theoryal	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

MODULE INFORMATION					
Department:	Biochemistry & Biotechnology			School:	Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020		
Replace this Module existing module(s)?	No	If YES, give the module codes:			
Module Code:	BTEC 203				
Module Name:	Introduction to Microbiology				
Content:	History and development of microbiology. Key concepts in microbiology. Classification and characterization of the different types of microorganisms. Comparison of prokaryotic and eukaryotic cells. Nutritional and requirement and microbiological media, cultivation and growth of microorganisms. Physical organization of bacteria, bacterial chromosomes, cytoplasm, cell wall and membrane components. Bacterial toxins and Methods for identification of bacteria				
Learning Outcomes:	<ul style="list-style-type: none"> <li>Understand the history and development of microbiology</li> <li>Discuss key concepts in microbiology</li> <li>Classify and characterize different types of microorganisms</li> <li>Differentiate between prokaryotic and eukaryotic cells</li> <li>Describe the nutritional requirements of bacteria</li> <li>Discuss the nature and uses of different types of bacteria growth media</li> <li>Describe the physical organization of bacteria, bacterial chromosomes, cytoplasm, cell wall and bacterial components</li> <li>Understand and describe different methods for identification of bacteria</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order) (Six Numbers)
	20		2		130501
Delivery Information:	Campus		Full/Part Time		Period Year/1 <sup>st</sup> /2 <sup>nd</sup> Semester
	SMU		Contact		2/1 <sup>st</sup> Sem
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	3 hours	1		40 hours
Pre-requisite modules for this module:	MBIO011, MZOO012, MCHM011, MCHM012				
Co-requisites modules for module:	BTEC202. BTEC 202 and BTEC 204				
Assessment	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>Draft Portfolio of introduction to microbiology Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment: Test, Quiz and Practicals</b>				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>Classify and characterize different types of microorganisms</li> <li>Differentiate between prokaryotic and eukaryotic cells</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Describe the nutritional requirements of bacteria</li> <li>Discuss the nature and uses of different types of bacteria growth media</li> <li>Describe the physical organization of bacteria, bacterial chromosomes, cytoplasm, cell wall and bacterial components</li> <li>Understand and describe different methods for identification of bacteria</li> </ul>				

<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li><b>Summative assessment: Test, Quiz and Practical.</b> During the programme students to develop a Portfolio of Environmental and Fungal Microbiology Theory and Practice. A first draft of this portfolio (including completed pre- and post-module questionnaires with proof of Blackboard assessments) to be assessed mid-year; with formative feedback given for improvement.</li> </ul>			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

MODULE INFORMATION					
<b>Department:</b>	<b>Biochemistry &amp; Biotechnology</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			

<b>Module Code:</b>	<b>BTEC 204</b>		
<b>Module Name:</b>	Immunology: Concepts, Mechanisms and Applications in Biotechnology		
<b>Content:</b>	Innate and acquired immunity. Cells of the immune system and their development, pattern recognition receptors and innate immunity, molecular mechanisms of antigen processing and presentation, long distance communication and immune cells' migration, homing, and trafficking. The workings of the mammalian immune system; Application of immunology in Biotechnology and autoimmune diseases; Use of immunotherapy in industry will also be discussed.		
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Differentiate between innate and adaptive immunity</li> <li>Describe the development of both B-lymphocytes and T-lymphocytes</li> <li>Describe the classification and structure of antibodies</li> <li>Understand the biochemical, molecular, cellular, and organ-level principles that govern the workings of the mammalian immune system.</li> <li>Describe molecular mechanisms of antigen processing and presentation</li> <li>Describe the application of immunology in Biotechnology</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
	20	2	130505
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>	<b>Period</b>

				Year/1 <sup>st</sup> /2 <sup>nd</sup> Semester		
		SMU		Contact		
				Year		
Periods per week:		Classes	Practicals	Tutorial	Seminars	Independent Learning
		5	3 hours	1		40 hours
<b>Pre-requisite modules for this module:</b>		MBIO011, MZOO012, MCHM011, MCHM012				
<b>Co-requisites modules for module:</b>		BTEC201. BTEC 202 and BTEC 203				
<b>Assessment</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> </ul> <b>Summative assessment:</b> Theoretical and Practical Assessment				
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Differentiate between innate and adaptive immunity</li> <li>Describe the development of both B-lymphocytes and T-lymphocytes</li> <li>Describe the classification and structure of antibodies</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Understand the biochemical, molecular, cellular, and organ-level principles that govern the workings of the mammalian immune system.</li> <li>Describe molecular mechanisms of antigen processing and presentation</li> <li>Describe the application of immunology in Biotechnology</li> </ul> Understand and describe ecological aspects of biodegradation				
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental and Fungal Microbiology Theory and Practice assessed at end of programme. Final portfolio contains completed pre- and post-module questionnaires, Blackboard assessment results, and practice certificates for Modules 6 to 11				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%			
		% Formative Assessment Mark	60%			
		% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)		50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory/Practical	Theory	N/A	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A	N/A

MODULE INFORMATION			
Department:	Biochemistry & Biotechnology		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module Code:	BTEC 301				
Module Name:	Industrial and Environmental Biotechnology				
Content:	Biocatalysis and Biotransformation, Industrial enzymology and immobilization of enzymes. Approaches to enzyme modification and large scale industrial enzyme applications. Bioreactor design and product yield, introduction to process control and management. Use of Biotechnological techniques in Forensic Science, Wildlife, Fisheries, and Forestry Management as well as in the management of Greenhouse gases, Floral Design and Environmental Science				
Learning Outcomes:	<ul style="list-style-type: none"> <li>Understand the principles of Biocatalysis and Biotransformation</li> <li>Describe the production of enzymes used in Industrial Biotechnology</li> <li>Describe the different methods of modifying enzymes for industrial usage</li> <li>Understand and describe the different applications of enzymes in Biotechnology</li> <li>Understand and describe the concept of enzyme engineering</li> <li>Describe the different methods of mobilizing enzymes</li> <li>Describe the properties of immobilized enzymes</li> <li>Describe the use of biotechnology in Forensic medicine and Environmental science</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order) (Six Numbers)
	30		3		131101
Delivery Information:	Campus		Full/Part Time		Period Year/1 <sup>st</sup> /2 <sup>nd</sup> Semester
	SMU		Full		Year
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	3 hours	1		30 hours
Pre-requisite modules for this module:	BTEC 201; BTEC 202, BTEC 203, BTEC 204, MBIA021 & MBIA022				
Co-requisites modules for module:	BTEC 302, BTEC 303 and BTEC 304				
Assessment	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>Draft Portfolio of Environmental Science Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment:</b> Test, Quiz and Practicals.				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand the principles of Biocatalysis and Biotransformation</li> <li>Describe the production of enzymes used in Industrial Biotechnology</li> <li>Describe the different methods of modifying enzymes for industrial usage</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Understand and describe the different applications of enzymes in Biotechnology</li> <li>Understand and describe the concept of enzyme engineering</li> <li>Describe the different methods of mobilizing enzymes</li> <li>Describe the properties of immobilized enzymes</li> </ul>				
Assessment methods	<b>Formative assessment: Theoretical and Practical Exam-</b> <b>Summative assessment: Test and Practicals</b>				

<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%			
		% Formative Assessment Mark	60%			
		% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)		50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory/Practical	Theory	N/A	N/A	N/A	
	Duration	3hrs	N/A	N/A	N/A	
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A	
	Sub minimum	40%	N/A	N/A	N/A	

MODULE INFORMATION					
<b>Department:</b>	<b>Biochemistry &amp; Biotechnology</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			

<b>Module Code:</b>	<b>BTEC 302</b>				
<b>Module Name:</b>	Plant and Microbial Biotechnology				
<b>Content:</b>	Micro-propagation and adaptation of plants to specific conditions. Production and use of transgenic plants. Genetically modified crops. . Production and development of plant-made pharmaceuticals . Production and development of plant-made pharmaceuticals. Microbial fermentation. Thermophilic, Pschothrophic, actinomycetes and extremophilic bacteria. Production and use of genetically altered microorganisms such as E. coli or yeast for the production of pharmaceuticals and antibiotics				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Define and explain the concept of micro-propagation</li> <li>• Describe the production and use of transgenic plants</li> <li>• Describe the production and use of genetically modified crops</li> <li>• Describe the production and development of man-made pharmaceuticals</li> <li>• Describe the process and use of microbial fermentation</li> <li>• Describe the different types of bacteria that are used in Biotechnology</li> <li>• Understand the production and use of genetically altered microorganism for production of pharmaceuticals and antibiotics</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>	
	30		3	131101	
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		Year
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3hours	1		30 hours
<b>Pre-requisite modules for this module:</b>	BTEC 201 2, BTEC 203, BTEC 204, MBIA021 and MBIA022				

<b>Co-requisites modules for module:</b>		BTEC 301, BTEC 302 and BTEC 304			
<b>Assessment</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Practical and Theoretical Assessment</li> </ul> <b>Summative assessment:</b> Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.			
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Define and explain the concept of micro-propagation</li> <li>Describe the production and use of transgenic plants</li> <li>Describe the production and use of genetically modified crops</li> <li>Describe the production and development of man-made pharmaceuticals</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Describe the process and use of microbial fermentation</li> <li>Describe the different types of bacteria that are used in Biotechnology</li> <li>Understand the production and use of genetically altered microorganism for production of pharmaceuticals and antibiotics.</li> </ul>			
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>For the practicals students visit a company and understand various processes involve in monitoring pollutants. Students are expected to submit a report.</li> </ul> <b>Summative assessment:</b> Report on visit to Industrial Companies, Practical and Tests			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

**SECTION F: MODULAR INFORMATION REQUIRED**

<b>Department:</b>	<b>Biochemistry &amp; Biotechnology</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020
<b>Replace this Module existing module(s)?</b>	<b>No</b>	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>BTEC 303</b>				
<b>Module Name:</b>	Biosensors and Biochips				
<b>Content:</b>	Conventional biosensors based on whole cells, nucleic acids, antibodies and enzymes (e.g., enzymatic glucose monitoring) as well as new and emerging technologies related to designing, fabricating and applying multi-array biochips and micro-fluidic systems (lab-on-the-chip). The interface between biotechnology, nanotechnology and micro-electronics industries.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>▪ Understand the basic principles of biosensors design and their applications.</li> <li>▪ Understand the basic principles of biochip design and its applications.</li> <li>▪ Describe and understand the applications of biosensors and biochips in health care, medical diagnostics, defense and other areas.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
	30		3		131101
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		Year
<b>Periods per week:</b>	<b>Classes</b>	<b>Practical's</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3 hours	1		40 hours
<b>Pre-requisite modules for this module:</b>	BTEC 201 and BTEC 202, BTEC 203, BTEC 204, MBIA 021 & MBIA 022				
<b>Co-requisites modules for module:</b>	BTEC 301, BTEC 302 and BTEC 304				
<b>Assessment</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>• Theoretical and Practical Assessment.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.				
<b>Assessment criteria:</b> (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>• Understand and describe the central dogma of molecular biology (DNA replication, transcription and translation) in prokaryocytes</li> <li>• Describe the causes, types and mechanisms of mutation in prokaryocytes</li> <li>• Describe microbial sex and conjugation</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>• Understand the nature and use of plasmids and bacteriophages</li> <li>• Understand concepts and use of genetic engineering</li> <li>• Understand and describe the principles of nucleic acid mapping, hybridization, sequencing and self-directed mutagenesis</li> </ul>				
<b>Assessment methods</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>• Theoretical and Practical Assessment.</li> <li>• For the practicals students attend visit a Micro Biology laboratory and understand various management practices.</li> </ul>				

		Summative assessment:			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

MODULE INFORMATION					
<b>Department:</b>	Biochemistry & Biotechnology			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019		<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	No		<b>If YES, give the module codes:</b>		

<b>Module Code:</b> (4 alphabetic & 3 numeric)	<b>BTEC 304</b>				
<b>Module Name:</b>	Biotechnology and Health Care				
<b>Content:</b>	An overview of key cutting-edge technologies such as stem-cell research and therapeutic cloning. Human Genome Project and its implications for health care and epigenetic modifications of the genome and their role in disease. The role of biotechnology in managing a number of sociologically high-impact diseases in developed and developing				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Understand the role of biotechnology in health care systems</li> <li>Understand and describe the principle of and application of stem cell research in health care</li> <li>Understand and describe the principle and application of therapeutic cloning</li> <li>Describe the Human Genome Project and its implication for health care</li> <li>Describe epigenetic and epigenetic modification mechanisms and their roles in disease</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
	30		3		131101
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		Year
<b>Periods per week:</b>	<b>Classes</b>	<b>Practical's</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3 hours	1		30 hours
<b>Pre-requisite modules for this module:</b>	BTEC 201 and BTEC 202, BTEC 203, BTEC 204, MBIA 021 & MBIA 022				
<b>Co-requisites modules for module:</b>	BTEC 301, BTEC 302 and BTEC 303				

<b>Assessment</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Practical and Theoretical Assessment</li> <li>Draft Portfolio of Environmental Science Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme.			
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand different concepts in environmental legislation.</li> <li>Understand the need for environmental sustainability.</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Explain various methods of environmental administration in South Africa.</li> </ul>			
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>For the practicals students attend will visit a nearby community and discuss issues around environmental management. Student will submit a report on the attitude and feelings towards environmental management</li> </ul> <b>Summative assessment:</b>			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory/Practical	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

## DEPARTMENT: BIOLOGY

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Biology</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2018	<b>First Year Offered (New):</b>	2019
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	MBIO000 (in part)

<b>Module Code:</b>	<b>MBIO000</b>
<b>Module Name:</b>	Introduction to Life Science Studies I
<b>Module Content:</b>	An introduction to biology with the emphasis on general laboratory procedures, basic microscopy skills, scientific method, biological terminology and the introduction to fields of Evolution (origin of life; genetics of evolution; evidence of macroevolution), Introduction to Ecology (ecosystems; biomes of the world; carbon-nitrogen and phosphorous cycles; point and non-point sources of pollution; air, soil, water, and noise pollution), Taxonomy and Systematics (characteristics of living organisms; groupings of organisms and the Kingdoms of life), Embryology (an introduction to developmental biology), Cytology (chemistry of biological molecules, classes of biological molecules, cell types and cellular structure; cellular transport, energy storage and release during chemical reactions, enzymes regulate chemical reactions in living organisms, ATP as primary energy carrier; mitosis and meiosis), Genetics (Mendelian genetics) and an introduction to

	fundamental concepts of Ecology, Environmental health and Pollution				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the historical ideas of the “evolution” of evolutionary thinking</li> <li>• Know the changes that occurred on planet earth throughout time</li> <li>• Apply genetics as background of evolution and evaluate the evidence for macroevolution</li> <li>• List the elements of the chemistry of life</li> <li>• Compare the structure of cells</li> <li>• Distinguish between mitosis and meiosis</li> <li>• Apply the principles of genetics, Mendelian patterns of inheritance and exceptions</li> <li>• Understand the phenomenon known as a mutation, and the types of mutations</li> <li>• Understand the importance of human genetics and genetics in agriculture, forensics and medicine</li> <li>• Describe the basic ecological concepts, biomes of the world</li> <li>• Distinguish between the carbon, water, nitrogen and phosphorous cycles</li> <li>• Evaluate the threat of pollution, destruction of the environment by man</li> <li>• Discuss the measures of ecosystem health, the impact of alien plant and animal invasion</li> <li>• Discuss the impact of the use of insecticides on the environment</li> <li>• Discuss the cause of man-made disasters, pollution, ozone depletion and greenhouse effects</li> <li>• Apply the binomial nomenclature system, taxonomic Kingdom.</li> </ul> <ul style="list-style-type: none"> <li>• List the characteristics of the Kingdom Protista, Phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata and Chordata</li> <li>• Describe the reproductive system, gametogenesis, the ultrastructure of gametes (of humans);</li> <li>• Discuss the process of fertilization, cleavage and gastrulation in mammals</li> <li>• Apply the early development of Branchiostoma and avian embryo to human embryology</li> <li>• Discuss the early development of the mammalian embryo in terms of general embryology</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		130101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min	1 x 3 hrs	Per arrangement	0	1.25 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Formative Assessments Mark	<b>60</b>
				% Summative Assessments Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40			

CURRICULUM INFORMATION			
Department:	<b>Biology</b>	School:	Science & Technology
Last Revision date:	2018	First Year Offered (New):	2019
Replace this Module existing module(s)?	Yes	If YES, give the module codes:	MBIB000 (in part)

<b>Module Code:</b>	<b>MBIB000</b>				
<b>Module Name:</b>	Introduction to Life Science Studies II				
<b>Module Content:</b>	Introduction of fundamental concepts of parasitology with reference to medical and pharmaceutical importance. A comparative study of the anatomy and physiology of selected vertebrate systems (epithelial-, connective, (blood & bone). muscular- and nervous tissues; digestive-, skeletal-, respiratory-, nervous-, muscular-, endocrine and circulatory systems)				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Define the general biological terms used in parasitology</li> <li>• Identify and discuss different types of medically important parasites</li> <li>• Define and explain different types of carriers/vectors of sickness-producing organisms</li> <li>• Name and describe the structure and functions of epithelia tissues, connective tissues, muscle tissue and nervous tissue</li> <li>• Explain the anatomy and growth of bones</li> <li>• Discuss the role of blood</li> <li>• Demonstrate the structure and function of the human respiratory system, digestive system, circulatory system, and skeletal system</li> <li>• Describe skeletal muscle contraction and aerobic and anaerobic muscle activity</li> <li>• Describe the autonomic nervous system</li> <li>• Differentiate between endocrine and exocrine systems</li> <li>• List the different functions of the different endocrine in the body</li> <li>• Discuss tropic hormones, pineal glands and circadian rhythm</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		130601
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min	1 x 3 hrs	Per arrangement	0	1.25 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> MBIO011 (in part)

<b>Module Code:</b>	<b>MBIO011</b>				
<b>Module Name:</b>	Introduction to Biological Studies				
<b>Module Content:</b>	An introduction to biology with the emphasis on the scientific method, biological terminology and the introduction to fields of Evolution (origin of life; genetics of evolution; evidence of macroevolution), Introduction to Ecology (ecosystems; biomes of the world; carbon- nitrogen and phosphorous cycles; point and non-point sources of pollution; air, soil, water, and noise pollution), Taxonomy and Systematics (characteristics of living organisms; groupings of organisms and the Kingdoms of life), Embryology (an introduction to developmental biology), Cytology (chemistry of biological molecules, classes of biological molecules, cell types and cellular structure; cellular transport, energy storage and release during chemical reactions, enzymes regulate chemical reactions in living organisms, ATP as primary energy carrier; mitosis and meiosis) and Genetics (Mendelian genetics)				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the historical ideas of the “evolution” of evolutionary thinking</li> <li>• Know the changes that occurred on planet earth throughout time</li> <li>• Apply genetics as background of evolution and evaluate the evidence for macroevolution</li> <li>• List the elements of the chemistry of life</li> <li>• Compare the structure of cells</li> <li>• Distinguish between mitosis and meiosis</li> <li>• Apply the principles of genetics, Mendelian patterns of inheritance and exceptions</li> <li>• Understand the phenomenon known as a mutation, and the types of mutations</li> <li>• Understand the importance of human genetics and genetics in agriculture, forensics and medicine</li> <li>• Describe the basic ecological concepts, biomes of the world</li> <li>• Distinguish between the carbon, water, nitrogen and phosphorous cycles</li> <li>• Evaluate the threat of pollution, destruction of the environment by man</li> <li>• Discuss the measures of ecosystem health, the impact of alien plant and animal invasion</li> <li>• Discuss the impact of the use of insecticides on the environment</li> <li>• Discuss the cause of man-made disasters, pollution, ozone depletion and greenhouse effects</li> <li>• Apply the binomial nomenclature system, taxonomic Kingdoms</li> <li>• List the characteristics of the Kingdom Protista, Phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata and Chordata</li> <li>• Describe the reproductive system, gametogenesis, the ultrastructure of gametes (of humans);</li> <li>• Discuss the process of fertilization, cleavage and gastrulation in mammals</li> <li>• Apply the early development of Branchiostoma and avian embryo to human embryology</li> <li>• Discuss the early development of the mammalian embryo in terms of general embryology</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	12	3		130101	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min	1 x 3 hrs	Per arrangement	0	3.5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	Final Mark =			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> MZOO012 (in part)

<b>Module Code:</b>	<b>MZOO012</b>					
<b>Module Name:</b>	Animal Biology					
<b>Module Content:</b>	Introduction of fundamental concepts of parasitology with reference to medical and pharmaceutical importance. A comparative study of the anatomy and physiology of selected vertebrate systems (epithelial-, connective, (blood & bone). muscular- and nervous tissues; digestive-, skeletal-, respiratory-, nervous-, muscular-, endocrine and circulatory systems)					
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Define the general biological terms used in parasitology</li> <li>• Identify and discuss different types of medically important parasites</li> <li>• Define and explain different types of carriers/vectors of sickness-producing organisms</li> <li>• Name and describe the structure and functions of epithelia tissues, connective tissues, muscle tissue and nervous tissue</li> <li>• Explain the anatomy and growth of bones</li> <li>• Discuss the role of blood</li> <li>• Demonstrate the structure and function of the human respiratory system, digestive system, circulatory system, and skeletal system</li> <li>• Describe skeletal muscle contraction and aerobic and anaerobic muscle activity</li> <li>• Describe the autonomic nervous system</li> <li>• Differentiate between endocrine and exocrine systems</li> <li>• List the different functions of the different endocrine in the body</li> <li>• Discuss tropic hormones, pineal glands and circadian rhythm</li> </ul>					
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>			
	12	3	130601			
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>	
	4 x 40 min	1 x 3 hrs	Per arrangement	0	3.5 hrs	
<b>Pre-requisite module/s:</b>	Compulsory registration of BIO010M and/or MBIO011					
<b>Co-requisites module/s :</b>	None					
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module					
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>	
	<b>Final Mark =</b>			% Formative Assessment Mark		<b>60</b>
				% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory / Practical	Theory				
	Duration	3 hrs				
	Sub minimum	40%				

### CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> MZOA021 (in part)

<b>Module Code:</b>	<b>MZOA021</b>					
<b>Module Name:</b>	Biodiversity of Invertebrates					
<b>Module Content:</b>	Systematic review and adaptive biodiversity of the invertebrates and non-vertebrate chordates: Protists, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nemertea, Nematoda, Mollusca, Annelida, Arthropoda, and Echinodermata. Non-vertebrate chordates: Hemichordata, Urochordata, Cephalochordata, Agnatha and Chondrichthyes. The economic importance and effect on humans of parasitic forms will be highlighted. Poisonous or venomous animals in each group will be studied in terms of: the poisonous or venomous structures, type of toxin, effect on humans and possible treatment of toxin					
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish between morphological characteristics of Protists, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nemertea, Nematoda, Mollusca, Annelida, Arthropoda, and Echinodermata</li> <li>• Evaluate and compare the functions of all organ systems and related structures in the diverse invertebrate phyla</li> <li>• Describe the life cycle strategies and survival potential of various invertebrate groups</li> <li>• Define invertebrate terminology and exemplify these on behalf of examples</li> <li>• Evaluate and discuss the evidence that links hemichordates to chordates</li> <li>• Understand and compare between the diverse body structure and function of representatives of hemichordate and lower chordate subgroups</li> <li>• Assess and discuss the adaptive nature of the body structure and organization of representatives of hemichordates and lower chordates to their way of life</li> <li>• Evaluate and compare the reproductive and development strategies of the representatives of hemichordates and lower chordates</li> </ul>					
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>		
	20	3		130601		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>	
	4 x 40 min	1 x 3 hrs	2 x 40 min	0	5 hrs	
<b>Pre-requisite module/s</b>	MBIO011 & MZOO012					
<b>Co-requisite module/s</b>	None					
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module					
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>	
	<b>Final Mark =</b>			% Formative Assessment Mark		<b>60</b>
				% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>	
<b>Summative Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory / Practical	Theory				
	Duration	3 hrs				
	Sub minimum	40%				

## CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> MZOB022 (in part)

<b>Module Code:</b>	<b>MZOB022</b>				
<b>Module Name:</b>	Adaptive Biodiversity of Vertebrates				
<b>Module Content:</b>	The module comprehensively illustrates the diversity of animal life at vertebrate level (Pisces, Amphibia, Reptilia and Aves). Relationships among groups, basic body plans and adaptations to make the most of and be successful in their respective environments are examined. The module is based on review, morpho-functional and adaptation studies of vertebrates. Additionally, specific examples of poisonous and venomous animals in each group will be highlighted as well as their poisonous or venomous structures, effects and possible treatment				
<b>Learning Outcomes:</b>	After successfully completing the module, the student should be able to: <ul style="list-style-type: none"> <li>• Discuss fish evolution and transition to amphibians and modern fish</li> <li>• Understand and compare between the diversity body structure and function of representatives of bony fishes</li> <li>• Recognize the integration of fishes with other relevant affecting human and environmental health</li> <li>• Understand the origin and evolution of tetrapods</li> <li>• Know the diversity, classification, structure and functional adaptation of modern day amphibians</li> <li>• Understand the status of modern day amphibians and identify the South African frogs</li> <li>• Critically evaluate the origin and evolution of higher vertebrate classes</li> <li>• Define and explain the external and internal morphology of the classes Reptilia and Aves</li> <li>• Recognize and demonstrate an understanding of the general physiology and special adaptations of reptiles and birds</li> <li>• Discuss the general and unique behavioural patterns occurring in reptiles and birds</li> <li>• Critically evaluate the classification of reptiles and birds</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	3		130601	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min	1 x 3 hrs	2 x 40 min	0	5 hrs
<b>Pre-requisite module/s:</b>	MBIO011 & MZOO012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> BLGY301 & MZOA031(in part)

<b>Module Code:</b>	<b>MZOA031</b>				
<b>Module Name:</b>	Ecology				
<b>Module Content:</b>	<p><b>Basic ecology:</b> in which the fundamental ecological concepts are illustrated with a balanced overview of the applications of these concepts in populations, communities and ecosystems. Animal associations are discussed as the relationships among members of populations and communities within an ecosystem</p> <p><b>Freshwater ecology:</b> freshwater ecosystems with the emphasis on interactions among animal and plant species, structure, biotic and abiotic components and water quality standards. The role of fish in the ecosystem is studied from the point of view of resource partitioning, physiological adaptations, fish health and the ecosystem and pollution</p> <p><b>Mammals and Wildlife Management:</b> introduction to ecological principles of wildlife conservation and the rationale for conservation management. It deals with the practical applications of ecological principles in the design of management plans for conservation purposes and commercial wildlife farming</p>				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the concepts of Ecology and vegetation types of South Africa</li> <li>• Prepare herbarium specimens and know how to manage a herbarium</li> <li>• Identify a variety of trees and grasses of South Africa</li> <li>• Understand the structure of freshwater ecosystems, organisms in lakes, streams, and estuaries, the role of light and heat in the freshwater ecosystems and the chemistry of natural waters</li> <li>• Describe pollution in the freshwater ecosystems</li> <li>• Understand the habitat requirements of terrestrial wildlife</li> <li>• Understand the factors determining habitat preferences of Southern African wildlife</li> <li>• Understand the factors influencing carrying capacity and population dynamics of wildlife species, and basic applications of such factors in wildlife management</li> <li>• Have knowledge of various economic- and conservation aims, and an understanding of selected strategies to achieve such aims by applying</li> <li>• Have knowledge of habitats influencing wildlife distribution and population dynamics</li> <li>• Critically evaluate the origin and evolution of the higher vertebrate classes</li> <li>• Define and explain the external morphology, physiology, special adaptation and unique behavioural patterns of mammals</li> <li>• Critically evaluate the classification of mammals</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	32	3		130605; 131201; 131204	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min	1 x 3 hrs	Per arrangement	0	10 hrs
<b>Pre-requisite module/s:</b>	ZLY201M ( <i>final code not available yet</i> ) and MCHM011				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> <b>Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2018	<b>First Year Offered (New):</b> 2019
<b>Replace this Module existing module(s)?</b> Yes	<b>Give the module codes:</b> BLGY302 & MZOB032 (in part)

<b>Module Code:</b>	<b>MZOB032</b>				
<b>Module Name:</b>	Conservation Genetics				
	<b>Applied Biology</b>				
<b>Module Content:</b>	Part of this course deals with the fundamental principles of evolution and evolutionary analysis. The accent in this part is on an introduction to basic evolutionary concepts, mechanisms of evolutionary change, Mendelian genetics in populations, adaptation, mechanisms of speciation, continental drift, palaeo-environment, stratigraphy, geological timetable, human and animal evolution. The last part of the course includes Laboratory & research techniques and Scientific reporting (biostatistics)				
<b>Learning Outcomes:</b>	After successfully completing the module, the student should be able to: <ul style="list-style-type: none"> <li>• Understand the forces that shaped the palaeo-environment of southern Africa over the past 3.2 billion years</li> <li>• Apply palaeontology knowledge of the major steps in plant and animal evolution in understanding the present day flora of southern Africa</li> <li>• Discuss human anatomical evolution in the light of information of the hominins out of Africa</li> <li>• Apply evolution as the underlying principle of Biological Science</li> <li>• Integrate knowledge of Genetics with the mechanism of evolution</li> <li>• Know how to defend Neo-Darwinism</li> <li>• Know the procedure to calibrate a microscope</li> <li>• Describe the procedure of a microscopic and macroscopic examination of material</li> <li>• Perform and describe a sedimentation technique</li> <li>• Describe and illustrate fixation techniques</li> <li>• Perform and describe staining with haematoxylin and silver nitrate</li> <li>• Describe the various techniques to isolate eggs in urine</li> <li>• Perform and describe thin and thick blood films and the staining process</li> <li>• Describe the technique to isolate microfilariae and pinworm eggs</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	32		3		130701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 40 min.	1 x 3 h	Per arrangement	0	10 h
<b>Pre-requisite module/s:</b>	MZOB022 and MCHM012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# DEPARTMENT: CHEMISTRY

## CURRICULUM INFORMATION

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> FCH010M

<b>Module Code:</b>	<b>MCHM000</b>				
<b>Module Name:</b>	Introduction to General Chemistry 1A				
<b>Module Content:</b>	Introduction to chemical terminology, A modern view of the periodic table, Quantitative chemical relationships, An overview of thermo-chemistry, Introduction to gases, An Introduction to thermodynamics, Introduction to the rates of reactions. Introduction to solutions, acids and bases. Colligative properties of solutions. Concepts of chemical equilibria. Equilibria in acid/base systems. Solubility and equilibrium. Electrochemistry				
<b>Learning Outcomes::</b>	<p>At the end of this course students should:</p> <ul style="list-style-type: none"> <li>• Know the concept of significant figures and the use thereof in chemical calculations</li> <li>• Know the importance of accuracy in recording measurements</li> <li>• Know chemical symbols, formulae and equations</li> <li>• Have a clear idea of the atomic structure of atoms</li> <li>• Have a basic picture of the layout of the periodic table and be able to use the periodic table and to extract the information summarized therein</li> <li>• Know how to use a balanced equations in stoichiometric calculations</li> <li>• Understand the basic concept of kinetic and potential energy</li> <li>• Know the energy changes involved during chemical reactions and be able to calculate heat of reactions occurring under constant pressure</li> <li>• Have a clear idea of Hess's law and heats of formation</li> <li>• Understand the basic properties of gasses, the kinetic theory of gasses as well as pressure, volume and temperature relationships. Must be able to use Dalton's law of partial pressure</li> <li>• Understand the importance of Gibbs free energy and its relation to the spontaneity of reactions</li> <li>• Know the worth of reaction rates</li> <li>• know the factors that influence the rate of chemical reactions</li> <li>• Have sound knowledge concerning all concepts about acids and bases. They will have the skills to balance these reactions</li> <li>• Know the different expressions for the concentration of solutions</li> <li>• Be able to calculate how the addition of a solute will influence the colligative properties of solutions</li> <li>• Understand the concept of reaction reversibility</li> <li>• Understand the basic concepts about chemical equilibrium and to implement the equilibrium law and have an understanding of the importance of K</li> <li>• Know how equilibrium influence the pH of aqueous solutions and how this knowledge is used in laboratories</li> <li>• Know the basic concepts concerning electrochemistry and how electricity is related to chemical equation</li> <li>• Understand cell potentials and be able to use reduction potentials in calculations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		130101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment at the end of the module				
	Min Summative Assessment mark for exam admission (%)				<b>40</b>

<b>Assessment Weighting:</b>	<b>Final Mark =</b>	% Summative Assessment Mark	<b>60</b>		
		% Summative Assessment Mark	<b>40</b>		
	Min Final Assessment mark to pass (%)		<b>50</b>		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Chemistry</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> FCHM010

<b>Module Code:</b>	<b>MCHB000</b>
<b>Module Name:</b>	Introduction to General Chemistry 1B
<b>Module Content:</b>	The Atomic and Electronic Structure; Chemical Bonding (Lewis structures, Valence shell electron pair repulsion (VSEPR), Valence Bond, and Molecular Orbital (MO) theories); Intermolecular Attractions and the Properties of Liquids and Solids; Alkanes, Alkenes, Alkynes; Alkyl Halides; Alcohols; Ethers; Aldehydes and Ketones; Acids and Derivatives; Aromatics; Amines; Conformational Analysis.
<b>Learning Outcomes:</b>	<p>After completion of this module, students should:</p> <ul style="list-style-type: none"> <li>• Understand the basic ideas on studying the electronic structure of atoms using electromagnetic radiation</li> <li>• Understand the principles of electron configurations and how it explains the arrangement of atoms in the periodic table</li> <li>• Have a picture of how electronic structure explains atomic properties</li> <li>• Understand the concepts of ionic as well as covalent bonds and how Lewis dot notations help scientists to explain these interactions</li> <li>• Know the influence of polarity on the properties of molecules</li> <li>• Be able to use the Lewis dot structures to predict the shape of molecules</li> <li>• Know the basics on hybridization as well as the formation of double and triple bonds</li> <li>• Know the different intermolecular attractions found in liquids and how these attractions influence the physical properties of them</li> <li>• Be able to explain the concept of vapor pressure and know its importance</li> <li>• Understand a basic phase diagram and the energy changes that accompany state changes</li> <li>• Have a basic understanding of the solid state of matter</li> <li>• Draw skeletal, positional, geometric and functional isomers of organic compounds with various functional groups, and use IUPAC system of nomenclature to name them. Know the names of the first ten alkanes</li> </ul>

<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Relate molecular structure to physical properties of alkanes and other organic compounds with various functional groups. Describe hydrogen bonding and predict its effect on the physical properties of organic compounds</li> <li>• Draw conformational isomers using sawhorse diagrams and Newman projections. Know the meaning of the terms eclipsed, staggered, anti and gauche conformations. Draw the boat and chair conformations of cyclohexane and distinguish between axial and equatorial positions in the chair. Know the meaning of the terms angle, torsional and van der Waals strain</li> <li>• Define reaction mechanisms and explain what is meant by homolytic and heterolytic bond cleavage. Describe and identify in molecules: multiple bonds, polar bonds, electrophiles, nucleophiles, Lewis acids, and Lewis bases as reaction sites in organic molecules. Know how to write mechanisms for all reactions discussed where necessary</li> <li>• Write general equations and specific examples of dehydrohalogenation reactions to form alkenes and alkynes, and dehydration reactions to form alkenes, and the use of Zaitsev's rule to predict the predominant product when more than one is possible. Predict the products of the addition of hydrogen halides and water to unsymmetrical alkenes and alkynes by applying Markovnikov's rule</li> <li>• Describe, by writing appropriate chemical equations, how to convert alkynes to aldehydes or ketones with the regioselectivity of hydration. Show how to convert an alkyne to either a <i>cis</i> or <i>trans</i> alkene without formation of a mixture of the two</li> <li>• Contrast the acidity of acetylene and terminal alkynes with other hydrocarbons, and describe reaction conditions suitable for converting these alkynes to their corresponding carbanions. Design syntheses of simple organic compounds starting from acetylene and another simple organic reagent</li> <li>• Describe the characteristics that influence reactivity of the carbonyl group and illustrate the general reactions and mechanisms for nucleophilic addition. Write reaction equations and mechanisms for the formation of cyanohydrin, hemiacetal and acetal from aldehydes and ketones. Write an equation for the hydration of an aldehyde or a ketone, and write mechanisms for the process under acid- and base-catalyzed conditions. Show how aldehydes and ketones can be prepared by oxidation of primary or secondary alcohols</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b> 24		<b>ITS Course Level Code</b> 03		<b>CESM Code (3<sup>rd</sup> Order)</b> 140401
<b>Periods per Week:</b>	<b>Classes</b> 4 x 45 min	<b>Practicals</b> 1 x 3 h	<b>Tutorial</b> 2 x 1 hrs	<b>Seminars</b> 0	<b>Independent Learning</b> 1.25 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 x 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				40
	<b>Final Mark =</b>			% Summative Assessment Mark	60
				% Summative Assessment Mark	40
	Min Final Assessment mark to pass (%)				50
<b>Summative Assessment Paper:</b>	<b>Paper 1</b>		<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical		Theory		
	Duration		3 hrs		
Sub minimum		40%			

## CURRICULUM INFORMATION

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCHM011</b>				
<b>Module Name:</b>	General Chemistry 1A				
<b>Module Content:</b>	Introduction to chemical terminology; A modern view of the periodic table; Quantitative chemical relationships; An overview of thermochemistry; Introduction to gases; An introduction to thermodynamics; Introduction to the rates of reactions; Introduction to solutions, acids and bases; Colligative properties of solutions; Concepts of chemical equilibria; Equilibria in acid/base systems; Solubility and equilibrium; Electrochemistry.				
<b>Learning Outcomes:</b>	<p>Students should</p> <ul style="list-style-type: none"> <li>• Understand the concept of significant figures and the use thereof in chemical calculations</li> <li>• Understand the importance of accuracy in recording measurements</li> <li>• Be able to understand chemical symbols, formulae and equations</li> <li>• Have a clear idea of the atomic structure of atoms</li> <li>• Have a basic picture of the layout of the periodic table and be able to use the periodic table and to extract the information summarized therein</li> <li>• Know how to use a balanced equations in stoichiometric calculations</li> <li>• Understand the basic concept of kinetic and potential energy</li> <li>• Know the energy changes involved during chemical reactions and be able to calculate heat of reactions occurring under constant pressure</li> <li>• Have a clear idea of Hess's law and heats of formation</li> <li>• Understand the basic properties of gasses, the kinetic theory of gasses as well as pressure, volume and temperature relationships. Must be able to use Dalton's law of partial pressure</li> <li>• Understand the importance of Gibbs free energy and its relation to the spontaneity of reactions</li> <li>• Know the worth of reaction rates</li> <li>• Understand the factors that influence the rate of chemical reactions</li> <li>• Have sound knowledge concerning all concepts about acids and bases. They will have the skills to balance these reactions</li> <li>• Understand the different expressions for the concentration of solutions</li> <li>• Be able to calculate how the addition of a solute will influence the colligative properties of solutions</li> <li>• Understand the concept of reaction reversibility</li> <li>• Understand the basic concepts about chemical equilibrium and to implement the equilibrium law and have an understanding of the importance of K</li> <li>• Understand how equilibrium influence the pH of aqueous solutions and how this knowledge is used in laboratories</li> <li>• Know the basic concepts concerning electrochemistry and how electricity is related to chemical equation</li> <li>• Understand cell potentials and be able to use reduction potentials in calculations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		140401
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	1 x 90 min		1.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH011 and MMTH012				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 x 3 hrs written examination				

<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)		<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark	<b>60</b>
		% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)		<b>50</b>

		Paper 1	Paper 2	Paper 3	Paper 4
Summative Assessment Paper:	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCHM012</b>
<b>Module Name:</b>	General Chemistry 1B
<b>Module Content:</b>	The Atomic and Electronic Structure; Chemical Bonding (Lewis structures, Valence shell electron pair repulsion (VSEPR), Valence Bond, and Molecular Orbital (MO) theories); Intermolecular Attractions and the Properties of Liquids and Solids; Alkanes, Alkenes, Alkynes; Alkyl Halides; Alcohols; Ethers; Aldehydes and Ketones; Acids and Derivatives; Aromatics; Amines; Conformational Analysis
<b>Learning Outcomes:</b>	<p>After completion of this module, students should:</p> <ul style="list-style-type: none"> <li>• Understand the basic ideas on studying the electronic structure of atoms using electromagnetic radiation</li> <li>• Understand the principles of electron configurations and how it explains the arrangement of atoms in the periodic table</li> <li>• Have a picture of how electronic structure explains atomic properties</li> <li>• Understand the concepts of ionic as well as covalent bonds and how Lewis dot notations help scientists to explain these interactions</li> <li>• Know the influence of polarity on the properties of molecules</li> <li>• Be able to use the Lewis dot structures to predict the shape of molecules</li> <li>• Know the basics on hybridization as well as the formation of double and triple bonds</li> <li>• Know the different intermolecular attractions found in liquids and how these attractions influence the physical properties of them</li> <li>• Be able to explain the concept of vapour pressure and know its importance</li> <li>• Understand a basic phase diagram and the energy changes that accompany state changes</li> <li>• Have a basic understanding of the solid state of matter</li> <li>• Draw skeletal, positional, geometric and functional isomers of organic compounds with various functional groups, and use IUPAC system of nomenclature to name them. Know the names of the first ten alkanes</li> <li>• Relate molecular structure to physical properties of alkanes and other organic compounds with various functional groups. Describe hydrogen bonding and predict its effect on the physical properties of organic compounds</li> <li>• Draw conformational isomers using sawhorse diagrams and Newman projections. Know the meaning of the terms eclipsed, staggered, anti and gauche conformations. Draw the boat and chair conformations of cyclohexane and distinguish between axial and equatorial positions in the chair. Know the meaning of the terms angle, torsional and van der Waals strain</li> </ul>

<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Define reaction mechanisms and explain what is meant by homolytic and heterolytic bond cleavage. Describe and identify in molecules: multiple bonds, polar bonds, electrophiles, nucleophiles, Lewis acids, and Lewis bases as reaction sites in organic molecules. Know how to write mechanisms for all reactions discussed where necessary</li> <li>Write general equations and specific examples of dehydrohalogenation reactions to form alkenes and alkynes, and dehydration reactions to form alkenes, and the use of Zaitseff's rule to predict the predominant product when more than one is possible. Predict the products of the addition of hydrogen halides and water to unsymmetrical alkenes and alkynes by applying Markovnikov's rule</li> <li>Describe, by writing appropriate chemical equations, how to convert alkynes to aldehydes or ketones with the regioselectivity of hydration. Show how to convert an alkyne to either a <i>cis</i> or <i>trans</i> alkene without formation of a mixture of the two</li> <li>Contrast the acidity of acetylene and terminal alkynes with other hydrocarbons, and describe reaction conditions suitable for converting these alkynes to their corresponding carbanions. Design syntheses of simple organic compounds starting from acetylene and another simple organic reagent</li> <li>Describe the characteristics that influence reactivity of the carbonyl group and illustrate the general reactions and mechanisms for nucleophilic addition. Write reaction equations and mechanisms for the formation of cyanohydrin, hemi-acetal and acetal from aldehydes and ketones. Write an equation for the hydration of an aldehyde or a ketone, and write mechanisms for the process under acid- and base-catalyzed conditions. Show how aldehydes and ketones can be prepared by oxidation of primary or secondary alcohols</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		140401
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 3 hrs	1 × 90 min	N/A	1.9 hrs
<b>Pre-requisite module/s :</b>	None				
<b>Co-requisites module/s :</b>	MMTH011/MMTH012				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Chemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	CHM201M

<b>Module Code:</b>	<b>MCHA021</b>
<b>Module Name:</b>	Organic Chemistry 2
<b>Module Content:</b>	Stereochemistry; Conjugation and Aromaticity; Substitution reactions of Aromatic compounds; Carboxylic acids and their derivatives; Amines: Preparation and their reactions. Epoxides:

<b>Module Code:</b>	<b>MCHA021</b>		
<b>Module Name:</b>	Organic Chemistry 2		
<b>Module Content:</b>	Preparation and reactions; Heterocyclic compounds: Pyridine, Pyrrole, Thiophene and Furan		
<b>Learning Outcomes</b>	<p>After completion of this module, students should be able to:</p> <ul style="list-style-type: none"> <li>• Define chiral carbons and identify them in molecules</li> <li>• Define enantiomers and racemic mixtures and recognize compounds capable of exhibiting these structures</li> <li>• Define and draw enantiomers, diastereomers and meso compounds with two chiral carbons</li> <li>• Assign <i>R</i> and <i>S</i> configurations to stereoisomers and draw compounds with these configurations</li> <li>• Draw pairs of enantiomers with one chiral center, using wedges/dashes and Fischer projections</li> <li>• Give the number of stereoisomers possible for a molecule having more than one stereogenic center</li> <li>• Describe how a plane of symmetry relates to whether or not a molecule is chiral</li> <li>• Explain optical activity as a property of chiral molecules, and calculate specific rotation and optical purity</li> <li>• Give an acceptable IUPAC names for aromatic compounds</li> <li>• Describe the structure of benzene using resonance. Name and draw aromatic compounds</li> <li>• Write chemical equations describing the electrophilic aromatic substitution reactions (halogenation, Friedel-Crafts alkylation and Friedel-Crafts acylation, nitration, and sulfonation), showing orientation of substitution</li> <li>• Write the mechanism for electrophilic aromatic substitution in general and then specifically for halogenation, Friedel-Crafts alkylation and Friedel-Crafts acylation, nitration, and sulfonation</li> <li>• Explain the mechanistic basis for the action of activating ortho, para-directing groups and deactivating meta-directing groups</li> <li>• Explain why the halogens are deactivating ortho, para-directing groups</li> <li>• Predict whether a substance is aromatic based on its structure and Huckel's rule. Synthesize substituted benzenes using the reactions in this chapter. Write reaction equations showing the preparation of aromatic diazonium salts, the replacement reactions of these salts, and the synthetic utility in conjunction with electrophilic aromatic substitution reactions</li> <li>• Write coupling reactions of diazonium salts</li> <li>• Give an acceptable IUPAC names for alkyl and arylamines</li> <li>• Describe the influence of hydrogen bonding on the physical properties of amines</li> <li>• Write equations showing the reaction of amines with acids to form ammonium salts</li> <li>• Explain what is meant by <math>K_b</math> and <math>pK_b</math> for an amine</li> <li>• Explain why arylamines are weaker bases than alkylamines</li> <li>• Write equations showing the reactions of amines with acids to form ammonium salts</li> <li>• Write reaction equations and describe the mechanism for alkylation of amines</li> <li>• Write reaction equations illustrating synthesis of amines by reduction of nitro compounds, nitriles, amides, ketones and aldehydes</li> <li>• Write chemical equations describing the preparation of alkenes from amines using the Hofmann elimination</li> <li>• Explain how you can distinguish primary, secondary and tertiary amines using Hinsberg test.</li> <li>• Write the structures of epoxides and equations, illustrating their ring-opening reactions</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	10	3	140404

Periods per Week:	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min		6.1 hrs
Pre-requisite module/s :	MCHM012				
Co-requisites module/s :	N/A				
Assessment Methods:	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination.				

Module Code:	<b>MCHA021</b>				
Module Name:	Organic Chemistry 2				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final Mark =	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
Summative Assessment Paper:		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

Department:	<b>Chemistry</b>	School:	Science & Technology
Last Revision date:	2011	First Year Offered (New):	2013
Replace this Module existing module(s)?	Yes	If YES, give the module codes:	CHM201M

Module Code:	<b>MCHB021</b>				
Module Name:	Inorganic Chemistry 2				
Module Content:	Atomic structure; General Bonding; Main Group chemistry: s- & p-block elements; Acids and bases; Introduction to Coordination Chemistry of Transition Metals; Inorganic solids				
Learning Outcomes:	<p>After completing this module, students should be able to:</p> <ul style="list-style-type: none"> <li>Define valence bond theory using homo and heteronuclear molecules</li> <li>Understand molecular orbital theory and the bonding orbitals of H<sub>2</sub>, the description of orbital overlap, bond strength, bond order and length, covalent radii as well as polarity in homo and heteronuclear molecules</li> <li>Know the properties and structure of ionic substances</li> <li>Discuss the lattice structures of a few typical examples</li> <li>Show the application of lattice energy and Born-Haber cycle</li> <li>Define ionic radius</li> <li>Introduce the transition metals and the electronic surtaxes of transition metals</li> <li>Understand the variable oxidation states of transition metals</li> <li>Look at coordination number and geometry isomerism</li> <li>Discuss the occurrence, physical and chemical properties of the s- block elements</li> <li>Understand the reactivity of, and the typical compounds of s- block elements</li> </ul>				
Module Information:	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	10		3		140403
Periods per Week:	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	6.1 hrs
Pre-requisite module/s :	MCHM012				
Co-requisites module/s :	N/A				
Assessment Methods:	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination.				

<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)		40		
	<b>Final Mark =</b>		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Min Final Assessment mark to pass (%)		50		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> CHEM202

<b>Module Code:</b>	<b>MCHA022</b>				
<b>Module Name:</b>	Analytical Chemistry 2				
<b>Module Content:</b>	Introduction to Analytical Chemistry: sampling, sample preparation, systematic and random errors; Application of statistics to data treatment and evaluation; Stoichiometric calculations; Aqueous solution chemistry (including chemical equilibria); Gravimetric methods of analysis; Titrimetric analysis; Advanced neutralization titrations; Precipitation titrimetry; Complexometric titrations; Oxidation-reduction titrimetry. Introduction to electrochemistry; Potentiometry				
<b>Learning Outcomes:</b>	After completion of the module, students should be able to: <ul style="list-style-type: none"> <li>• Explain the theory of sampling and sample preparation</li> <li>• Handle and evaluate statistical data</li> <li>• Handle stoichiometric and equilibrium calculations</li> <li>• Understand and apply the basic theory of gravimetry</li> <li>• Understand and apply the basics of titrimetry</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	10		3	140402	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	6.1 hrs
<b>Pre-requisite module/s:</b>	MCHM011				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)		40		
	<b>Final Mark =</b>		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Min Final Assessment mark to pass (%)		50		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Chemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	CHEM202

<b>Module Code:</b>	<b>MCHB022</b>				
<b>Module Name:</b>	Physical Chemistry 2				
<b>Module Content:</b>	The laws of thermodynamics. Application to energy changes which govern the physical and chemical equilibria. Physical properties of pure matter and mixtures with more emphasis on the liquid phase. Phase diagrams. Properties of colloids and surface films				
<b>Learning Outcomes:</b>	Students should be able to demonstrate knowledge of the laws of thermodynamics, energy changes which govern the physical and chemical equilibria, physical properties of pure matter and mixtures, properties of colloids and surface films				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	10	3		140405	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	6.1 hrs
<b>Pre-requisite module/s :</b>	MCHM011 & MMTH011				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Chemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>MCHA031</b>				
<b>Module Name:</b>	Physical Chemistry 3				
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>• Transport phenomena in gases and liquids.</li> <li>• Chemical kinetics/theories of chemical collisions.</li> <li>• Chemical bonding.</li> <li>• Quantum mechanics (properties of light, photoelectric effect), wave-particle nature of matter.</li> <li>• Molecular structure and symmetry.</li> <li>• Vibrational and rotational spectra.</li> </ul>				

<b>Module Code:</b>	<b>MCHA031</b>				
<b>Module Name:</b>	Physical Chemistry 3				
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>• Electronic transitions and magnetic resonance.</li> <li>• <b>Miscellaneous Topics:</b> Molecules in motion: viscosity, diffusion, mobility. Surface chemistry: Processes at solid surfaces (Physisorption and chemisorption, adsorption isotherms, surface tension), Heterogeneous catalytic rate reactions, capillarity</li> </ul>				
<b>Learning Outcomes:</b>	Students should be able to demonstrate knowledge of electro-analytical methods, spectrometric methods and separation methods				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		140405
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
<b>Pre-requisite module/s:</b>	MCHAB022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Chemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>MCHB031</b>		
<b>Module Name:</b>	Inorganic Chemistry 3		
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>• Coordination chemistry and stereochemistry.</li> <li>• Redox reactions.</li> <li>• Bonding theories:</li> <li>• Valence bond theory (VBT), Crystal field theory (CFT), Ligand field theory (LFT) and Molecular orbital theory (MOT).</li> <li>• Inorganic reactions and mechanisms.</li> <li>• Introduction to f-block elements (lanthanides and actinides).</li> <li>• Organometallic chemistry and isolobal analogies.</li> <li>• Organometallic complexes in action: Homogeneous catalysis</li> </ul>		
<b>Learning Outcomes:</b>	Students should be able to demonstrate knowledge of co-ordination chemistry and stereochemistry, redox reactions, valence bond theory, crystal field theory, molecular orbital theory, inorganic reactions and mechanisms, introduction to f-block elements (lanthanides and actinides), isolobal analogy and organometallic chemistry (with application to homogeneous catalysis)		
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		140403

<b>Module Code:</b>	<b>MCHB031</b>				
<b>Module Name:</b>	Inorganic Chemistry 3				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
<b>Pre-requisite module/s:</b>	MCHB021				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assess Mark	<b>60</b>
				% Summative Assess Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Chemistry</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCHA032</b>				
<b>Module Name:</b>	Analytical Chemistry 3				
<b>Module Content:</b>	Electro-Analytical methods: Potentiometry. Spectrometric methods: Ultra-violet/Visible (UV/VIS), Atomic absorption spectrometry (AAS). Separation methods: Solvent extraction, High Performance Liquid Chromatography (HPLC) and Gas chromatography (GC). <b>Miscellaneous Topic(s):</b> Surface analysis techniques				
<b>Learning Outcomes:</b>	Students should be able to demonstrate knowledge of electro-analytical methods, spectrometric methods and separation methods				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		140402
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
<b>Pre-requisite module/s :</b>	MCHA022				
<b>Co-requisites module/s :</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>

<b>Module Code:</b>	<b>MCHA032</b>				
<b>Module Name:</b>	Analytical Chemistry 3				
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Chemistry</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCHB032</b>				
<b>Module Name:</b>	Organic Chemistry 3				
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>• Substitution and elimination reactions: S<sub>N</sub>1, S<sub>N</sub>2, E1, E2.</li> <li>• Carbonyl chemistry: reactions at the α position (Aldol condensation and related reactions).</li> <li>• Carboxylic acids and their derivatives: acyl compounds, enolate chemistry of esters.</li> <li>• Organic spectroscopy: systematic identification of organic compounds (mass spectrometry, infrared and UV/VIS spectroscopy, nuclear magnetic resonance).</li> <li>• Organometallics: Introduction to organometallic compounds.</li> </ul>				
<b>Learning Outcomes:</b>	<p>A successful student in this module will gain proficiency in:</p> <ul style="list-style-type: none"> <li>• Reactions and mechanisms of organic molecules</li> <li>• Identification of organic substances using spectroscopic techniques</li> <li>• Solving problems that involve organic molecules, their reactions, mechanisms and identification</li> <li>• Laboratory techniques used to synthesize, purify, and identify organic substances</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	16	3		140404	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
<b>Pre-requisite module/s:</b>	MCHA021				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# DEPARTMENT: COMPUTER SCIENCE

## CURRICULUM INFORMATION

<b>Department:</b> Computer Science	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCSC000</b>				
<b>Module Name:</b>	Computing concepts and algorithms				
<b>Module Content:</b>	<p><b>COMPUTING CONCEPTS:</b></p> <ul style="list-style-type: none"> <li>• Basic concepts in ICT</li> <li>• Concepts of operating systems and networks</li> <li>• Data storage and binary numbersystem</li> <li>• Microsoft Office Software Applications</li> </ul> <p><b>ALGORITHMS</b></p> <ul style="list-style-type: none"> <li>• Fundamental Algorithmic concepts and problem solving</li> <li>• Concepts of Programming languages</li> <li>• Basic Logic gates and Karnaugh maps</li> </ul> <p><b>FUNDAMENTALS OF C++ PROGRAMMING</b></p> <ul style="list-style-type: none"> <li>• Introduction to Programming</li> <li>• Program components in C++</li> <li>• Data types, Declarations, and Displays</li> <li>• Assignment and Interactive input</li> <li>• Control Structures (if, if/else, while, do/while, switch, for)</li> </ul>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• The learner at this level should be able to:</li> <li>• Demonstrate a basic understanding of broad fundamental concepts and trends of computing.</li> <li>• Demonstrate a basic understanding of the modern computer-based problem solving paradigm.</li> <li>• Understand algorithms and how they are developed</li> <li>• Develop logical constructs for solving problems</li> <li>• Demonstrate problem solving capability</li> <li>• Understand and use information and communication technology (ICT) tools appropriately</li> <li>• Effectively use software productivity tools</li> <li>• Understand the basics of a C++ Integrated Development Environment (IDE)</li> <li>• Construct basic C++ statements a given simple problem specification</li> <li>• Write simple decision-making statements</li> <li>• Apply multiple selection using the <b>switch, while</b> and <b>do while</b> statements</li> <li>• Use if, if/else, for loops when necessary to perform repetition routines in a program</li> <li>• Implement counter-controlled repetition and sentinel-control repetition</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		060601
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 45 min	2 x 45 min	0	4 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be derived from a three-hour written examination and the module mark in the ratio 2:3				

<b>Module Code:</b>	<b>MCSC000</b>				
<b>Module Name:</b>	Computing concepts and algorithms				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>MCSB000</b>
<b>Module Name:</b>	Introduction to data organization and artificial Intelligence (AI)
<b>Module Content:</b>	<p><b>DATA ORGANIZATION</b></p> <ul style="list-style-type: none"> <li>• Files and Data Structures;</li> <li>• Introduction to Database concepts</li> <li>• Advanced algorithm development and problem solving</li> <li>• Concepts of software development</li> <li>• Intermediate Object Oriented Programming using C++ compiler</li> </ul> <p><b>ARTIFICIAL INTELLIGENCE</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of Artificial Neural Networks (ANN)</li> <li>• Expert Systems</li> <li>• Introduction to Theory of computations</li> <li>• Introduction to Web development</li> </ul> <p><b>PROCEDURAL AND OBJECT ORIENTED PROGRAMMING</b></p> <ul style="list-style-type: none"> <li>• Introduction to modularity using functions</li> <li>• Math Library Functions</li> <li>• C++ Standard Library Header Files</li> <li>• Basic arrays and pointers</li> <li>• Introduction to Object Oriented Programming –Classes</li> </ul>
<b>Learning Outcomes:</b>	<p><b>After successful completion of the module, the student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Apply different search strategies in computer processing;</li> <li>• Explain how the Turing test works;</li> <li>• Interpret how Artificial Neural Networks are applied in general ;</li> <li>• Analyse Robotics and Expert Systems;</li> <li>• Understand fundamental concepts of web design</li> <li>• Design and write structured, efficient programs using C++</li> <li>• Conduct basic program analysis and construct programs modularly from functions</li> <li>• Implement modularity using functions, pointers and classes</li> <li>• Apply various basic problem-solving techniques</li> <li>• Create functions with multiple parameters</li> <li>• Use common mathematical functions available in the C++ Standard Library</li> </ul>

<b>Module Code:</b>	<b>MCSB000</b>				
<b>Module Name:</b>	Introduction to data organization and artificial Intelligence (AI)				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		060601
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 45 min	2 x 45 min	0	4 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be derived from a three-hour written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	COSC101

<b>Module Code:</b>	<b>MCOA011</b>		
<b>Module Name:</b>	Computing Concepts and Algorithms		
<b>Module Content:</b>	Fundamental concepts of computing, data storage and binary number system, concepts of operating systems and networks, fundamental algorithmic concepts, problem solving, programming concepts, basic logic gates and functions, karnaugh maps.		
<b>Learning Outcomes:</b>	<p>The learner at this level should be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate a thorough understanding of broad fundamental concepts and trends of computing.</li> <li>• Demonstrate a thorough understanding of the modern computer-based problem solving paradigm.</li> <li>• Understand algorithms and how they are developed</li> <li>• Develop logical constructs for solving problems</li> <li>• Demonstrate problem solving capability</li> <li>• Understand and use information and communication technology (ICT) tools appropriately</li> <li>• Effectively use software productivity tools</li> <li>• Understand the basics of a specific object-oriented computer programming language for application development</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	12	3	060601

<b>Module Code:</b>	<b>MCOA011</b>				
<b>Module Name:</b>	Computing Concepts and Algorithms				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1.5	2	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH011, MSTS011				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be derived from a three-hour written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Computer Science</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MCOB011</b>		
<b>Module Name:</b>	Data Organization and Artificial Intelligence		
<b>Module Content:</b>	<p><b>DATA ORGANIZATION</b></p> <ul style="list-style-type: none"> <li>• Files and Data Structures;</li> <li>• Introduction to Database concepts</li> <li>• Advanced algorithm development</li> <li>• Intermediate Object Oriented Programming using C++ compiler</li> </ul> <p><b>ARTIFICIAL INTELLIGENCE</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of Artificial Neural Networks (ANN)</li> <li>• Expert Systems</li> <li>• Introduction to Theory of computations</li> <li>• Introduction to Web development</li> </ul>		
<b>Learning Outcomes:</b>	<p>After successful completion of the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Apply different search strategies in computer processing;</li> <li>• Explain how the Turing test works;</li> <li>• Interpret how Artificial Neural Networks is applied in general ;</li> <li>• Analyse Robotics and Expert Systems;</li> <li>• Design and write structured, efficient programs using C++</li> <li>• Conduct basic program analysis and write medium size programs.</li> <li>• Be familiar with functions, pointers and classes</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	12	3	060601

<b>Module Code:</b>	<b>MCOB011</b>				
<b>Module Name:</b>	Data Organization and Artificial Intelligence				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1.5	2	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH012 ; MSTSO12				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be derived from a three-hour written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	COSC201

<b>Module Code:</b>	<b>MC0A021</b>				
<b>Module Name:</b>	Data Structures				
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>Modularization, data encapsulation, information hiding, data abstraction, functional decomposition.</li> <li>Structure, Array, Queue, Stack, List, Linked list, Binary Search Tree and Files creation</li> <li>Compiler theory.</li> </ul>				
<b>Learning Outcomes:</b>	<p>After successful completion of the module, the student should be able to</p> <ul style="list-style-type: none"> <li>Apply advanced concepts of structured programming, debugging and error handling.</li> <li>Identify and differentiate between a Stack and a Queue; Linear Linked list and a doubly Linked list</li> <li>Understand basic operations of data structures eg create, store, search, replace, delete, insert and sort.</li> <li>Creation and manipulation of electronic files processing</li> <li>Implement data structures in object oriented programming</li> <li>Acquired skills at using a variety of programming languages</li> <li>Apply evaluation criteria for choosing an appropriate programming language in a given scenario.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		060702
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1.5	0	0	6

<b>Module Code:</b>	<b>MCOA021</b>				
<b>Module Name:</b>	Data Structures				
<b>Pre-requisite module/s:</b>	MMTH011, MMTH012, MCOA011, MCOB011				
<b>Co-requisite module/s:</b>	MMTA021				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be obtained from a three-hour written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assess Mark		<b>60</b>
			% Summative Assess Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	COSC202

<b>Module Code:</b>	<b>MCOA022</b>				
<b>Module Name:</b>	Computer Organization & Architecture				
<b>Module Content:</b>	<ul style="list-style-type: none"> <li>• Basic Concepts: IA – 32 Processor Architecture</li> <li>• Assembly language fundamentals</li> <li>• Data transfers, Addressing and Integer Arithmetic</li> <li>• Procedures, Advance procedures and conditional processing</li> <li>• Structures and Macros</li> <li>• 32 – Bit Windows Programming</li> <li>• High Level language Interface</li> <li>• 16 – Bit MS-DOS Programming</li> <li>• Disk Fundamentals</li> <li>• BIOS – Level and Expert MS-DOS programming</li> </ul>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Understanding of the design and operations of the Assembly language.</li> <li>• Interface Assembly language to high level languages.</li> <li>• Write programs in Assembly language.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		060701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1.5	0	0	6
<b>Pre-requisite module/s:</b>	MMTH011, MCOA011, MCOB011				
<b>Co-requisite module/s:</b>	MMTA022				

<b>Module Code:</b>	<b>MCOA022</b>				
<b>Module Name</b>	Computer Organisation & Architecture				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	COSC351

<b>Module Code:</b>	<b>MCOA031</b>				
<b>Module Name</b>	Database Systems				
<b>Content:</b>	Database Systems; Data Models; Relational Database Model; Relational Algebra; Entity-Relationship Modelling; Advanced Data Modelling; Normalization of Database Tables; SQL; Database Design and Implementation.				
<b>Learning Outcomes:</b>	<p>Knowledge of the following:</p> <ul style="list-style-type: none"> <li>• Different types of databases, importance of Database design and evolution of Database from file systems</li> <li>• Functions of DBMS and Database components</li> <li>• Building Data models, Evolution of Data models and their classification by level of abstraction, characteristics of good primary keys, flexible solutions and issues to consider when developing models based on EER diagrams</li> <li>• Basic concepts and development of relational models</li> <li>• Manipulation of Tables using relational operators</li> <li>• Incorporation of Entity-Relationship modelling into the Database design process</li> <li>• The normalization process</li> <li>• Using both basic and advanced SQL commands for manipulation of tables.</li> <li>• System Development and Database Life Cycles, The role of DBA and navigating through the three stages of Database design</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		060601
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2	1.5	0	0	8

<b>Module Code:</b>	<b>MCOA031</b>				
<b>Module Name</b>	Database Systems				
<b>Pre-requisite module/s:</b>	MCOA021, MCOA022, MMTH011, MMTH012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, tests and practicals. The final mark will be obtained from the average of a three-hour written examination and the module mark				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	COSC361

<b>Module Code:</b>	<b>MCOB031</b>				
<b>Module Name:</b>	Operating Systems				
<b>Module Content:</b>	Overview of Operating and Computer Systems, Process Concept, Concurrent Processing, Processor Scheduling, Input/output and Files, Embedded Systems, Computer Security Issues, Distributed Systems, Cloud Computing				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Understanding of the concept of a process</li> <li>• Understanding and appreciation of concurrent processing</li> <li>• Knowledge of virtual memory techniques</li> <li>• Understanding of processor scheduling techniques</li> <li>• Appreciation of I/O and File handling strategies</li> <li>• Knowledge and appreciation of embedded systems</li> <li>• Understanding of computer security issues</li> <li>• Knowledge of distributed systems</li> <li>• Appreciation of cloud computing paradigm</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		060999
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2	1.5		0	8
<b>Pre-requisite module/s:</b>	MCOA021, MCOA022, MMTH011, MMTH012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The final mark will be obtained from a two-hour written examination and the module mark in the ratio 2:3.				

<b>Module Code:</b>	<b>MCOB031</b>			
<b>Module Name:</b>	Operating Systems			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	2 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b> <b>Computer Science</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> COSC372

<b>Module Code:</b>	<b>MCOA032</b>			
<b>Module Name:</b>	Artificial Intelligence			
<b>Module Content:</b>	Predicate Calculus Representation, State Space Search Strategies, Heuristic Search, Stochastic Methods, Knowledge Representation, Expert Systems, Probabilistic Reasoning, Machine Learning, Natural Language Understanding and Processing..			
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Knowledge of predicate calculus representation</li> <li>• Understanding of general state space search techniques</li> <li>• Appreciation and use of stochastic methods</li> <li>• Understanding of knowledge representation schemes</li> <li>• Understanding of structure and role of expert systems</li> <li>• Knowledge of automated and probabilistic reasoning techniques</li> <li>• Knowledge of machine learning strategies and approaches</li> <li>• Knowledge of natural language understanding processes.</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	16		3	
<b>Periods per Week:</b>	<b>Classes</b>		<b>Independent Learning</b>	
	2		8	
<b>Pre-requisite module/s:</b>	MCOA021, MCOA022, MMTH011, MMTH012			
<b>Co-requisite module/s:</b>	None			
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be obtained from a two-hour written examination and the module mark in the ratio 2:3.			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>

<b>Module Code:</b>	<b>MCOA032</b>				
<b>Module Name:</b>	Artificial Intelligence				
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Computer Science</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	COSC382

<b>Module Code:</b>	<b>MCOB032</b>				
<b>Module Name:</b>	Computer Networks				
<b>Content:</b>	Networking Basics; Physical Layer Technologies; Local Area Networks; TCP/IP Internet-Working; Wide Area Networks.				
<b>Learning Outcomes:</b>	<p>At the end of this course students are expected to have mastered the following:</p> <ul style="list-style-type: none"> <li>• General principle of network design and switching process</li> <li>• Packet and circuit switching</li> <li>• Network Architecture, standardization and classification</li> <li>• Network characteristics and QoS</li> <li>• Data encoding and multiplexing</li> <li>• Ethernet and wireless transmission</li> <li>• TCP/IP Addressing and internet protocol</li> <li>• IP WANS</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		060902
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2	1.5		0	8
<b>Pre-requisite module/s:</b>	MCOA021, MCOA022, MMTH011, MMTH012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, and tests. The final mark will be obtained from the average of a three-hour written examination and the module mark.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	Environmental Biology		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code	EMT 201		
Module name	Introduction to Environmental Science		
Module Content	<p>Meaning and types of Environment, New trends in Environmental Science, Man - Environment Interaction, The Atmosphere: Structure, Functions, Composition and Factors influencing the Composition of the Atmosphere; Man-Environment Interaction. Physical and Chemical processes in basic plants and animal physiology. Basic Elements of Respiration, Photosynthesis, Transportation or Circulation. Reproduction, Germination, Growth hormones and Enzymology. Classification of Environmental Problems. Methods in environmental analysis, types of precipitate/crystal formation, contamination and appropriate handling environmental samples. Titrimetric analysis: Acid-base redox, complexometric, precipitation, non-aqueous titrations, indicators. Colorimetric: Spectrophotometric reagents, elementary visible Spectrophotometry: spectrophotometric titrations.</p>		
Learning Outcomes	<ul style="list-style-type: none"> <li>▪ Understand the different types of environment and different trends in environmental science.</li> <li>▪ Describe the composition and structure of the atmosphere.</li> <li>▪ Identify different types of environmental problems.</li> <li>▪ Appreciate the impact of humans in managing the environment efficiently through man – environment interactions.</li> <li>▪ Understand and identify various factors that may bring about changes in the environment.</li> <li>▪ Understand various methods used in environmental analysis and Identify limitations of these methods.</li> <li>▪ Explain reasons why contaminants should be avoided during sampling and various sources of these contaminants.</li> <li>▪ Give examples of different types of precipitate and crystal formation.</li> <li>▪ Identify various instruments used for environmental sampling and analysis..</li> <li>▪ Ability to operate and use spectrophotometers for environmental samples.</li> </ul>		
Module information	SAQA Credits	ITS Course Level Code	CESM Code
Periods per week	Classes	Practicals	Tutorial
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012, MMTH011 &MMTH012		
Co-requisite module(s)	EMT202,EHS201,MICB201 & MICB202		
Assessment Methods	Formative tests, Assignments, Summative written examination		
Assessment Weighting	Min Formative Assessment Mark for exam admission (%)		40
	Final Mark =		% Formative Assess Mark
			% Summative Assess Mark
	Min Final mark to pass to pass (%)		50
Summative assessment Paper:		Paper 1	Paper 2
	Theory/Practical		
	Duration		
	Sub minimum		

CURRICULUM INFORMATION			
Department:	<b>Environmental Biology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code	<b>EMT 202</b>			
Module name	<b>Environmental Management</b>			
Module Content	Definition, scope and element of Environmental management and planning, History and Rise of Environmental Management and Concern in South Africa. Elements of environment management, environmental problems such as pollution including solid waste, land degradation and soil and water conservation as well as health implication of noise. Issues related to Environmental Standards and Regulations Enforcement Agency. Environmental Protection Agencies Mandates and Limitations. Environmental Law and Implementation in South Africa. Contributions or otherwise, of International Institutions to manage the Environment such as United Nations Conference on Environment and Development (UNCED); Non-governmental Organisations (NGOs).			
Learning Outcomes	<ul style="list-style-type: none"> <li>▪ Define and understand environmental management and planning.</li> <li>▪ Appreciate the need for Environmental Management in South Africa.</li> <li>▪ Identify some elements of environmental management and principles.</li> <li>▪ Describe the role and functions of Environmental Managers.</li> <li>▪ Integrate the role of International Institutions and Non-Governmental Organizations.</li> <li>▪</li> </ul>			
Module information	SAQA Credits	ITS Course Level Code		CESM Code
	Classes	Practicals	Tutorial	Seminars
Periods per week				Independent Learning
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012			
Co-requisite module(s)	EMT 201, EHS 201 & EHS202, MICB201 & MICB202			
Assessment Methods	Formative tests, Assignments, Summative written examination			
Assessment Weighting	Min Formative Assessment Mark for exam admission (%)			40
	Final Mark =		% Formative Assess Mark	60
			% Summative Assess Mark	40
	Min Final mark to pass to pass (%)			50
Summative assessment Paper:		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	<b>Environmental Biology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code	<b>EHS 201</b>		
Module name	<b>Fundamentals of Environmental Health Science</b>		
	Definition of Environmental Health, Environmental Effects on Health, Cleanliness, Conservation the Environment and Law, Exposure to Environmental Stressors: Biological, Physical and Ergonomic		

<b>Module Content</b>	Surveillance and Susceptibility, How Chemicals Cause Harm: Toxicokinetics and Toxicodynamics, Cancer: Role of the Environment in the Carcinogenic Process, Community Solid Wastes and Hazardous Wastes and their Management, Drinking Water - Procurement and Treatment; Wastewater Management, Air Pollution, Indoor Air Pollution and the Health Effects of Air Pollution, Climate Change and human health.				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Understand the co-evolution of human civilization, environmental exposures, and disease</li> <li>• Describe environmental hazards in communities and the workplace</li> <li>• Describe surveillance procedures for hazards in communities and the workplace</li> <li>• Understand the basis of genetic and non-genetic susceptibility to environmental disease</li> <li>• Describe the major mechanisms of toxicity</li> <li>• Understand basic principles of toxicokinetic and toxicodynamics</li> <li>• Understand how a risk assessment document is prepared, the information it contains, and how it is used to manage risk to environmental hazards</li> <li>• Describe the major environmental problems caused by solid and hazardous waste, water pollution, air pollution and agriculture</li> <li>• Understand basic principles that underlie climate change and its impact on human and ecological health</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Pre-requisite module(s)</b>	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012				
<b>Co-requisite module(s)</b>	EMT 201 & EMT202 , EHS 202, MICB201 & MICB202				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination				
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)				40
	Final Mark =		% Formative Assess Mark		60
			% Summative Assess Mark		40
	Min Final mark to pass to pass (%)				50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Environmental Biology</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019		<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	No		<b>If YES, give the module codes:</b>		

<b>Module code</b>	<b>EHS 202</b>
<b>Module name</b>	<b>Food borne Diseases and Human Parasitic Diseases</b>
<b>Module Content</b>	Significance and brief description of food borne diseases, Definition of food borne diseases, Epidemiology of food borne diseases, Classification and Etiology of some food borne diseases, Pathogenesis and clinical features of some food borne disease, Food-borne Infections, Food poisonings/intoxications, diagnosis of food-borne diseases, General management approaches of food-borne diseases, Prevention and control of food-borne diseases, Investigation of outbreaks of food-borne diseases. Human parasitic diseases, epidemiology of parasitic diseases, sources and management of parasitic diseases, Common parasitic diseases in South Africa.
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Describe food borne diseases</li> <li>▪ Understand the epidemiology of food borne diseases.</li> <li>▪ Identify pathogens causing food borne diseases.</li> <li>▪ Explain various ways of managing food borne diseases.</li> </ul>

	<ul style="list-style-type: none"> <li>Describe methods that can be used to prevent food borne diseases.</li> <li>Identify some common parasites in South Africa.</li> <li>Understand the importance of managing the parasites.</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code</b>
	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Periods per week</b>					
<b>Pre-requisite module(s)</b>	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 &MMTH012				
<b>Co-requisite module(s)</b>	EMT 201 , EHS 201 & EHS 202, MICB201 & MICB202				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination				
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)				40
	Final Mark =		% Formative Assess Mark		60
			% Summative Assess Mark		40
	Min Final mark to pass to pass (%)				50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Environmental Biology</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			

<b>Module code</b>	<b>MICB201</b>				
<b>Module name</b>	<b>Introduction to Microbiology</b>				
<b>Module Content</b>	History and development of microbiology. Key concepts in microbiology. Classification and characterization of the different types of microorganisms. Comparison of prokaryotic and eukaryotic cells. Nutritional and requirement and microbiological media, cultivation and growth of microorganisms. Physical organization of bacteria, bacterial chromosomes, cytoplasm, cell wall and membrane components. Bacterial toxins and Methods for identification of bacteria				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>Understand the history and development of microbiology</li> <li>Discuss key concepts in microbiology</li> <li>Classify and characterize different types of microorganisms</li> <li>Differentiate between prokaryotic and eukaryotic cells</li> <li>Describe the nutritional requirements of bacteria</li> <li>Discuss the nature and uses of different types of bacteria growth media</li> <li>Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components</li> <li>Understand and describe different methods for identification of bacteria.</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code</b>
	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Periods per week</b>					
<b>Pre-requisite module(s)</b>	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012				
<b>Co-requisite module(s)</b>					

<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination		
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)		40
	Final Mark =	% Formative Assess Mark	60
		% Summative Assess Mark	40
	Min Final mark to pass to pass (%)		50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2
	Theory/Practical		
	Duration		
	Sub minimum		

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Environmental Biology</b>		<b>School:</b> Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module code</b>	<b>MICB202</b>			
<b>Module name</b>	<b>Environmental and Fungal Microbiology</b>			
<b>Module Content</b>	Zoosporic fungi. The Deuteromycotina, Yeast. Fungi as saprotropots. Fungi and humans. Microbial populations in air, water and soil. The effects of abiotic factors on microorganisms. Measurement of bacterial numbers, biomass and activities in microbial ecosystems. The roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles. Ecological aspects of biodegradation of waste. Microorganisms in mineral and energy recovery. The role of microorganisms in water quality (water pollution, water treatment, sewage treatment and solid municipal waste). Indices of sanitary quality and microbiological standards. Water quality testing techniques and water purification technology			
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Understand and describe the classification of fungi</li> <li>▪ Describe the effects of abiotic factors on microorganisms</li> <li>▪ Measure bacterial numbers in air, biomass and ecosystems</li> <li>▪ Describe the roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles</li> <li>▪ Understand and describe ecological aspects of biodegradation</li> <li>▪ Understand and describe the role of microorganisms in water pollution and treatment.</li> <li>▪ Understand and describe water quality testing and purification trchnology.</li> </ul>			
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars Independent Learning
<b>Pre-requisite module(s)</b>	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012			
<b>Co-requisite module(s)</b>				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination			
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)		40	
	Final Mark =	% Formative Assess Mark	60	
		% Summative Assess Mark	40	
	Min Final mark to pass to pass (%)		50	
<b>Summative assessment Paper:</b>		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	<b>Environmental Biology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

<b>Module code</b>	<b>EHS 301</b>			
<b>Module name</b>	<b>Human Nutrition in Health and Diseases</b>			
<b>Module Content</b>	Historical Perspectives and General Definitions (Nutrition, Health, Disease, Food, Food Groups, etc.). Food Classification (Why and How, Which), Food Presentation, purchasing and preparation. Formulation of Special Diets, Nutritional Diseases and how some of these are prevented: (Energy-related Diseases, Vitamin-related Disease, Mineral-related Diseases, and Nutritional Excesses). Management of Nutritional Diseases. Microorganisms Causing Most Food Contamination. Food spoilage, Food poisoning, Food borne infection and intoxication. Prevention of food borne diseases outbreak.			
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Define basic terminology in human nutrition and diseases</li> <li>▪ Classify food into groups.</li> <li>▪ Hygienic methods of food preparation and preservation.</li> <li>▪ Understand some diseases caused by improper food diet.</li> <li>▪ Analyse and understand various methods that can be used in managing nutritional diseases.</li> <li>▪ Identify different microorganisms causing food poisoning.</li> </ul>			
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars
<b>Pre-requisite module(s)</b>	EMT 201 & EMT 202, EHS201 & EHS202			
<b>Co-requisite module(s)</b>	EHS302			
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination			
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)			40
	Final Mark =		% Formative Assess Mark	60
			% Summative Assess Mark	40
	Min Final mark to pass to pass (%)			50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	<b>Environmental Biology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code	<b>EHS 302</b>			
Module name	<b>Occupational and Health Safety</b>			
Module Content	What is occupational health? Challenges for the development of occupational health and safety. Interrelationship between occupational health and human development. Elements of a work environment. Interactions in the work place. Relationship between work and health. Health and safety policies in industries and work environments, Strategies and objectives, First Aid and Techniques; burns, poison stings and bites, artificial respiration etc. Accidents; classification, causes and costs; Fire and firefighting. Health and safety audits as management tools. Health and safety plans. Accidents : case studies.			
Learning Outcomes	<ul style="list-style-type: none"> <li>▪ Define occupational health</li> <li>▪ Discuss challenges for the development of occupational health and safety.</li> <li>▪ Explain the scope of occupational health and safety.</li> <li>▪ Describe the interrelationship between occupational health and development</li> <li>▪ Identify the elements of a work environment.</li> <li>▪ Discuss the three common interactions in the work place.</li> <li>▪ Explain the interrelationships between work and health</li> </ul>			
Module information	SAQA Credits		ITS Course Level Code	
Periods per week	Classes	Practicals	Tutorial	Seminars
Pre-requisite module(s)	EMT 201 & EMT 202, EHS201 & EHS202			
Co-requisite module(s)	EHS301 , EPS301, & EPS302			
Assessment Methods	Formative tests, Assignments, Summative written examination			
Assessment Weighting	Min Formative Assessment Mark for exam admission (%)			40
	Final Mark =		% Formative Assess Mark	60
			% Summative Assess Mark	40
	Min Final mark to pass to pass (%)			50
Summative assessment Paper:		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	<b>Environmental Biology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code	<b>EPS 301</b>		
Module name	<b>Community Health and Development</b>		
	Definition of concepts in community and public health, Influence of the environment and development on Community health, Agencies involved in international health, Distinction between community/public health in developed and less developed countries, The vicious circles of population pressure, Malnutrition and		

<b>Module Content</b>	infection, Problem solving in the developing world, Sources of community/public health problems in rural and Urban areas in less developed countries: water availability/scarcity, vehicular emission, population increase, air pollution, sanitation; Control of health problems arising from contamination of Water, air in communities, Spatial Epidemiological Approach to community/public health Problems analysis, Planning intervention programme for community/public Health problems. The ecological and spatial approaches to the study of communicable diseases (epidemic and pandemic etc), measures, methods and techniques of controlling diseases in general, the major patterns of diseases in Southern Africa; the possible control strategies the provision and utilization of health care services and the factors influencing these.				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Describe the difference between community health and public health</li> <li>▪ Describe the influence of the environment on community health</li> <li>▪ Distinguish between the impact of community health in developed and less developed countries.</li> <li>▪ Understand the relationship between malnutrition and infection.</li> <li>▪ Analyse and understand various methods that can be used in solving problems within the community.</li> <li>▪ Identify factors that can mitigate against health hazards within the community health perspectives.</li> <li>▪ Appreciate the importance of good environment</li> <li>▪ Discuss the impact of pollution on community health.</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code</b>
	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Periods per week</b>					
<b>Pre-requisite module(s)</b>	EMT201 & EMT202, EHS201 & EHS202				
<b>Co-requisite module(s)</b>	EHS301 & EHS302, EPS302				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination				
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)				40
	Final Mark =		% Formative Assess Mark		60
			% Summative Assess Mark		40
	Min Final mark to pass to pass (%)				50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Environmental Biology</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019		<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	No		<b>If YES, give the module codes:</b>		

<b>Module code</b>	<b>EPS 302</b>
<b>Module name</b>	<b>Environmental Epidemiology</b>
<b>Module Content</b>	Social and behavioural perspectives in environmental health, Social, cultural & environmental health behaviour theories, Health promotion programs in South Africa, Global health challenges, Principles of health System and Administration in South Africa. Epidemiological evidence
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Use theory, research, and the problem-solving process in examining the health status of people across the life span.</li> <li>▪ Negotiate outside learning experiences that will enhance the application of health and wellness concepts.</li> <li>▪ Examine the impact of the health care professional on health care systems at local, state, national, and international levels.</li> </ul>

	<ul style="list-style-type: none"> <li>Analyze environmental, sociocultural, and economic factors that influence health care practices across cultures.</li> <li>Explore past, present, and future trends in the health care system and the changing role of selected health care professionals.</li> <li>Articulate the role of values, beliefs, ethics, and public policy on health and wellness.</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code</b>
	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Periods per week</b>					
<b>Pre-requisite module(s)</b>	EMT 201 & EMT 202, EHS201 & EHS202				
<b>Co-requisite module(s)</b>	EHS301 & EHS302, EPS301				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination				
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)				40
	Final Mark =		% Formative Assess Mark		60
			% Summative Assess Mark		40
	Min Final mark to pass to pass (%)				50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

## ENVIRONMENTAL MANAGEMENT & TOXICOLOGY - BSCG01

### SECTION F: MODULAR INFORMATION REQUIRED

<b>Department:</b>	<b>Environmental Management and Toxicology</b>		<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>		

<b>Module code</b>	<b>EMT 201</b>
<b>Module name</b>	<b>Introduction to Environmental Science</b>
<b>Content:</b>	Meaning and types of Environment, New trends in Environmental Science, Man - Environment Interaction, The Atmosphere: Structure, Functions, Composition and Factors influencing the Composition of the Atmosphere; Man-Environment Interaction. Physical and Chemical processes in basic plants and animal physiology. Basic Elements of Respiration, Photosynthesis, Transportation or Circulation. Reproduction, Germination, Growth hormones and Enzymology. Classification of Environmental Problems. Methods in environmental analysis, types of precipitate/crystal formation, contamination and appropriate handling environmental samples. Titrimetric analysis: Acid-base redox, complexometric, precipitation, non-aqueous titrations, indicators. Colorimetric: Spectrophotometric reagents, elementary visible Spectrophotometry: spectrophotometric titrations.
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Understand the different types of environment and different trends in environmental science.</li> <li>Describe the composition and structure of the atmosphere.</li> <li>Identify different types of environmental problems.</li> <li>Appreciate the impact of humans in managing the environment efficiently through man – environment interactions.</li> <li>Explain reasons why contaminants should be avoided during sampling and</li> </ul>

	various sources of these contaminants. <ul style="list-style-type: none"> <li>Give examples of different types of precipitate and crystal formation.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>	
	20		2	140503	
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		2/1 <sup>ST</sup> Sem
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3 hours	1		40 hours
<b>Pre-requisite modules for this module:</b>	MZOO011& MZOO012, MCHM011& MCHM012,MPHS011& MPHS012,MMTH011& MMTH012				
<b>Co-requisites modules for module:</b>	EMT202,EHS201,MICB201 & MICB202				
<b>Assessment</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical testing at end of Module with feedback.</li> <li>Draft Portfolio of Environmental Science Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme.				
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand and identify various factors that may bring about changes in the environment.</li> <li>Understand various methods used in environmental analysis and Identify limitations of these methods.</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Identify various instruments used for environmental sampling and analysis.</li> <li>Ability to operate and use spectrophotometers for environmental samples.</li> </ul>				
<b>Assessment methods</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>During the programme students to develop a Portfolio of Environmental Health Theory and Practice. A first draft of this portfolio (including completed pre- and post-module questionnaires with proof of Blackboard assessments) to be assessed mid-year; with formative feedback given for improvement.</li> </ul> <b>Summative assessment: Test, Quiz and Practicals</b>				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%		
	% Formative Assessment Mark		60%		
	% Summative Assessment Mark		40%		
	Minimum final mark to pass (%)		50%		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory	Theory	N/A	N/A
	Duration	3hrs	3hrs	N/A	N/A
	% contribution to Summative Assessment Mark	100%	100%	N/A	N/A
	Sub minimum	40%	40%	N/A	N/A

**CURRICULUM INFORMATION**

<b>Department:</b>	<b>Environmental Management &amp; Toxicology</b>	<b>School:</b>	Science and Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

<b>Module code</b>	<b>EMT 202</b>				
<b>Module name</b>	<b>Environmental Management</b>				
Content:	Definition, scope and element of Environmental management and planning, History and Rise of Environmental Management and Concern in South Africa. Elements of environment management, environmental problems such as pollution including solid waste, land degradation and soil and water conservation as well as health implication of noise. Issues related to Environmental Standards and Regulations Enforcement Agency. Environmental Protection Agencies Mandates and Limitations. Environmental Law and Implementation in South Africa. Contributions or otherwise, of International Institutions to manage the Environment such as United Nations Conference on Environment and Development (UNCED); Non-governmental Organisations (NGOs).				
Learning Outcomes:	<ul style="list-style-type: none"> <li>• Define and understand environmental management and planning.</li> <li>• Identify some elements of environmental management and principles.</li> <li>• Describe the role and functions of Environmental Managers.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order) (Six Numbers)
	20		2		140503
Delivery Information:	Campus		Full/Part Time		Period Year/1 <sup>st</sup> /2 <sup>nd</sup> Semester
	SMU		Contact/Full Time		2/2 <sup>nd</sup> Sem
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	3 hours	1		40 hours
Pre-requisite modules for this module:	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012				
Co-requisites modules for module:	EMT 202				
Assessment	Formative assessment: <ul style="list-style-type: none"> <li>• Theoretical and Practical Assessment.</li> <li>• Draft Portfolio of Environmental Health Theory and Practice assessed mid-year.</li> </ul> Summative assessment: Final Portfolio of Environmental Health Theory and Practice assessed at end of programme.				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>• Appreciate the need for Environmental Management in South Africa.</li> </ul> Specific educational outcome: Explain how vaccines are distributed <ul style="list-style-type: none"> <li>• Integrate the role of International Institutions and Non-Governmental Organizations.</li> </ul>				
Assessment methods	Formative assessment: <ul style="list-style-type: none"> <li>• Theoretical and Practical Assessment</li> <li>• During the programme students to develop a Portfolio of Environmental Theory and Practice. A first draft of this portfolio (including completed pre- and post-module questionnaires with proof of Blackboard assessments) to be assessed mid-year; with formative feedback given for improvement.</li> </ul> Summative assessment: Test, Quiz and Practicals				

Mark Structure:	Minimum Form Assessment Mark for exam admission (%)		40%			
		% Formative Assessment Mark	60%			
		% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)		50%			
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4	
	Theory/Practical	Theory/Practical	N/A	N/A	N/A	
	Duration	3hrs	N/A	N/A	N/A	
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A	
	Sub minimum	40%	N/A	N/A	N/A	

CURRICULUM INFORMATION					
Department:	<b>Environmental Management &amp; Toxicology</b>			School:	Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020		
Replace this Module existing module(s)?	No	If YES, give the module codes:			

<b>Module code</b>	<b>EHS 201</b>				
<b>Module name</b>	<b>Fundamentals of Environmental Health Science</b>				
<b>Module Content</b>	Definition of Environmental Health, Environmental Effects on Health, Cleanliness, Conservation the Environment and Law, Exposure to Environmental Stressors: Biological, Physical and Ergonomic Surveillance and Susceptibility, How Chemicals Cause Harm: Toxicokinetics and Toxicodynamics, Cancer: Role of the Environment in the Carcinogenic Process, Community Solid Wastes and Hazardous Wastes and their Management, Drinking Water - Procurement and Treatment; Wastewater Management, Air Pollution, Indoor Air Pollution and the Health Effects of Air Pollution, Climate Change and human health.				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>Understand the co-evolution of human civilization, environmental exposures, and disease</li> <li>Describe environmental hazards in communities and the workplace</li> <li>Describe surveillance procedures for hazards in communities and the workplace</li> <li>Understand the basis of genetic and non-genetic susceptibility to environmental disease</li> <li>Describe the major mechanisms of toxicity</li> <li>Understand basic principles of toxicokinetic and toxicodynamics</li> <li>Understand how a risk assessment document is prepared, the information it contains, and how it is used to manage risk to environmental hazards</li> <li>Describe the major environmental problems caused by solid and hazardous waste, water pollution, air pollution and agriculture</li> <li>Understand basic principles that underlie climate change and its impact on human and ecological health</li> </ul>				
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code</b>	
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars	Independent Learning
<b>Pre-requisite module(s)</b>	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012				
<b>Co-requisite module(s)</b>	EMT202, EHS201,MICB201,MICB202				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination				
	Min Formative Assessment Mark for exam admission (%)			40	
	% Formative Assess Mark			60	

<b>Assessment Weighting</b>	Final Mark =	% Summative Assess Mark	40
	Min Final mark to pass to pass (%)		50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2
	Theory/Practical		
	Duration		
	Sub minimum		

CURRICULUM INFORMATION			
Department:	<b>Environmental Management &amp; Toxicology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

<b>Module code</b>	<b>EHS 202</b>			
<b>Module name</b>	<b>Food borne Diseases and Human Parasitic Diseases</b>			
<b>Module Content</b>	Significance and brief description of food borne diseases, Definition of food borne diseases, Epidemiology of food borne diseases, Classification and Etiology of some food borne diseases, Pathogenesis and clinical features of some food borne disease, Food-borne Infections, Food poisonings/intoxications, diagnosis of food-borne diseases, General management approaches of food-borne diseases, Prevention and control of food-borne diseases, Investigation of outbreaks of food-borne diseases. Human parasitic diseases, epidemiology of parasitic diseases, sources and management of parasitic diseases, Common parasitic diseases in South Africa.			
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Describe food borne diseases</li> <li>▪ Understand the epidemiology of food borne diseases.</li> <li>▪ Identify pathogens causing food borne diseases.</li> <li>▪ Explain various ways of managing food borne diseases.</li> <li>▪ Describe methods that can be used to prevent food borne diseases.</li> <li>▪ Identify some common parasites in South Africa.</li> <li>▪ Understand the importance of managing the parasites.</li> </ul>			
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars Independent Learning
<b>Pre-requisite module(s)</b>	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012			
<b>Co-requisite module(s)</b>				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination			
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)		40	
	Final Mark =	% Formative Assess Mark		60
		% Summative Assess Mark		40
	Min Final mark to pass to pass (%)		50	
<b>Summative assessment Paper:</b>		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	<b>Environmental Management &amp; Toxicology</b>		School: Science & Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

<b>Module code</b>	<b>MICB201</b>		
<b>Module name</b>	<b>Introduction to Microbiology</b>		
<b>Module Content</b>	History and development of microbiology. Key concepts in microbiology. Classification and characterization of the different types of microorganisms. Comparison of prokaryotic and eukaryotic cells. Nutritional and requirement and microbiological media, cultivation and growth of microorganisms. Physical organization of bacteria, bacterial chromosomes, cytoplasm, cell wall and membrane components. Bacterial toxins and Methods for identification of bacteria		
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Understand the history and development of microbiology</li> <li>▪ Discuss key concepts in microbiology</li> <li>▪ Classify and characterize different types of microorganisms</li> <li>▪ Differentiate between prokaryotic and eukaryotic cells</li> <li>▪ Describe the nutritional requirements of bacteria</li> <li>▪ Discuss the nature and uses of different types of bacteria growth media</li> <li>▪ Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components</li> <li>▪ Understand and describe different methods for identification of bacteria.</li> </ul>		
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial
<b>Pre-requisite module(s)</b>	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012		
<b>Co-requisite module(s)</b>			
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination		
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)		40
	Final Mark =		% Formative Assess Mark % Summative Assess Mark
			40
	Min Final mark to pass to pass (%)		50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2
	Theory/Practical		
	Duration		
	Sub minimum		

CURRICULUM INFORMATION			
Department:	<b>Environmental Management &amp; Toxicology</b>		School: Science and Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

<b>Module code</b>	<b>MICB202</b>			
<b>Module name</b>	<b>Environmental and Fungal Microbiology</b>			
<b>Module Content</b>	Zoosporic fungi. The Deuteromycotina, Yeast. Fungi as saprotropots. Fungi and humans. Microbial populations in air, water and soil. The effects of abiotic factors on microorganisms. Measurement of bacterial numbers, biomass and activities in microbial ecosystems. The roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles. Ecological aspects of biodegradation of waste. Microorganisms in mineral and energy recovery. The role of microorganisms in water quality (water pollution, water treatment, sewage treatment and solid municipal waste). Indices of sanitary quality and microbiological standards. Water quality testing techniques and water purification technology			
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>▪ Understand and describe the classification of fungi</li> <li>▪ Describe the effects of abiotic factors on microorganisms</li> <li>▪ Measure bacterial numbers in air, biomass and ecosystems</li> <li>▪ Describe the roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles</li> <li>▪ Understand and describe ecological aspects of biodegradation</li> <li>▪ Understand and describe the role of microorganisms in water pollution and treatment.</li> <li>▪ Understand and describe water quality testing and purification trchnology.</li> </ul>			
<b>Module information</b>	<b>SAQA Credits</b>	<b>ITS Course</b>	<b>Level Code</b>	<b>CESM Code</b>
<b>Periods per week</b>	Classes	Practicals	Tutorial	Seminars Independent Learning
<b>Pre-requisite module(s)</b>	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012			
<b>Co-requisite module(s)</b>				
<b>Assessment Methods</b>	Formative tests, Assignments, Summative written examination			
<b>Assessment Weighting</b>	Min Formative Assessment Mark for exam admission (%)			40
	Final Mark =		% Formative Assess Mark	60
			% Summative Assess Mark	40
	Min Final mark to pass to pass (%)			50
<b>Summative assessment Paper:</b>		Paper 1	Paper 2	
	Theory/Practical			
	Duration			
	Sub minimum			

CURRICULUM INFORMATION			
Department:	Environmental Management & Toxicology		School: Science and Technology
Last Revision date:	2019	First Year Offered (New):	2020
Replace this Module existing module(s)?	No	If YES, give the module codes:	

Module code		EMT 301		
Module Name		Environmental Toxicology		
Content:	<p>The nature, origin and classification of hazardous toxic substances; Characteristics of wastes and hazardous substance. Identification of hazardous substances. Sources and pathways of hazardous substances. Disposal methods and technology of hazardous substance. Geological environmental factors affecting choice of disposal site; contamination of water bearing strata; soil, plants, food webs and bio-concentration. Analysis of hazardous and toxic substances. Regulations and law governing the sale, importation, transportation, storage and disposal of hazardous and toxic substances. Origin of Metals. Classification of metals. Utilisation of metals in industries. Sources of metal pollution; geological weathering, industrial discharge, metals fabricating and furnishing, leaching of metals from garbage, agricultural waste products. Effect of metals on the environment sediment, waste, air and food. Adverse effect of nearby metals – poisoning effects of Pb, Cd, Zn and Hg. Other effects e.g. neurologic, and renal effects. Analysis of metals in environmental samples.</p>			
Learning Outcomes:	<ul style="list-style-type: none"> <li>Classify and characterise hazardous substances in the environment.</li> <li>Understand different pathways of hazardous substance into food chain.</li> <li>Describe various disposal methods for hazardous substances</li> </ul>			
Module Information:	SAQA Credits		ITS Course Level	CESM Code (3 <sup>rd</sup> Order) (Six Numbers)
	30		3	130906
Delivery Information:	Campus		Full/Part Time	Period Year/1 <sup>st</sup> /2 <sup>nd</sup> Semester
	SMU		Full	Year
Periods per week:	Classes	Practicals	Tutorial	Seminars
	5	3 hours	1	
Independent Learning	30 hours			
Pre-requisite modules for this module:	EMT 201 AND 202			
Co-requisites modules for module:	No			
Assessment	<p><b>Formative assessment:</b></p> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>Draft Portfolio of Environmental Science Theory and Practice assessed mid-year.</li> </ul> <p><b>Summative assessment:</b> Test, Quiz and Practicals.</p>			
Assessment criteria (see Annex 1 for assessment criteria grid)	<p>Specific educational outcome 1:</p> <ul style="list-style-type: none"> <li>Explain how hazardous substance enters into water, soil and plants</li> <li>List different methods of hazardous disposal</li> </ul> <p>Specific educational outcome 2:</p> <ul style="list-style-type: none"> <li>Understand and describe the effect of metals in the environment</li> <li>Describe the adverse effects of metals in humans, plants and animals.</li> </ul>			
Assessment methods	<p><b>Formative assessment: Theoretical and Practical Exam-</b> <b>Summative assessment: Test, Practicals and Quiz</b></p>			
Mark	Minimum Form Assessment Mark for exam admission (%)	40%		
Structure:	% Formative Assessment Mark	60%		

	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory/Practical	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Environmental Management &amp; Toxicology</b>			<b>School:</b>	Science and Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020		
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>			

<b>Module code</b>	<b>EMT 302</b>				
<b>Module Name</b>	Pollution Monitoring Techniques and Control				
<b>Content:</b>	Waste: Identification and Classification, Techniques for water purification, Types of waste, Selecting technology. Air Pollution: factors affecting air pollution, methods for monitoring air pollution, improved technologies in reducing air pollution, measurement of air pollutants. Waste water treatment, Wastewater treatment principles, Wastewater treatment plants, Primary treatment, Secondary treatment and Tertiary treatment. Soil pollution, bioremediation techniques in soil. Noise Control, Noise Guidelines and Techniques.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Identify and classify different waste management techniques.</li> <li>List different factors affecting air pollution.</li> <li>Understand different methods of monitoring air pollution.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>	
	30		3	140503	
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
	SMU		Full		Year
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	3hours	1		30 hours
<b>Pre-requisite modules for this module:</b>	EMT 201 AND EMT 202				
<b>Co-requisites modules for module:</b>	No				
<b>Assessment</b>	<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Practical and Theoretical Assessment</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme.				
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: <ul style="list-style-type: none"> <li>Identify different methods for treating waste water</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Understand bioremediation techniques used for soil.</li> <li>List different methods for noise control and techniques.</li> </ul>				

<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>For the practicals students visit a company and understand various processes involve in monitoring pollutants. Students are expected to submit a report.</li> </ul> <b>Summative assessment:</b> Report on visit to Industrial Companies, Practical, Test and Quiz.			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)	40%			
	% Formative Assessment Mark	60%			
	% Summative Assessment Mark	40%			
	Minimum final mark to pass (%)	50%			
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory/Practical	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

**SECTION F: MODULAR INFORMATION REQUIRED**

<b>Department:</b>	<b>Environmental Management &amp; Toxicology</b>		<b>School:</b>	Science and Technology
<b>Last Revision date:</b>	2019	<b>First Year Offered (New):</b>	2020	
<b>Replace this Module existing module(s)?</b>	<b>No</b>	<b>If YES, give the module codes:</b>		

<b>Module code</b>	<b>EMT 303</b>		
<b>Module Name</b>	Natural Resources Management		
<b>Content:</b>	<p>Natural resources types and origin, environment, resource and development; rational use of resources and concept of sustainable development. Classification of resources, Survey of resources within the ecological regions of South Africa (Earth Minerals, Water resources, Forest resources, etc) Management of forests, grazing, lands, soils, foods, minerals, etc. Community resource development, population and pressure on resource utilization, administration and management of natural resources in South Africa. Resource economics and management. Environmental conservation – Protection of nature and conservation of species. Conservation of agricultural landscape. Case studies concerned with concepts of balanced approach to natural resources management. Development of planning and management principles of natural resources and ecosystem subject to increasing development processes.. Current uses and potentials of South African resources. Links between the resources of the Earth, Approaches to resources management concept, Resources utilization and sustainability. Waste minimization in resources utilization. Techniques for resources processing and value-adding.</p>		
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Identify different natural resources in South Africa.</li> <li>Describe different ways of managing natural resources.</li> <li>Understand the impact of population growth on natural resources.</li> <li></li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
	30	3	131207
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>	<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>

		SMU		Full		Year	
Periods per week:		Classes	Practical's	Tutorial	Seminars	Independent Learning	
		5	3 hours	1		40 hours	
Pre-requisite modules for this module:		EMT 201 and EMT 202					
Co-requisites modules for module:		No					
Assessment		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme.					
Assessment criteria: (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Describe different ways of conserving natural resources</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Understand current use and potential use of natural resources.</li> <li>Understand the techniques involved in resource processing and utilization.</li> </ul>					
Assessment methods		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>For the practicals students attend visit a natural game reserve and understand various management practices.</li> </ul> <b>Summative assessment:</b>					
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)				40%		
		% Formative Assessment Mark			60%		
		% Summative Assessment Mark			40%		
	Minimum final mark to pass (%)				50%		
Summative Assessment Paper:			<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory/Practical		Theory/Practical	N/A	N/A	N/A	
	Duration		3hrs	N/A	N/A	N/A	
	% contribution to Summative Assessment Mark		100%	N/A	N/A	N/A	
	Sub minimum		40%	N/A	N/A	N/A	

CURRICULUM INFORMATION							
Department:	<b>Environmental Management &amp; Toxicology</b>				School:	Science and Technology	
Last Revision date:	2019			First Year Offered (New):	2020		
Replace this Module existing module(s)?	No			If YES, give the module codes:			

Module code	<b>EMT 304</b>
Module Name	Environmental Education
Content:	Environmental Management and Assessment: Our planet, The need for environmental sustainability, Environmental legislation, Environmental Management Systems (EMS), Environmental impact assessment, Strategic environmental assessment, Environmental audit, Cost benefit analysis, Life cycle assessment, Clean technology, Environmental risk management, Sustainable development; Health and safety policies in industries and work environments, Strategies and objectives. Socio Political factors involves in environmental management, Environmental Administration in South Africa.

<b>Learning Outcomes:</b>		<ul style="list-style-type: none"> <li>Describe basic environmental management principles.</li> <li>Understand and describe the steps involves in EIA.</li> <li>Analyse some socio political factors involve in environmental management.</li> </ul>			
<b>Module Information:</b>		<b>SAQA Credits</b>		<b>ITS Course Level</b>	<b>CESM Code (3<sup>rd</sup> Order) (Six Numbers)</b>
		30		3	131205
<b>Delivery Information:</b>		<b>Campus</b>		<b>Full/Part Time</b>	<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>
		SMU		Full	Year
<b>Periods per week:</b>		<b>Classes</b>	<b>Practical's</b>	<b>Tutorial</b>	<b>Seminars</b>
		5	3 hours	1	
<b>Pre-requisite modules for this module:</b>		EMT 201 and 202			
<b>Co-requisites modules for module:</b>		No			
<b>Assessment</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Practical and Theoretical Assessment</li> <li>Draft Portfolio of Environmental Science Theory and Practice assessed mid-year.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme.			
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand different concepts in environmental legislation.</li> <li>Understand the need for environmental sustainability.</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Explain various methods of environmental administration in South Africa.</li> </ul>			
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment.</li> <li>For the practicals students attend will visit a nearby community and discuss issues around environmental management. Student will submit a report on the attitude and feelings towards environmental mangement</li> </ul> <b>Summative assessment:</b>			
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%		
		% Formative Assessment Mark	60%		
		% Summative Assessment Mark	40%		
	Minimum final mark to pass (%)		50%		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory/Practical	N/A	N/A	N/A
	Duration	3hrs	N/A	N/A	N/A
	% contribution to Summative Assessment Mark	100%	N/A	N/A	N/A
	Sub minimum	40%	N/A	N/A	N/A

# DEPARTMENT: LANGUAGE PROFICIENCY

CURRICULUM INFORMATION			
<b>Department:</b>	Language Proficiency		<b>School:</b> Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	N/A

<b>Module Code:</b>	<b>MHEL000</b>				
<b>Module Name:</b>	Health Education and Life Competencies I				
<b>Module Content:</b>	Respect for all forms of life Sexual health Safety in my environment Successful scientific communication Successful study skills Computer literacy				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• List different life forms, list differences between humans and explain how to have respect for all living things</li> <li>• Know the basic male and female reproductive structure and function</li> <li>• Shortly describe pregnancy and human development</li> <li>• List and compare the effectiveness of different methods of contraception</li> <li>• Explain what safe sex is and why it is important</li> <li>• Know the importance of family planning</li> </ul>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Know the rights and responsibilities with regard to his/her own body</li> <li>• List different types of abuse, define rape and shortly discuss the causes and the health and social effects of abuse and rape</li> <li>• Know how to ensure safety at home, in the laboratory and in the future place of work</li> <li>• Know some aspects of the South African Occupational Health and Safety Act</li> <li>• Know how to plan for his/her future, including financial responsibilities</li> <li>• Know how to take notes and study effectively</li> <li>• Find good quality scientific information on a variety of topics</li> <li>• Write short notes on scientific topics</li> <li>• Understand plagiarism, its consequences and how to reference in a correct way</li> <li>• Organize &amp; manage activities &amp; observations</li> <li>• Identify &amp; solve problems using critical &amp; creative thinking</li> <li>• Work effectively as a member of a group</li> <li>• Collect, analyse &amp; organise information</li> <li>• Communicate effectively using scientific language skills in written form and in presentations</li> <li>• Know how to access good scientific information using the internet</li> <li>• Know how to use MS Word to type documents</li> <li>• Be able to compile factual, scientific documents using a computer</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		
	12		2		
			<b>CESM Code (3<sup>rd</sup> Order)</b>		
			091305		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min.	1 x 3 h	1	0	2 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory and practical assessments at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%)				
	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final Mark			% Summative Assessment Mark	<b>60</b>

<b>Assessment Weighting:</b>	% Summative Assessment Mark			<b>40</b>	
	Min Final Assessment mark to pass (%)			<b>50</b>	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Practical	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

<b>CURRICULUM INFORMATION</b>					
<b>Department:</b>	<b>Language Proficiency</b>			<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011			<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No			<b>If YES, give the module codes:</b>	N/A

<b>Module Code:</b>	<b>MHEB012</b>
<b>Module Name:</b>	Health Education and Life Competencies II
<b>Module Content:</b>	Sexual health Healthy lifestyle My environment influences my health The scientific method Successful scientific communication Information literacy
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Define infertility, list different causes of infertility and shortly explain how it can be treated</li> <li>• Know what abortion is, and understand the consequences of abortions</li> <li>• List and distinguish between different types of sexual orientation</li> <li>• Define sexually transmitted diseases, list some examples of sexually transmitted diseases and shortly explain the signs and symptoms of these diseases</li> <li>• Explain the effects of HIV on the community and the country</li> <li>• Write short notes on practical advice to living with HIV</li> <li>• Know the importance of being examined for sexually transmitted diseases and what such an examination consists of</li> <li>• Describe the importance of a healthy lifestyle</li> <li>• Know the importance of following a healthy diet and explain what a healthy diet consist of</li> <li>• List and discuss the effects of smoking, alcohol abuse and substance abuse</li> <li>• Understand the importance of exercise and know how often, and which types of exercise to do.</li> <li>• Write short notes on the effects of exposure to sunlight, air pollution and water pollution on the human body</li> <li>• Know what radiation is, list some sources of radiation and shortly describe the effects of radiation on the human body</li> <li>• Review and discuss the scientific method</li> <li>• Find good quality scientific information on a variety of topics</li> <li>• Write short notes on scientific topics</li> <li>• Create slide shows using MS PowerPoint and be able to present such slide shows in class</li> </ul>

<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Create tables and graphs from scientific data using MS Exell</li> <li>• Be able to create and interpret tables and graphs depicting scientific information</li> <li>• Organize &amp; manage activities &amp; observations</li> <li>• Identify &amp; solve problems using critical &amp; creative thinking</li> <li>• Work effectively as a member of a group</li> <li>• Collect, analyze &amp; organize information</li> <li>• Communicate effectively using scientific language skills in written form and in presentations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		2		091305
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	1	0	2 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory and practical assessments (40%)				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

### CURRICULUM INFORMATION

<b>Department:</b> Language Proficiency	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b> N/A

<b>Module Code:</b>	<b>MHEL011</b>
<b>Module Name:</b>	Health Education and Life Competencies I
<b>Module Content:</b>	Respect for all forms of life Sexual health Safety in my environment Successful scientific communication Successful study skills
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• List different life forms, list differences between humans and explain how to have respect for all living things</li> <li>• Know the basic male and female reproductive structure and function</li> <li>• Shortly describe pregnancy and human development</li> <li>• List and compare the effectiveness of different methods of contraception</li> <li>• Explain what safe sex is and why it is important</li> <li>• Know the importance of family planning</li> </ul>

<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Know the rights and responsibilities with regard to his/her own body</li> <li>• List different types of abuse, define rape and shortly discuss the causes and the health and social effects of abuse and rape</li> <li>• Know how to ensure safety at home, in the laboratory and in the future place of work</li> <li>• Know some aspects of the South African Occupational Health and Safety Act</li> <li>• Know how to plan for his/her future, including financial responsibilities</li> <li>• Know how to take notes and study effectively</li> <li>• Find good quality scientific information on a variety of topics</li> <li>• Write short notes on scientific topics</li> <li>• Understand plagiarism, its consequences and how to reference in a correct way</li> <li>• Organize &amp; manage activities &amp; observations</li> <li>• Identify &amp; solve problems using critical &amp; creative thinking</li> <li>• Work effectively as a member of a group</li> <li>• Collect, analyse &amp; organise information</li> <li>• Communicate effectively using scientific language skills in written form and in presentations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		2		091305
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	1	0	2 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory and practical assessments at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%)				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Practical	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Language Proficiency</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	N/A

<b>Module Code:</b>	<b>MHEL012</b>
<b>Module Name:</b>	Health Education and Life Competencies II
<b>Module Content:</b>	Sexual health Healthy lifestyle My environment influences my health The scientific method Successful scientific communication

<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Define infertility, list different causes of infertility and shortly explain how it can be treated</li> <li>• Know what abortion is, and understand the consequences of abortions</li> <li>• List and distinguish between different types of sexual orientation</li> <li>• Define sexually transmitted diseases, list some examples of sexually transmitted diseases and shortly explain the signs and symptoms of these diseases</li> <li>• Explain the effects of HIV on the community and the country</li> <li>• Write short notes on practical advice to living with HIV</li> <li>• Know the importance of being examined for sexually transmitted diseases and what such an examination consists of</li> <li>• Describe the importance of a healthy lifestyle</li> <li>• Know the importance of following a healthy diet and explain what a healthy diet consist of</li> <li>• List and discuss the effects of smoking, alcohol abuse and substance abuse</li> <li>• Understand the importance of exercise and know how often, and which types of exercise to do.</li> <li>• Write short notes on the effects of exposure to sunlight, air pollution and water pollution on the human body</li> <li>• Know what radiation is, list some sources of radiation and shortly describe the effects of radiation on the human body</li> <li>• Review and discuss the scientific method</li> <li>• Find good quality scientific information on a variety of topics</li> <li>• Write short notes on scientific topics</li> <li>• Be able to create and interpret tables and graphs depicting scientific information</li> <li>• Organize &amp; manage activities &amp; observations</li> <li>• Identify &amp; solve problems using critical &amp; creative thinking</li> <li>• Work effectively as a member of a group</li> <li>• Collect, analyse &amp; organize information</li> <li>• Communicate effectively using scientific language skills in written form and in presentations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		2		091305
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	1	0	2 hrs
<b>Pre-requisite modules:</b>	None				
<b>Co-requisites modules :</b>	None				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory and practical assessments (40%)				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark	<b>60</b>	
			% Summative Assessment Mark	<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Practical	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

<b>Module Information:</b>		<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order (Six Numbers))</b>		
		20		2		131205		
<b>Delivery Information:</b>		<b>Campus</b>			<b>Full/Part Time</b>		<b>Period Year/1<sup>st</sup>/2<sup>nd</sup> Semester</b>	
		SMU			Contact		Year	
<b>Periods per week:</b>		<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>		
		5	3 hours	1		30 hours		
<b>Pre-requisite modules for this module:</b>		MZOO011, MZOO012, MCHM011, MCHM012						
<b>Co-requisites modules for module:</b>		No						
<b>Assessment</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> </ul> <b>Summative assessment:</b> Test, Quiz and Practicals.						
<b>Assessment criteria</b> (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: <ul style="list-style-type: none"> <li>Understand and describe ecological aspects of biodegradation</li> <li>Understand and describe the role of microorganisms in water pollution and treatment.</li> </ul> Specific educational outcome 2: <ul style="list-style-type: none"> <li>Understand and describe water quality testing and purification technology</li> </ul>						
<b>Assessment methods</b>		<b>Formative assessment:</b> <ul style="list-style-type: none"> <li>Theoretical and Practical Assessment</li> <li>For the practicals students will write a practical exam and submit a report on research carried out during the course.</li> </ul> <b>Summative assessment:</b> Final Portfolio of Environmental Science Theory and Practice assessed at end of programme. Final portfolio contains completed pre- and post-module questionnaires, Blackboard assessment results, and practice certificates for Modules 6 to 11.						
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)		40%					
	% Formative Assessment Mark		60%					
	% Summative Assessment Mark		40%					
	Minimum final mark to pass (%)		50%					
<b>Summative Assessment Paper:</b>			<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>		
	Theory/Practical		Theory/Practical	N/A	N/A	N/A		
	Duration		3hrs	N/A	N/A	N/A		
	% contribution to Summative Assessment Mark		100%	N/A	N/A	N/A		
	Sub minimum		40%	N/A	N/A	N/A		

# DEPARTMENT : MATHEMATICS & APPLIED MATHEMATICS

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	MATH101, FMH010M

<b>Module Code:</b>	<b>MMTH000</b>				
<b>Module Name:</b>	Elementary set theory, Linear and Introductory Abstract Algebra and Elementary Statistics				
<b>Module Content:</b>	Binary operations (commutative, associative & distributive laws), Mathematical symbols (brackets, equal etc), Fractions, Powers, Estimation & Proportions; Exponents & Logarithms; Expansions & Factors; Equations & Inequalities; Functions & Graphs (of Linear, exponential, quadratic, cubic, hyperbolic); Trigonometric functions and trigonometric identities, Trigonometric equations and solving triangles; signs; Elementary Set Theory, Relations and Inequalities, Mathematical Induction, Complex Numbers, Symbolic Logic, Binomial Theorem, Boolean Algebra, Matrix Algebra and Systems of Linear Equations; Elementary probability theory, Counting technique: Permutations & Combinations, Binomial & normal distribution.				
<b>Learning Outcomes:</b>	At the end of the module a student should have knowledge of Elementary Set Theory, knowledge of different types of relations, identify different types functions, be able to solve systems of linear equations using different methods where possible, to work with complex numbers, use Binomial Theorem, understand symbolic logic and recognize group structures. A student should also <ul style="list-style-type: none"> <li>• be able to define &amp; calculate probability;</li> <li>• have a basic understanding of binomial &amp; normal distribution;</li> <li>• be able to solve problems based on permutations &amp; combinations.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	24		3		150101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	6 x 45 min	0	1 x 3 hrs	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The theory and practical mark of 40% is mandatory for a student to qualify for the final examination. The module mark is calculated at 10% of the quizzes, 30% of the tests and 20% of the practical mark. The final mark will be derived from a three-hour written examination and the module mark in the ratio 2:3				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> AMAT101

<b>Module Code:</b>	<b>MAPM011</b>				
<b>Module Name:</b>	Introduction To Applied Mathematics				
<b>Module Content:</b>	Vectors and Scalar quantities; Newton's laws of motion, Falling bodies and Projectiles; Harmonic Oscillators, Central force and Planetary motion; System of Particles, Plane motion of Rigid bodies, Space motion of rigid bodies. Simple interest, simple discount, compound interest, annuities and amortisation.				
<b>Learning Outcomes:</b>	At the end of the module students should be able to: <ul style="list-style-type: none"> <li>• Know how to add and subtract two vectors and also know how to combine two vectors using dot and cross product.</li> <li>• Differentiate vector functions.</li> <li>• Integrate vector functions.</li> <li>• Solve some mechanics problems using the concept of vector calculus.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	3	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	MMTH011 and MMTH012				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative theory assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> AMAT102

<b>Module Code:</b>	<b>MAPM012</b>
<b>Module Name:</b>	Computational Mathematics and Mathematical Modelling
<b>Module Content:</b>	Computational Mathematics: Introduction to Maple software; Algebraic computation and computer programming and errors; Numerical solution of linear systems; Roots of non-linear equations; Curve fitting. Mathematical Modelling: Ideal of modeling; Some straight forward examples; Translating models into mathematics; modelling linear systems; Study of typical behaviours, i.e. exponential, sinusoidal, etc; Discrete models; First order difference equations; Cobweb diagrams; First order differential equations models

<b>Learning Outcomes:</b>	At the end of the module, learners should be able to: <ul style="list-style-type: none"> <li>• Perform some algebraic computations, that is, mathematical operations in base 2, 8, 10 and 16.</li> <li>• Determine errors arising from some approximations, that is, find relative errors and absolute percentage errors.</li> <li>• Find roots of non-linear equations using Bisection method, Fixed point method, Newton-Rophson method and the method of False Position.</li> <li>• Find numerical solutions to linear systems.</li> <li>• Use Maple software to analyse some simple mathematical problems, that is, solve linear systems, and perform differentiation and integration, plotting graphs of some functions and curve fitting.</li> <li>• Define concepts in Mathematical Modelling.</li> <li>• Identify a real life problem and translate it into a mathematical model, state assumptions considered in the development of the model.</li> <li>• Model change with difference equations.</li> <li>• Solve simple mathematical modeling problems in the context of dynamical systems.</li> <li>• Graph solutions of some simple first order Differential Equations.</li> <li>• Analyse a simple dynamical system of interacting species.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b> 12		<b>ITS Course Level Code</b> 3		<b>CESM Code (3<sup>rd</sup> Order)</b> 150201
<b>Periods per week:</b>	<b>Classes</b> 5	<b>Practicals</b> 0	<b>Tutorial</b> 3	<b>Seminars</b> 0	<b>Independent Learning</b> 4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH011 and MMTH012				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

<b>CURRICULUM INFORMATION</b>	
<b>Department:</b> <b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> AMAT201

<b>Module Code:</b>	<b>MAPA021</b>
<b>Module Name:</b>	Ordinary and Partial Differential Equations
<b>Model Content:</b>	General introduction to differential equations; Classification of ODE's: first, second and higher order linear ODE's; Methods of solutions; Power series method; Laplace transforms and applications; Classification of Partial differential equations into elliptic, hyperbolic and parabolic equations and their methods of solutions and application in science and engineering.

<b>Learning Outcomes:</b>	At the end of the module students should be able to: <ul style="list-style-type: none"> <li>• Define ODEs and PDEs and differentiate between the two.</li> <li>• Distinguish between linear and non-linear ODEs.</li> <li>• Differentiate between the order and the degree of ODEs and PDEs.</li> <li>• Solve first order ODEs using the following methods/techniques: separation of variables, integrating factor, Bernoulli, exact.</li> <li>• Define linear dependence and linear independence.</li> <li>• Determine if two functions are linearly dependent or linearly independent.</li> <li>• Solve second order ODEs using the following methods: undetermined coefficients and variation of parameters.</li> <li>• Define a Laplace Transform.</li> <li>• Derive elementary Laplace transforms formulas.</li> <li>• Use Laplace transforms to solve boundary value problems.</li> <li>• Use the properties of Laplace transforms to first n-th order ODEs.</li> <li>• Differentiate between parabolic, hyperbolic and elliptic PDEs.</li> <li>• Use the Fourier series separation of variables and the method of characteristics to solve PDEs.</li> <li>• Identify odd and even functions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	3	0	6
<b>Pre-requisite module/s:</b>	MAPM011, MAPM012, MMTH011, MMTH012				
<b>Co-requisites module/s:</b>	MMTA021				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	AMAT202

<b>Module Code:</b>	<b>MAPA022</b>
<b>Module Name:</b>	Numerical Analysis
<b>Module Content:</b>	Numbers and errors; Root finding for single non-linear equations; Interpolation and approximation; Limitation of polynomial interpolation; Numerical integration and differentiation; Numerical solution of systems of linear equations; Numerical solution of initial value problems and boundary value problems.; Eigenvalue problems, the largest eigenvalue in magnitude by power method; Eigenvalues and eigenvectors of symmetric matrices; The LR- and QR-algorithms; Errors in computed eigenvalues and eigenvectors, etc

<b>Learning Outcomes:</b>	At the end of the module, a learner will be able to: <ul style="list-style-type: none"> <li>• Solve differential equations using Taylor's method, Euler's method, Improved Euler's method, Runge-Kutta method, Adam's method and Milner's method.</li> <li>• Apply the power method to solve linear equations.</li> <li>• Describe and apply the LR- and QR- algorithms to solve problems.</li> <li>• Explain and apply Numerical Integration to solve integral problems.</li> <li>• Explain and apply Numerical Differentiation to solve differential problems.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	0	2 x 1¼ Hours	0	6
<b>Pre-requisite module/s:</b>	MMTH011, MMTH012, MAPM011, MAPM012				
<b>Co-requisites module/s:</b>	MMTA022				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	AMAT301

<b>Module Code:</b>	<b>MAPA031</b>
<b>Module Name:</b>	Fluid Mechanincs
<b>Model Content:</b>	<p><b>Part 1:</b> Fluid motion description; Streaklines; Eulerian and Lagrangian descriptions; Hydrodynamic and Euler's equations; Bernoulli's equations and their application; Stream function; some elementary flows; Potential flows; Vortex dynamics; Kelvin theorem, etc.</p> <p><b>Part 2:</b> Constitutive equations; Continuity equations; Navier-Stokes equations; Vorticity Transport equations; Energy equation, etc; Couette flow; Poiseuille flow; Flow between two rotating cylinders, etc; Boundary layer equations; Von-Karman equations, etc.</p>

<b>Learning Outcomes:</b>	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>• Understand and distinguish between Fluid motion, Streaklines, Eulerian, Lagrangian.</li> <li>• Understand Hydrodynamic and Euler's equations.</li> <li>• Understand and apply Bernoulli equations.</li> <li>• Understand stream function, some elementary flows; Potential flows; Vortex dynamics; Kelvin theorem and related theorems.</li> <li>• Understand and distinguish between Constitutive equations; Continuity equations; Navier-Stokes equations; Vorticity Transport equations; Energy equations, Boundary layer equations; Von-Karman equations and related equations..</li> <li>• Understand and distinguish between Couette flow; Poiseuille flow; Flow between two rotating cylinders, and related flows.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	32		3		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	0	0	8
<b>Pre-requisite module/s:</b>	MMTA021, MMTA022, MAPA021, MAPA022				
<b>Co-requisite module/s:</b>	MAPA032				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	AMAT302

<b>Module Code:</b>	<b>MAPA302</b>
<b>Module Name:</b>	Mathematical Theory of Electromagnetism and Special Theory of Relativity
<b>Module Content:</b>	<b>Mathematical Theory of Electromagnetism:</b> Newton's laws of motion; Lorentz transformation; Minkowski space-time, Length contraction, Time dilatation; Spacelike and timelike intervals; Light cones, Velocity, acceleration and momentum; Minkowski law of force; Energy and mass; Momentum and energy. <b>Special Relativity:</b> Classical electrodynamics; Maxwell's equations; Continuity equations; Gauge invariance of electromagnetic field; Variation principles in field theory; Euler-Lagrange's equations; Maxwell's equation in 4-dimensional Minkowski space; Equations of motion; Lagrangian for a charged field and Equations of motion derived from variational methods.

<b>Learning Outcomes:</b>	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>Understand and apply Newton's laws of motion, Lorentz transformation; Minkowski space-time, Length contraction, Time dilatation; Spacelike and timelike intervals; Light cones, Velocity, acceleration and momentum; Minkowski law of force; Energy and mass; Momentum and energy</li> <li>Understand and apply Classical electrodynamics; Maxwell's equations; Continuity equations; Gauge invariance of electromagnetic field; Variation principles in field theory; Euler-Lagrange's equations; Maxwell's equation in 4-dimensional Minkowski space; Equations of motion; Lagrangian for a charged field and Equations of motion derived from variational methods.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	32		3		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	0	0	8
<b>Pre-requisite module/s:</b>	MMTA021, MMTA022, MAPA021,MAPA022				
<b>Co-requisites module/s:</b>	MAPA031				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				40
	Final mark =		% Summative Assess Mark		60
			% Summative Assess Mark		40
	Min Final Assessment mark to pass (%)				50
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	AMAT302

<b>Module Code:</b>	<b>MMTH011</b>				
<b>Module Name:</b>	Differential and Integral Calculus				
<b>Content:</b>	Limits, Continuity, Derivatives and Integration				
<b>Learning Outcomes:</b>	At the end of the module students should be able to: <ul style="list-style-type: none"> <li>Evaluate limits with ease</li> <li>Understand the continuity of a function</li> <li>Differentiate a wide range of functions</li> <li>Find extreme values of functions and sketch curves</li> <li>Integrate a wide range of functions</li> <li>Find the area between two curves in the xy-plane</li> <li>Solve simple ordinary differential equations</li> <li>Calculate the arc length for a wide range of curves</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	6 x 45 min	0	1 x 3 hrs	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 3:2 respectively, to get the final mark. There will be a supplementary assessment				

<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)		<b>40</b>		
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)		<b>50</b>		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

<b>CURRICULUM INFORMATION</b>	
<b>Department:</b> <b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MMTH012</b>				
<b>Module Name:</b>	Elementary Set Theory, Linear and Introductory Abstract Algebra				
<b>Content:</b>	Complex Numbers, Symbolic Logic, Binomial Theorem, Boolean Algebra, Matrix Algebra and Systems of Linear Equations				
<b>Learning Outcomes:</b>	Students should be able to solve systems of linear equations using different methods where possible, to work with complex numbers, use Binomial Theorem, understand symbolic logic and recognize group structures				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	6 x 45 min	0	1 x 3 Hours	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 3:2 respectively, to get the final mark. There will be a supplementary assessment				
<b>Assessment Weighting:</b>	Min Summative Assessments mark for exam admission (%)		<b>40</b>		
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)		<b>50</b>		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/ Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> MATH201

<b>Module Code:</b>	<b>MMTA021</b>				
<b>Module Name:</b>	Advanced Calculus				
<b>Module Content:</b>	Improper Integrals and L'Hôpital's Rules; Definitions and Properties of Infinite Sequences; Infinite Series; Tests for Convergence and Divergence for Series with Positive terms; Alternating Series; Absolute Convergence; Power Series; Convergence of Power Series; Taylor and Maclaurin series; Differential Calculus of Functions of several variables; Distance between two points in $R^n$ ; Partial Derivatives; Limits and Continuity; Multiple Integrals; Definition of Double Integral; Evaluation of Double Integral as an Iterated Integral; Fubini's Theorem; Change of Variables; Jacobian of the transformation; Double Integrals in Polar Form; Triple Integrals; Line Integrals; The Fundamental Theorem for Line Integrals; Green's Theorem; Stokes's Theorem; Hyperbolic Functions; Definitions and Identities; Derivatives and Integrals; Inverse Hyperbolic Functions; Ordinary Differential Equations; First Order Differential Equations; Linear (higher order) homogeneous and non-homogeneous differential equations with constant coefficients; Use of the variation of parameters.				
<b>Learning Outcomes:</b>	<p>At the end of the module a student should be able to:</p> <ul style="list-style-type: none"> <li>• Apply L'Hopital's rules for a wide range of limits.</li> <li>• Apply the various tests of convergence to a wide range of infinite series.</li> <li>• Evaluate the Taylor series of a wide range of functions.</li> <li>• Evaluate multiple integrals and partial derivatives for a wide range of functions.</li> <li>• Evaluate first and second order linear homogeneous and non-homogeneous differential equations.</li> <li>• Handle complex functions with the same ease as real functions.</li> <li>• Differentiate and integrate Hyperbolic and inverse hyperbolic functions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	3		150101	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1 hour	0	6
<b>Pre-requisite module/s:</b>	MMTH011				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	MATH212

<b>Module Code:</b>	<b>MMTA022</b>				
<b>Module Name:</b>	Linear Algebra				
<b>Content:</b>	General Vector Spaces; Examples of Concrete vector spaces; Vector Space Properties; Linear independence, Spanning sets and Bases; Sub Spaces; Inner Product Spaces and Orthogonal Bases; Linear transformations: Matrix representations; Properties of linear transformations; Change of basis; Linear problems; The Eigenvalue Problem; The Characteristic Polynomial and Eigenvalues; The Hamilton- Cayley Theorem; Eigenvectors and Eigenspaces; Similarity Transformations and Diagonalization; Symmetric Matrices, Bilinear and Quadratic Forms; Linear Functionals; Dual Spaces; Bases for dual spaces; Annihilators.				
<b>Learning Outcomes:</b>	<p>At the end of the module a student should be able to:</p> <ul style="list-style-type: none"> <li>• Handle the abstract concepts of vector space properties and linear transformations with confidence.</li> <li>• Find a matrix representing a linear transformation relative to any set of given bases.</li> <li>• Find bases for null space and range of a linear transformation.</li> <li>• Solve eigenvalue problems and diagonalize a given square matrix.</li> <li>• Determine an orthogonal bases for an inner product space using the Gramm-Schmidt process.</li> <li>• Find the matrix representing a quadratic and bilinear form.</li> <li>• Find bases for dual spaces and annihilators of subspaces.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		150102
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1 hour	0	6
<b>Pre-requisite module/s:</b>	MMTH012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assess Mark	<b>60</b>
				% Summative Assess Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Mathematics and Applied Mathematics</b>	School: Science & Technology
Last Revision date: New	First Year Offered (New): 2019 (First Semester)
Replace this Module existing module(s) No	If YES, give the module codes:

Module Code:	<b>MMTA023</b>				
Module Name:	Calculus II A (for non- Mathematics students)				
Module Content:	Infinite sequence and Series of real numbers, Vector Calculus; Partial Derivatives, Evaluation of Double Integral, Double Integrals in Polar Form, Line Integrals, Fundamental Theorem for Line Integrals; Differential Equations.				
Learning Outcomes:	<p>At the end of the module students should be able to:</p> <ul style="list-style-type: none"> <li>• Apply various tests of convergence for sequences and series.</li> <li>• Differentiate functions of two and three variables.</li> <li>• Evaluate multiple integrals for a wide range of functions.</li> <li>• Evaluate line integrals of vector fields.</li> <li>• Understand the relationship between a line integral around a simple closed curve and a double integral over the region bounded by the curve.</li> <li>• Apply Green's theorem and Stoke's Theorem</li> <li>• Evaluate first order linear differential equations.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3 <sup>rd</sup> Order)
	12		3		150101
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5 x 40 min		4x40min	0	6 hrs
Pre-requisite module/s:	MMTH011				
Co-requisite module/s:	None				
Assessment Methods:	Continous formative assessment based on Quizzes, Tutorials, Assignments and Tests. Summative assessment will be done at the end of the module				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Formative Assessments Mark		<b>60</b>
			% Summative Assessments Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
Summative Assessment Paper:		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> New	<b>First Year Offered (New):</b> 2019 (Second Semester)
<b>Replace this Module existing module(s)?</b>	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MMTA024</b>				
<b>Module Name:</b>	Linear Algebra IIA (for non-Mathematics students)				
<b>Module Content:</b>	Vector Analysis: Basic laws of vector Algebra, orthogonal co-ordinate systems, co-ordinate transformations, gradient of a scalar field; General Vector spaces: Examples of concrete vector spaces, vector space properties; Linear independence, Spanning sets and Bases; Sub Spaces; Inner Products spaces and Orthogonal Bases; Linear transformations: Matrix representations; Properties of linear transformations; Change of bases; Linear problems; The Eigenvalue Problem; The Characteristic polynomial and Eigenvalues; The Hamilton-Cayley Theorem				
<b>Learning Outcomes:</b>	<p>After successfully completing the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the equality of vectors, vector addition, subtraction and multiplication</li> <li>• Know and understand position distance of vectors and scalar and vector triple products</li> <li>• Understand Cartesian, cylindrical and spherical co-ordinates</li> <li>• Distinguished and understand Cartesian to Cylindrical, Spherical Transformations</li> <li>• To apply gradient operator in Cylindrical and spherical coordinates</li> <li>• Understand properties of the gradient operators</li> <li>• Handle the abstract concepts of vector space properties and linear transformations with confidence</li> <li>• Find a matrix representing a linear transformation relative to any set of given bases</li> <li>• Find bases for null space and range of a linear transformation</li> <li>• Solve eigenvalue problem and diagonalize a given square matrix</li> <li>• Determine an orthogonal bases for an inner product space using the Gramm-Schmidt</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		150102
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5 x 40 min		3x40min	0	6 hrs
<b>Pre-requisite module/s:</b>	MMTH012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments and Tests. Summative assessment will be done at the end of the module				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Formative Assessments Mark			<b>60</b>
		% Summative Assessments Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Applied Mathematics</b>	School: Science & Technology
Last Revision date: New	First Year Offered (New): 2019 (First Semester)
Replace this Module existing module(s)?	If YES, give the module codes:

Module Code:	<b>MAPA033</b>				
Module Name:	Numerical Methods				
Content:	<b>Boundary Value Problem ODE:</b> Boundary Value Problem in ODE of higher order. <b>Boundary Value Problem PDE:</b> Finite Difference Method; Laplace and Poisson equation, Heat equation, wave equation. Finite element Method.				
Learning Outcomes:	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>• Compute numerical solutions of Ordinary Differential Equation. Also compute solution of systems ordinary differential equation</li> <li>• Understand finite difference method and apply it for solving parabolic and hyperbolic partial differential equations..</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3 <sup>rd</sup> Order)
	16		3		150201
Delivery Information:	SMU		Full		Period (1Sem)
	SMU		Contact-Full Time		1 <sup>st</sup> Semester
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	0	2	0	8
Pre-requisite modules for this module:	MMTA021, MMTA022, MAPA021, MAPA022				
Co-requisites modules for module:	MAPA031, MAPA032, MAPA034				
ASSESSMENT:					
Assessment Criteria:	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practicals and Tests. Summative assessment will be done at the end of the module.				
Assessment Methods:	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 3:2 respectively, to get the final mark. There will be a supplementary assessment.				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				40%
	Final mark =	% Formative Assess Mark			60%
		% Summative Assess Mark			40%
	Min Final Assessment mark to pass (%)				50%
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> New	<b>First Year Offered (New):</b> 2019 ( Second Semester)
<b>Replace this Module existing module(s)?</b>	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MAPA034</b>				
<b>Module Name:</b>	Introduction to Financial Mathematics				
<b>Content:</b>	Introduction to markets and instruments. Futures and options trading strategies, exotic options, arbitrage relationships, binomial option pricing method, Interest rates models, Mortgage backed securities				
<b>Learning Outcomes:</b>	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>• Understand some dynamics of financial markets and financial instruments.</li> <li>• Understand interest rates and bond markets</li> <li>• Price simple financial instruments.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>			<b>CESM Code (3<sup>rd</sup> Order)</b>
	16	3			150201
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period /2<sup>nd</sup>Sem</b>
	SMU		Contact-Full Time		2 <sup>nd</sup> Semester
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	2	0	8
<b>Pre-requisite modules for this module:</b>	MMTA021, MMTA022, MAPA021, MAPA022				
<b>Co-requisites modules for module:</b>	MAPA031, MAPA032, MAPA033				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 3:2 respectively, to get the final mark. There will be a supplementary assessment.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				40%
	Final mark =	% Formative Assess Mark			60%
		% Summative Assess Mark			40%
	Min Final Assessment mark to pass (%)				50%
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> MATH341

<b>Module Code:</b>	<b>MMTA031</b>				
<b>Module Name:</b>	Mathematical Analysis I				
<b>Content:</b>	Series and sequences of functions; The Riemann-Stieljes integrals; Metric Spaces (introduction and examples); Normed and Inner Product Spaces; Complete Spaces.				
<b>Learning Outcomes:</b>	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>Identify and give examples of sequences and series of functions.</li> <li>State and use/apply different convergence criteria to determine the convergence or divergence of sequences or series of functions.</li> <li>Define and identify a metric/inner/normed space.</li> <li>Define and use the concepts of open and closed sets.</li> <li>Define and give examples of complete metric spaces.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	16	3		150103	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1	0	8
<b>Pre-requisite module/s:</b>	MMTA021				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> MATH351
<b>Module Code:</b>	<b>MMTB031</b>
<b>Module Name:</b>	Abstract Algebra
<b>Module Content:</b>	Groups; Definition and properties of Groups; Subgroups; Cyclic and permutation groups; Cosets and Lagrange's Theorem; External and Internal Direct Products; Isomorphisms and homomorphisms; Normal subgroups and Factor groups; Rings and Fields; Definitions and examples; Integral Domains; Ideals and Factor rings; Ring Homomorphisms; Prime and Maximal Ideals; Rings of polynomials; Definition, properties and examples; Factorization of polynomials over a field; Unique Factorization and Euclidean Domains, Extension Fields, Algebraic and Transcendental elements ; Geometric Constructions.

<b>Learning Outcomes:</b>	At the end of the module a student should be able to: <ul style="list-style-type: none"> <li>• Write down a clear and coherent proof of a mathematical statement.</li> <li>• Identify various mathematical structures as groups or rings.</li> <li>• Identify various mathematical structures as unique factorization domains.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		150102
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1	0	8
<b>Pre-requisite module/s:</b>	MMTA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assess Mark		<b>60</b>
			% Summative Assess Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	MATH372

<b>Module Code:</b>	<b>MMTA032</b>				
<b>Module Name:</b>	Complex Analysis				
<b>Module Content:</b>	Complex numbers; Some topology of the set of complex numbers; Analytic and harmonic functions; Complex power series and elementary complex functions; Complex integrals; Curves and contours; Fundamental Theorem of Calculus; Estimation Theorem; Theory of holomorphic functions; Cauchy's theorem for a contour; Deformation theorem; Cauchy's Integral Formula; Liouville's and Morera's Theorem; Cauchy's Integral Formula for Derivatives; Representation of holomorphic functions by power series; Maximum Principle; Laurent's series; Residue Theory; Classification of singularities; Cauchy's Residue Theorem; Summation of series; Conformal mappings.				
<b>Learning Outcomes:</b>	A student at this level should be able to: <ul style="list-style-type: none"> <li>• Deal confidently with problems involving complex numbers.</li> <li>• Apply complex methods to solve complicated integrals.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		150101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1	0	8
<b>Pre-requisite module/s:</b>	MMTA021				
<b>Co-requisites module/s:</b>	MMTA031				
<b>Assessment Methods:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>

	Min Final Assessment mark to pass (%)	50			
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	<b>Mathematics and Applied Mathematics</b>		School: Science & Technology
Last Revision date:	2011		First Year Offered (New): 2013
Replace this Module existing module(s)?	Yes	If YES, give the module codes:	MATH382

Module Code:	<b>MMTB032</b>				
Module Name:	Mathematical Analysis Linear				
Module Content:	Continuity and homeomorphisms in metric spaces; Compactness in metric spaces; Connectedness in metric spaces; Differentiation in normed spaces.				
Learning Outcomes:	<p>A student at this level should be able to:</p> <ul style="list-style-type: none"> <li>Define and identify the concepts of continuity, compactness and connectedness.</li> <li>Define continuity on general metric spaces.</li> <li>Give examples on homeomorphisms.</li> <li>State and prove results on continuity, compactness and connectedness in general metric spaces and applications thereof.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3 <sup>rd</sup> Order)
	16		3		150103
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	0	1	0	8
Pre-requisite module/s:	MMTA021				
Co-requisites module/s:	MMTA031				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments and Tests. Summative assessment will be done at the end of the module.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				40
	Final mark =		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Min Final Assessment mark to pass (%)				50
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

# DEPARTMENT : PHYSICS

## CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> FPHS010

<b>Module Code:</b>	<b>MPHS000</b>				
<b>Module Name:</b>	Introduction to General Physics 1A				
<b>Module Content:</b>	<p><b>Measurements</b> – Physical quantities and vectors, scientific method, unit conversions, significant figures, measuring tools and uncertainty, operational definitions, proportional reasoning with mass and volume.</p> <p><b>Mechanics:</b> Frame of reference, mathematical and graphical representation of motions. Impulse and momentum, types of forces, Newton's laws, induced forces, forces in 2 dimensions, adding and resolving forces, rotational Motion, work, kinetic and potential energy, conditions for equilibrium.</p> <p><b>Energy and temperature</b> - Thermal interactions, mixing water, specific heat capacity, mixing other substances, phase transition, latent heat, proportional reasoning with energy and temperature, and energy transfer mechanisms.</p> <p><b>Properties of matter:</b> Elasticity, fluid Mechanics and Thermal Physics</p> <p><b>Modern Physics:</b> Atomic Structure and Nuclear Physics</p>				
<b>Learning Outcomes:</b>	<p>After successfully completing this module students should be able to:</p> <ul style="list-style-type: none"> <li>• Transfer learning from one context to another</li> <li>• Understand when a certain formula can be applied and when it cannot be applied.</li> <li>• Demonstrate an understanding of underlying ideas and concepts (the basic principles of physics)</li> <li>• Understand operational definitions of physics concepts</li> <li>• Do unit conversions</li> <li>• Understand the concept of uncertainty in measurements</li> <li>• Demonstrate basic laboratory skills</li> <li>• Analyse forces acting on an object and predict their effects.</li> <li>• State, explain and apply the laws of Newton in solving problems.</li> <li>• Differentiate between work, energy and power and be able to apply the three concepts in real-life situations</li> <li>• Define and show understanding of vector and scalar quantities, and differentiate between them.</li> <li>• Differentiate between heat and temperature</li> <li>• Discuss the atomic nuclei structure, atomic forces and nuclear energy</li> <li>• Carry out calculations involving the relationship between energy and mass loss for fission and fusion reactions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	24	03		140701	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hour
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous assessments: tests and assignments; Practical assessments. Summative assessment: one theory examination at the end of the year				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> FPHH010M

<b>Module Code:</b>	<b>MPHB000</b>				
<b>Module Name:</b>	Introduction to General Physics 1B				
<b>Module Content:</b>	<p><b>Electricity and Magnetism</b> – Electrostatics, charging process, charge distributions, potential difference, Ohm's law, resistors in parallel and series, internal resistance and Electromagnetism.</p> <p><b>Oscillations and Waves:</b> Simple Harmonic Motion, Mechanical Waves, Acoustics, Electromagnetic Waves</p> <p><b>Optics:</b> Nature and Propagation of Light and Geometrical Optics</p>				
<b>Learning Outcomes:</b>	<p>After taking this module students should be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate an understanding of underlying ideas and concepts of electricity</li> <li>• Define Coulomb's law and apply it for interaction of stationary charges</li> <li>• Know how to calculate work, energy and electric potential of a charge</li> <li>• Know how a capacitor works and solve circuits with capacitors connected in series and in parallel</li> <li>• Define correctly electric current and apply Ohm's law to emf and Kirchhoff circuits</li> <li>• Know the originality of magnetism and calculate current in different types of conductors</li> <li>• Understand the Hall Effect in metals and semiconductors</li> <li>• Understand Hooke's law and the oscillations in a simple pendulum</li> <li>• Differentiate between transverse and longitudinal waves</li> <li>• Understand the application of the Doppler Effect to sound</li> <li>• Understand the nature of light and know the difference between reflection and refraction</li> <li>• Understand how images are formed in mirrors, lenses and cameras</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	24	03		140701	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Continuous assessments: tests and assignments Summative assessment: one theory examination at the end of the year				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Physics</b>	School: Science & Technology
Last Revision date: 2011	First Year Offered (New): 2013
Replace this Module existing module(s)? No	If YES, give the module codes:

Module Code:	<b>MPHS011</b>			
Module Name:	General Physics 1A			
Module Content:	<b>Mechanics:</b> Units, Physical quantities and vectors, Kinematics, Dynamics, Statics, Work and Mechanical Energy, Impulse and momentum, and Rotational Motion <b>Properties of matter:</b> Elasticity, Fluid Mechanics and Thermal Physics <b>Modern Physics:</b> Atomic Structure and Nuclear Physics			
Learning Outcomes:	After successfully completing this module students should be able to: <ul style="list-style-type: none"> <li>• Use SI units of all physical quantities</li> <li>• Distinguish between fundamental and derived physical quantities</li> <li>• Measure mass, time, length and temperature</li> <li>• Define and classify vector and scalar quantities</li> <li>• Carry out calculations involving work done, potential energy, kinetic energy and power</li> <li>• Analysis of falling objects, thrown objects, projected objects</li> <li>• Discuss energy conservation</li> <li>• Explain the impulse and relate it to momentum</li> <li>• Carry out calculations involving density, mass and volume</li> <li>• Describe the principles of a method for measuring the density of air</li> <li>• Carry out calculations involving pressure, force, density, depth and area</li> <li>• Explain hydrostatic and hydrodynamic principles and discuss their applications</li> <li>• Explain temperature, heat and heat capacity</li> <li>• Discuss applications of heat flow and heat transfer</li> <li>• Discuss the atomic nuclei structure, atomic forces and nuclear energy</li> <li>• Carry out calculations involving the relationship between energy and mass loss for fission and fusion reactions</li> </ul>			
Module Information:	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	12		3	
Periods per Week:	<b>Classes</b>		<b>Practicals</b>	
	4 x 45 min		1 x 3 hrs	
Pre-requisite module/s:	<b>Tutorial</b>		<b>Seminars</b>	
	1 x 45 min			
Independent Learning	<b>Independent Learning</b>			
	2.4 hrs			
Pre-requisite module/s:	None			
Co-requisites module/s :	MMTH011			
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 x 3 hour written examination.			
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark	<b>60</b>
			% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
Summative Assessment Paper:	<b>Paper 1</b>		<b>Paper 2</b>	
	Theory/ Practical		Theory	
	Duration		3 hrs	
	Sub minimum		40%	
Summative Assessment Paper:	<b>Paper 3</b>		<b>Paper 4</b>	

## CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MPHS012</b>			
<b>Module Name:</b>	General Physics 1B			
<b>Module Content:</b>	<b>Electricity and Magnetism:</b> Electrostatics, Current electricity, Electromagnetism; <b>Oscillations and Waves:</b> Simple Harmonic Motion, Mechanical Waves, Acoustics, Electromagnetic Waves <b>Optics:</b> Nature and Propagation of Light and Geometrical Optics			
<b>Learning Outcomes:</b>	After taking this module student should be able to: <ul style="list-style-type: none"> <li>Define Coulomb's law and apply it for interaction of stationary charges</li> <li>Know how to calculate work, energy and electric potential of a charge</li> <li>Know how a capacitor works and solve circuits with capacitors connected in series and in parallel</li> <li>Define correctly electric current and apply Ohm's law to emf and Kirchhoff circuits</li> <li>Know the originality of magnetism and calculate current in different types of conductors</li> <li>Understand the Hall Effect in metals and semiconductors</li> <li>Understand Hooke's law and the oscillations in a simple pendulum</li> <li>Differentiate between transverse and longitudinal waves</li> <li>Understand the application of the Doppler Effect to sound</li> <li>Understand the nature of light and know the difference between reflection and refraction</li> <li>Understand how images are formed in mirrors, lenses and cameras</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	12		3	
<b>Periods per Week:</b>	<b>Classes</b>		<b>Tutorial</b>	<b>Independent Learning</b>
	4 x 45 min		1 x 45 min	2.4 hrs
<b>Pre-requisite module/s:</b>	None			
<b>Co-requisite module/s:</b>	MMTH012			
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 x 3 Hours written examination			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark	<b>60</b>
			% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory/ Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

CURRICULUM INFORMATION			
<b>Department:</b> Physics	<b>School:</b> Science & Technology		
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b>		2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b>		PHS201M

<b>Module Code:</b>	<b>MPHA021</b>				
<b>Module Name:</b>	<b>Classical Mechanics</b>				
<b>Module Content:</b>	Vector Analysis, Kinematics, Lagrangian and Hamiltonian mechanics, Central force motion, Oscillations and Rigid bodies.				
<b>Learning Outcomes:</b>	After completion of this module students are expected to: <ul style="list-style-type: none"> <li>• Use mathematical models to solve physical systems problems.</li> <li>• Solve real problems using ideal problems formulation.</li> <li>• Make a correlation between theoretical and practical nature of mechanics.</li> <li>• Solve and analyze rigid-body problems and problems in non-inertial frames.</li> <li>• Use Lagrangian and Hamiltonian mechanics to obtain the equations of motion for a variety of problems, including the use of generalized coordinates and cyclic coordinates.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	10		03		140799
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		2.6 hrs
<b>Pre-requisite module/s:</b>	MPHS011 and MPHS012				
<b>Co-requisite module/s:</b>	MMTH011				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Vector Analysis, Kinematics, Lagrangian and Hamiltonian mechanics, Central force motion, Oscillations and Rigid bodies.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS202

<b>Module Code:</b>	<b>MPHB021</b>				
<b>Module Name:</b>	Modern Physics				
<b>Module Content:</b>	Special and general relativity, Quantization of electromagnetic radiation, Wave-particle duality, Atomic Physics, Nuclear structure, Radioactivity, Nuclear reactions, Radiation and matter, and Elementary particles.				
<b>Learning Outcomes:</b>	After completing this module, students should be able to: <ul style="list-style-type: none"> <li>• Differentiate between Galilean Relativity and Special Relativity</li> <li>• Correctly calculate time dilation and length contraction effects</li> <li>• Perform Lorentz Transformations between reference frames</li> <li>• Describe where classical physics fails to explain aspects of, Atomic Spectra, Photoelectric Effect, Blackbody Radiation, Heat Capacities of Solids, Atomic Theory and Electrical Conduction</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	10		03		140799
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		2.6 hrs
<b>Pre-requisite module/s:</b>	MPHS011 and MPHS012				
<b>Co-requisite module/s:</b>	MMTH012				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Special and general relativity, Quantization of electromagnetic radiation, Wave-particle duality, Atomic Physics, Nuclear structure, Radioactivity, Nuclear reactions, Radiation and matter, and Elementary particles.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

**CURRICULUM INFORMATION**

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS203

<b>Module Code:</b>	<b>MPHA022</b>				
<b>Module Name:</b>	Electrodynamics and Electronics				
<b>Module Content:</b>	<b>Electrodynamics:</b> Electrostatic fields in vacuum and in matter, Magnetostatic fields in vacuum and in matter. <b>Electronics:</b> Electronic Circuits, Semiconductors and Introduction to Solid State Physics.				
<b>Learning Outcomes:</b>	After completing this module, students should be able to: <ul style="list-style-type: none"> <li>• Solve problems in electrostatics and magnetostatics.</li> <li>• Demonstrate the ability to use Gauss's law and Amperes law to find electric and magnetic fields in symmetric situations.</li> <li>• Demonstrate the ability to calculate electric and magnetic fields in the presence of matter which can be electrically and magnetically polarized,</li> <li>• Understand electronic circuits</li> <li>• Identify the fundamental mechanisms and models of controlling the operation of semiconductor devices.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	10		03		140799
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		2.6 hrs
<b>Pre-requisite module/s:</b>	MPHS011 and MPHS012				
<b>Co-requisite module/s:</b>	MMTH012				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to <b>Electrodynamics:</b> Electrostatic fields in vacuum and in matter, Magnetostatic fields in vacuum and in matter. <b>Electronics:</b> Electronic Circuits, Semiconductors and Introduction to Solid State Physics.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS204

<b>Module Code:</b>	<b>MPHB022</b>				
<b>Module Name:</b>	<b>Waves and Physical Optics</b>				
<b>Module Content:</b>	<b>Waves:</b> General wave properties; Simple, damped, forced and coupled oscillators; Transverse wave motion and Fourier methods. <b>Physical Optics:</b> Waves in optical systems, Interference and diffraction theory and Polarization.				
<b>Learning Outcomes:</b>	After taking this module students should be able to: <ul style="list-style-type: none"> <li>• Describe wave properties</li> <li>• Describe oscillators and their behavior when an external force acts</li> <li>• Understand wave phenomena such interference and diffraction.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	10		03	140799	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		2.6 hrs
<b>Pre-requisite module/s:</b>	MPHS011; MPHS012				
<b>Co-requisite module/s:</b>	MMTH012				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to <b>Waves</b> : General wave properties; Simple, damped, forced and coupled oscillators; Transverse wave motion and Fourier methods. <b>Physical Optics</b> : Waves in optical systems, Interference and diffraction theory and Polarization.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hour written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Physics</b>	School: Science & Technology
Last Revision date: 2011	First Year Offered (New): 2013
Replace this Module existing module(s)? Yes	If YES, give the module codes: PHYS204

Module Code:	<b>MPHA031</b>				
Module Name:	Quantum Mechanics				
Module Content:	Background to quantum mechanics, Schrödinger equation, Properties of Schrödinger equation, Application of quantum mechanics to one-dimensional systems, Quantum theory of the hydrogen atom.				
Learning Outcomes:	After completion of this course students are expected to: <ul style="list-style-type: none"> <li>describe the wave nature and particle nature of particles and radiation.</li> <li>solve problems concerning particles in various potentials.</li> <li>make a connection between quantum mechanics and high energy physics experiments.</li> </ul>				
Module Information:	SAQA Credits	ITS Course Level Code		CESM Code (3 <sup>rd</sup> Order)	
	16	04		140799	
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	5	2	1		10.2 hrs
Pre-requisite module/s:	MPHA021; , MPHB021, MPHA022, MPHB022, MMTA021, MMTA 022				
Co-requisite module/s:	MPHB031, MPHB032, MPHA032				
Assessment Criteria:	Describe, explain and apply in a logical manner the principles, concepts and facts related to quantum mechanics, Schrödinger equation, Properties of Schrödinger equation, Application of quantum mechanics to one-dimensional systems, Quantum theory of the hydrogen atom.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				40
	Final mark =		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Min Final Assessment mark to pass (%)				50
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Physics</b>	School: Science & Technology
Last Revision date: 2011	First Year Offered (New): 2013
Replace this Module existing module(s)? Yes	If YES, give the module codes: PHYS302

Module Code:	<b>MPHB031</b>
Module Name:	Thermodynamics and Statistical Mechanics
Module Content:	<b>Thermodynamics:</b> Fundamental concepts, Ideal and real gases, 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> laws of thermodynamics and Thermodynamic potential. <b>Statistical Mechanics:</b> Classical statistical Physics and Quantum Statistics

<b>Module Code:</b>	<b>MPHB031</b>				
<b>Module Name:</b>	Quantum Mechanics				
<b>Learning Outcomes:</b>	After taking this module student should be able to: <ul style="list-style-type: none"> <li>• Coherent and critical understanding of the fundamental concepts of Thermodynamics</li> <li>• Explain the macroscopic properties of a gas, such as its pressure and its temperature, in terms of the behavior of the molecules that make it up.</li> <li>• Coherent and critical understanding of the laws of Thermodynamics</li> <li>• Apply statistical methods to particles.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		03		140799
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		10.2 hrs
<b>Pre-requisite module/s:</b>	MPHA022, MPHB022, MPHA021, MPHB021, MMTA021, MMTA022				
<b>Co-requisite module/s:</b>	MPHA031, MPHA032, MPHB032				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Fundamental concepts, Ideal and real gases, 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> laws of thermodynamics and Thermodynamic potential. Classical statistical Physics and Quantum Statistics				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				40
	<b>Final mark =</b>		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Min Final Assessment mark to pass (%)				50
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

### CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS303

<b>Module Code:</b>	<b>MPHA032</b>
<b>Module Name:</b>	Solid State Physics
<b>Module Content:</b>	Atomic structure of matter, Crystallography, X-ray diffraction theory, Thermal vibrations, Free electrons in crystals and the band theory.
<b>Learning Outcomes:</b>	After taking this module students should be able to: <ul style="list-style-type: none"> <li>• Describe the crystal structure of solids.</li> <li>• Determine the reciprocal lattice from the real space lattice for cubic structures and appreciate the importance of unit cells in each case.</li> <li>• Coherent and critical understanding of the concept of translational invariance and point symmetry of crystals.</li> </ul>

<b>Module Code:</b>	<b>MPHA032</b>				
<b>Module Name:</b>	Solid State Physics				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		04		140799
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		10.2 hrs
<b>Pre-requisite module/s:</b>	MPHA022, MPHB022, MPHA021, MPHB021, MMTA021, MMTA022				
<b>Co-requisite module/s:</b>	MPHA031, MPHB031, MPHB032				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Atomic structure of matter, Crystallography, X-ray diffraction theory, Thermal vibrations, Free electrons in crystals and the band theory.				
<b>Assessment Methods:</b>	Summative: Tests, Practical, Tutorials and/or Assignments. Summative: 1 × 3 hour written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS304

<b>Module Code:</b>	<b>MPHB032</b>		
<b>Module Name:</b>	Electrodynamics and Electronics		
<b>Module Content:</b>	Electronics: Diodes, Transistors, Amplifiers and Oscillator circuits. Electrodynamics: Electromotive force, Faraday's law, Potential formulation of electrodynamics, Energy and momentum.		
<b>Learning Outcomes:</b>	After taking this module student should be able to: <ul style="list-style-type: none"> <li>• Apply the techniques of AC theory in a complex representation;</li> <li>• Describe the operation of simple semiconductor devices: junction diode, bipolar transistor, field-effect transistor, etc.;</li> <li>• Analyse the operation of a range of basic analogue electronic circuits involving transistors and/or operational amplifiers;</li> <li>• Perform design calculations for such circuits;</li> <li>• Demonstrate an understanding of the basic principles and concepts related to electrodynamics</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		140799
	<b>ITS Course Level Code</b>		
	03		

<b>Module Code:</b>	<b>MPHB032</b>				
<b>Module Name:</b>	Electrodynamics and Electronics				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1		10.2 hrs
<b>Pre-requisite module/s:</b>	MPHA021, MPHA022, MPHB021, MPHB022, MMTA021, MMTA022				
<b>Co-requisite module/s:</b>	MPHA031, MPHA032, MPHB032				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Diodes, Transistors, Amplifiers and Oscillator circuits. Electromotive force, Faraday's law, Potential formulation of electrodynamics, Energy and momentum.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Practical, Tutorials and/or Assignments. Summative (40%): 1 × 3 hour written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## DEPARTMENT: STATISTICS & OPERATIONS RESEARCH

### CURRICULUM INFORMATION

<b>Department:</b> Statistics and Operation Research	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2012	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTS000</b>		
<b>Module Name:</b>	Descriptive Statistics		
<b>Module Content:</b>	Definitions and concepts. Sources and types of data. Organizing and summarizing data; Descriptive statistics. Elementary probability theory. Counting techniques: Permutations and combinations. Random variables and probability distributions: Bernoulli, Binomial, Poisson and Normal distributions. Sampling distributions: t, F and Chi-square distributions. Central Limit Theorem. Estimation: point and interval; Confidence Interval for the mean, proportion and variance. Test of hypotheses: Tests for the mean, proportion and variance. Inferences about differences in two means and two proportions; One-way ANOVA. Chi-square tests. Simple linear regression and correlation. Time series analysis. Index numbers.		
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Find point and interval estimates of the mean, proportion and variance;</li> <li>• Test hypotheses on the mean, proportion and variance;</li> <li>• Compare several means and proportions; Fit a simple linear regression model and calculate the correlation coefficient; Analyse a time series data.</li> <li>• Calculate different indices.</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	12	3	150301

<b>Module Code:</b>	<b>MSTS000</b>				
<b>Module Name:</b>	Descriptive Statistics				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0.5	1	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH011				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to organize and summarize data and have basic knowledge of probability.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous summative assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a 1 x 3 hour comprehensive written summative assessment and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Statistics and Operation Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2012	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTS011</b>				
<b>Module Name:</b>	Introduction To Statistics				
<b>Module Content:</b>	Definitions and concepts. Sources and types of data. Organizing and summarizing data; Descriptive statistics. Elementary probability theory. Counting techniques: Permutations and combinations. Random variables and probability distributions: Bernoulli, Binomial, Poisson and Normal distributions.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Distinguish the different types of data;</li> <li>• Organize and summarize data by using tabular and graphical methods;</li> <li>• Compute values of different descriptive statistics;</li> <li>• Evaluate probabilities of events;</li> <li>• Use elementary probability distribution functions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150301
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0.5	1	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH011				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to organize and summarize data and have basic knowledge of probability.				

<b>Module Code:</b>	<b>MSTS011</b>				
<b>Module Name:</b>	Descriptive Statistics				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous summative assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour written summative assessment and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Statistics and Operation Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2012	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTS012</b>				
<b>Module Name:</b>	Introduction To Statistical Inference				
<b>Module Content:</b>	Sampling distributions: t, F and Chi-square distributions. Central Limit Theorem. Estimation: point and interval; Confidence Interval for the mean, proportion and variance. Test of hypotheses: Tests for the mean, proportion and variance. Inferences about differences in two means and two proportions; One-way ANOVA. Chi-square tests. Simple linear regression and correlation. Time series analysis. Index numbers.				
<b>Learning Outcomes:</b>	<p>After successful completion of the module, the student should be able to</p> <ul style="list-style-type: none"> <li>• Find point and interval estimates of the mean, proportion and variance</li> <li>• Test hypotheses on the mean, proportion and variance</li> <li>• Compare several means and proportions</li> <li>• Fit a simple linear regression model and calculate the correlation coefficient; Analyse a time series data</li> <li>• Calculate different indices.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150301
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0.5	1	0	4
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTH012				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has a basic knowledge of statistical inference, linear regression, time series analysis and index numbers.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				

<b>Module Code:</b>	<b>MSTS012</b>				
<b>Module Name:</b>	Introduction To Statistical Inference				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Statistics and Operation Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2012	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTA021</b>				
<b>Module Name:</b>	Theory of Distributions				
<b>Module Content:</b>	Basic probability concepts. Theory of discrete and continuous probability distributions. Expected values and MGF. Special discrete and continuous probability distributions: Bernoulli, Binomial, Hypergeometric, Geometric, Poisson and Negative Binomial, Uniform, Gamma, Exponential, Weibull, Pareto and Normal distributions. Theory of multivariate discrete and continuous distributions, marginal and conditional distributions. Covariance and correlation. Theory of conditional expectation and conditional variance. Distributions of random functions: distribution function, transformation and MGF techniques.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Know the basic concepts of probability.</li> <li>• Identify the important distribution functions.</li> <li>• Derive distributions of random functions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		150302
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	6	0.5	2	0	8
<b>Pre-requisite module/s:</b>	MMTH011, MMTH012, MST011, MST012				
<b>Co-requisite module/s:</b>	MMTA021				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has a satisfactory knowledge of the theory of statistical distributions.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				

<b>Module Code:</b>	<b>MSTA021</b>			
<b>Module Name:</b>	Theory of Distributions			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b> <b>Statistics and Operations Research</b>	<b>School:</b> Science and Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTA022</b>				
<b>Module Name:</b>	Statistical Inference				
<b>Module Content:</b>	Sampling distributions: t, F and Chi-square distributions. Central Limit Theorem. Estimation: point and interval; Confidence Interval for the mean, proportion and variance. Test of hypotheses: Tests for the mean, proportion and variance. Inferences about differences in two means and two proportions; One-way ANOVA. Chi-square tests. Simple linear regression and correlation. Time series analysis. Index numbers.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Know the important sampling distributions.</li> <li>• Estimate parameters.</li> <li>• Conduct statistical tests.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		150302
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	6	0.5	2	0	8
<b>Pre-requisite module/s:</b>	MMTH011, MMTH012, MSTS011, MSTS012				
<b>Co-requisite module/s:</b>	MMTA022				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has a satisfactory knowledge of statistical inference.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>	
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)			<b>50</b>	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Statistics and Operations Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b> STAT351

<b>Module Code:</b>	<b>MSTA031</b>				
<b>Module Name:</b>	Time Series Analysis				
<b>Module Content:</b>	The classical approach to time series analysis: Decomposition of time series. Smoothing methods. Forecasting. Properties of stochastic time series models. stationary series. Autocorrelation and partial autocorrelation functions. Purely random, moving average and autoregressive processes. The Box-Jenkins approach: ARMA and ARIMA models. Case studies.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Understand basic time series concepts and terminology.</li> <li>• Select time series methods appropriate for the situation.</li> <li>• Summarize results of the analysis in writing.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		150302
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3	0.3	1	0	7
<b>Pre-requisite module/s:</b>	MSTA021, MSTA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has a good knowledge of the theory of time series analysis and can apply it to analyse a time series data.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Summative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Statistics and Operations Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b> STAT351

<b>Module Code:</b>	<b>MSTB031</b>
<b>Module Name:</b>	Applied Linear Regression
<b>Module Content:</b>	Simple Linear Regression: Fitting the model, Model assumptions, Estimation and tests, Regression through the origin. Review of Matrix Algebra: Matrices, Operations on matrices. Multiple Linear Regression: Fitting the model, Estimation and tests, Prediction, Multicollinearity. Model Adequacy
<b>Module Content:</b>	Checking: Residual analysis, Detecting unequal variances, Checking the normality assumption, Detecting

	outliers. Variable Selection and Model Building: Subset regression models, All possible regressions, Stepwise procedures.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Fit simple and multiple regression models.</li> <li>• Select appropriate models.</li> <li>• Test for adequacy of models.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		150302
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3	0.5	1	0	7
<b>Pre-requisite module/s:</b>	MMTA022, MSTA021, MSTA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has a good knowledge of linear regression and can apply the theory of linear regression to real life problems.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assess Mark		<b>60</b>
			% Summative Assess Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Statistics and Operations Research</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	STAT351

<b>Module Code:</b>	<b>MSTA032</b>		
<b>Module Name:</b>	Design and Analysis of Experiments		
<b>Module Content:</b>	Definitions of basic terminologies; Design of experiments. Design and analysis of: Completely randomized, Randomized block, Latin square and Factorial designs. Multiple comparisons of treatment mean. Analysis of covariance.		
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Design and analyze experiments with and without blocking.</li> <li>• Design and analyze factorial experiments.</li> <li>• Perform multiple comparisons.</li> <li>• Perform analysis of covariance.</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>
	16		3
			<b>CESM Code (3<sup>rd</sup> Order)</b>
			150302

<b>Module Code:</b>	<b>MSTA032</b>				
<b>Module Name:</b>	Design and Analysis of Experiments				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3	0.3	1	0	7
<b>Pre-requisite module/s:</b>	MMTA022, MSTA021, MSTA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to select an appropriate design for an experiment, analyze the data and write a report.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Statistics and Operations Research</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> STAT342

<b>Module Code:</b>	<b>MSTB032</b>				
<b>Module Name:</b>	Multivariate Statistical Methods				
<b>Module Content:</b>	Review of matrix theory. Multivariate distributions: Multivariate normal distribution and its properties; Inference about multivariate means; Hotelling's $T^2$ . Multivariate analysis of variance and regression. Introduction to data reduction.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Understand multivariate methods and what they do.</li> <li>• Know when to apply the different multivariate methods.</li> <li>• Analyze a multivariate data set and write a report.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		3		150302
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3	0.3	1	0	7
<b>Pre-requisite module/s:</b>	MMTA022, MSTA021, MSTA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to select an appropriate multivariate method, analyze a multivariate data and write a report.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.				

<b>Module Code:</b>	<b>MSTB032</b>			
<b>Module Name:</b>	Multivariate Statistical Methods			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	2 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Statistics and Operations Research</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	STAT392

<b>Module Code:</b>	<b>MSTC032</b>			
<b>Module Name:</b>	Sampling Theory			
<b>Module Content:</b>	Elements of Sampling, Questionnaire Design, Simple Random Sampling, Stratified Random Sampling, Ratio Estimation, Difference and Regression Estimators, Systematic Sampling.			
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Design a questionnaire</li> <li>• Design a sample survey</li> <li>• Estimate the parameters and standard errors</li> <li>• Write a report.</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	16		3	
<b>Periods per Week:</b>	<b>Classes</b>		<b>Independent Learning</b>	
	3		7	
<b>Pre-requisite module/s:</b>	MSTA021, MSTA022			
<b>Co-requisite module/s:</b>	None			
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to design a questionnaire, design a sample survey, estimate the parameters with their standard errors and write a report.			
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. Tutorials will be compulsory. The final mark will be obtained from a three-hour comprehensive written examination and the module mark in the ratio 2:3.			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assess Mark		<b>60</b>
		% Summative Assess Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	2 hrs		
	Sub minimum	40%		

# DEPARTMENT : HUMAN PHYSIOLOGY

## CURRICULUM INFORMATION

<b>Department:</b> Human Physiology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHY201M replaces PHYL200 (in part)

<b>Module Code:</b>	<b>MPLA021</b>				
<b>Module Name:</b>	Systems Physiology I				
<b>Module Content:</b>	<p><b>Introduction:</b> Cell physiology and homeostasis  <b>Nerve &amp; Muscle:</b> Types, contraction of skeletal and smooth muscle  <b>Central nervous system:</b> Spinal cord, motor functions, cortex, limbic system and hypothalamus, brain activity, autonomic nervous system, cerebral blood. <b>Senses:</b> Fundamentals and principles, olfaction, gustation, vision, equilibrium and hearing  <b>Transport systems:</b> Red blood cells and their genesis, white blood cells, platelets and their function, the heart as a pump, cardiac cycle, cardiac output, blood vessels, blood flow and arterial pressure, lymphatics, pathophysiology</p>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Define Physiology and explain the concept of homeostasis and give a detailed description of cell membrane physiology</li> <li>• Demonstrate an understanding of neural and hormonal communication in the human body, including graded potentials, action potentials, synapses, neuronal integration, intercellular communication and the principles of hormonal action</li> <li>• Explain the physiology of the central and peripheral nervous systems in humans and display knowledge of receptor physiology, pain and the physiology of the special senses</li> <li>• Demonstrate an understanding of muscle physiology in humans, and know skeletal muscle mechanics, metabolism, fibre types and the control of motor movement.</li> <li>• Discuss cardiovascular physiology in humans, with regard to the physiology, functions, basic anatomy and histology of the heart, the structure and functions for the vascular tree and the physiology of blood vessels and the maintenance of blood pressure</li> <li>• Explain the physiology of the blood and body defences in humans, including the composition and functions of blood and its individual components and both innate and acquired immunity</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		130801
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 3 Hours	0	0	5 hrs
<b>Pre-requisite module/s :</b>	None				
<b>Co-requisites module/s :</b>	MBIA021				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%).				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>

<b>Module Code:</b>	<b>MPLA021</b>				
<b>Module Name:</b>	Systems Physiology I				
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Human Physiology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHY202M replaces PHYL200 (in part)

<b>Module Code:</b>	<b>MPLA022</b>				
<b>Module Name:</b>	Systems Physiology II				
<b>Module Content:</b>	<p><b>Respiration:</b> Functional characteristics, volumes and capacities, gas exchange, transport of gasses, regulation, and pathophysiology</p> <p><b>Filtration:</b> Formation of urine, regulation of body fluids, acid-base balance and micturition, clinical abnormalities and renal disease</p> <p><b>Digestive system:</b> Structure and function, alimentary canal, accessory organs, movements, digestive juices, absorption</p> <p><b>Nutrition:</b> Digestion and metabolism, fat and water soluble vitamins, minerals</p> <p><b>Exercise:</b> Performance, energy, training and recovery, body systems, in exercise, drugs</p> <p><b>Endocrine system:</b> Hormones, hypothalamus, pituitary, thyroid, parathyroid, pineal and adrenal glands, pancreas, endocrine kidney</p> <p><b>Male reproductive system:</b> Testes, duct system, accessory glands, external genitalia, semen</p> <p><b>Female reproductive system:</b> anatomy, menstrual, uterine, vaginal and ovarian cycle</p> <p><b>Sexual health:</b> STD's and HIV, methods of contraception, pregnancy, sexual dysfunction</p>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>□ Understand the respiratory system physiology in humans, including respiratory mechanics, gas exchange, gas transport, the control of respiration and its role in homeostasis</li> <li>□ Know the urinary system physiology in humans, understand glomerular filtration, tubular reabsorption and tubular secretion and discuss urine excretion, plasma clearance and the role of the urinary system in the maintenance of homeostasis</li> <li>□ Demonstrate an understanding of the maintenance of fluid and acid-base balance in the human body and describe the role of fluid and acid-base balance in the maintenance of homeostasis.</li> <li>□ Know the physiology of the digestive system, energy balance and temperature regulation, describe the processes of digestion and absorption of different nutrients and understand the control of food intake in humans</li> <li>□ Understand endocrine physiology in humans, including the physiology of the pineal gland and circadian rhythms, and the hypothalamus and pituitary gland and their regulatory roles in the body</li> <li>□ Discuss reproductive physiology of males and females, know the physiology of sexual intercourse between males and females, and understand the basics regarding contraception, abortion, certain aspects of sexual health and the relationship between the reproductive system and homeostasis</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		130801
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 3 Hours	0	0	5 Hours
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MBIA021				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final				

	mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%)			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final Mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

CURRICULUM INFORMATION			
<b>Department:</b> Human Physiology	School: Medicine		
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b>	2013	
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b>	PHY202M replaces PHYL200 (in part)	

<b>Module Code:</b>	<b>MPLC031</b>		
<b>Module Name:</b>	Environmental Influences on the Human Body		
<b>Module Content:</b>	<p><b>Chronic diseases of lifestyle:</b> Mortality patterns, hypertension, smoking, drugs and alcohol, dyslipidemia, obesity, diabetes mellitus, lifestyle induced cancers, stroke, exercise, diet</p> <p><b>Sexual health:</b> PCOS, endometriosis, contraception; risk behaviour; PID and sexual dysfunction</p> <p><b>Introduction to occupational health and hygiene</b></p> <p><b>Anthropometry</b></p> <p><b>Ergonomics</b></p>		
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>List and describe various chronic diseases of lifestyle in terms of risk factors, aetiology, prevalence and complications</li> <li>Discuss the mortality patterns in South Africa, especially with regard to chronic diseases of lifestyle.</li> <li>Demonstrate an understanding of the role of smoking, diet, obesity, early life origins and physical inactivity in the development of chronic diseases of lifestyle</li> <li>Explain the basic concepts of occupational health and hygiene, as well as the types of factors that can affect workers in an occupational setting</li> <li>Demonstrate an understanding of anthropometry and its applications in various fields</li> <li>Describe anthropometric evaluation, annual monitoring indicators, collection of anthropometric data through surveys, and the selection of samples</li> <li>Be able to take some basic anthropometric measurements accurately</li> <li>Demonstrate an understanding of the basic concepts of ergonomics</li> <li>Explain designing principles for design for various working positions, human strength, vision and for designing of hand tools</li> <li>Students can also be expected to do theory assignments on any of the above topics. At least one theory assignment will be included in the assessment criteria every year</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	32	3	130801

<b>Module Code:</b>	<b>MPLC031</b>				
<b>Module Name:</b>	Environmental Influences on the Human Body				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 3 hrs	0	0	10hrs
<b>Pre-requisite module/s:</b>	MBIA021				
<b>Co-requisite module/s:</b>	MPLC032				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%)				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Human Physiology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHY202M replaces PHYL200 (in part)

<b>Module Code:</b>	<b>MPLC032</b>				
<b>Module Name:</b>	Principles of occupational and environmental toxicology				
<b>Module Content:</b>	<b>Occupational toxicology:</b> introduction to occupational toxicology, toxicokinetics, toxicodynamics, toxicity testing and risk assessments <b>Environmental toxicology:</b> radiation pollution, water pollution, air pollution				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Demonstrate an understanding of the basic concepts of occupational toxicology</li> <li>• Describe toxicity testing and risk assessment and understand the action and effects of certain toxic agents</li> <li>• Explain the basic principles of environmental toxicology</li> <li>• Demonstrate an understanding of radiation as well as the types, sources and effects of radiation.</li> <li>• Define air pollution and discuss the basic principles of air pollution</li> <li>• Discuss the atmosphere and distinguish between and discuss climate, global warming and ozone loss</li> <li>• List and shortly discuss non-renewable and renewable energy sources</li> <li>• Demonstrate an understanding of the basic principles of water pollution and know basic hydrological principles and water management aspects</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	32		3		130906
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	2 x 3 hrs	0	0	10 hrs

<b>Module Code:</b>	<b>MPLC032</b>				
<b>Module Name:</b>	Principles of occupational and environmental toxicology				
<b>Pre-requisite module/s:</b>	MBIA021				
<b>Co-requisite module/s:</b>	MPLC031				
<b>Assessment Methods:</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and a summative theory assessment at the end of the module. The final mark is calculated as follows: Average of summative theory and practical assessments (60%) and summative theory assessment (40%)				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark	<b>60</b>	
			% Summative Assessment Mark	<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## DEPARTMENT: PSYCHOLOGY

CURRICULUM INFORMATION						
<b>Department:</b>	<b>Psychology</b>			<b>School:</b>	Medicine	
<b>Last Revision date:</b>	2011			<b>First Year Offered (New):</b>	2013	
<b>Replace this Module existing module(s)?</b>	Yes			<b>If YES, give the module codes:</b>	PSYC100	

<b>Module Code:</b>	<b>MPCL011</b>				
<b>Module Name:</b>	Introduction to Psychology				
<b>Module Content:</b>	Foundations of Psychology Learning Theories Developmental Psychology Personality, Emotions, Motivation & Stress Psychophysiology				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Students must know and understand the basic principles and perspectives in psychology</li> <li>• Students must be able to understand and apply all the knowledge gathered in psychology I course and link theories in their specific discipline and their studies</li> <li>• Students must have a basic understanding of human development; personality; emotion; motivation and stress</li> <li>• Students must know and understand the link between mind and body interaction</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	12	3	180101		

<b>Module Code:</b>	<b>MPCL011</b>				
<b>Module Name:</b>	Introduction to Psychology				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	2	0	1 hour
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>ASSESSMENT</b>	Assessment will comply in all respects with the University of Limpopo Assessment Policy and the NQF guidelines for validity, reliability, fairness and practicability				
<b>Assessment Criteria:</b>	Students must be able to name, describe, explain, apply, compare, and differentiate all the knowledge gathered in psychology I and link theories in their specific discipline and their studies. Students must be able to apply a basic understanding of human development; personality; emotion; motivation and stress Students must be able to explain the link between mind and body interaction				
<b>Assessment Methods:</b>	Examinations, Tests and Assignments				
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Summative Assessment Mark	<b>60</b>	
			% Summative Assessment Mark	<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Psychology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PSYC100

<b>Module Code:</b>	<b>MPCL012</b>				
<b>Module Name:</b>	Research, Interpersonal Skills and Social Psychology				
<b>Content:</b>	Interpersonal Skills Social Psychology Introduction to Research Cognitive Processes (Human memory, perception & Sensation)				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Students must have a basic understanding of cognitive processes.</li> <li>• Students must understand the role of social interaction and link it to their specific field.</li> <li>• Students must know and understand the basic principles of interpersonal skills and research.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12		3		180101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	2	0	1 Hour
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>ASSESSMENT</b>	Assessment will comply in all respects with the University of Limpopo Assessment Policy and the NQF guidelines for validity, reliability, fairness and practicability				

<b>Module Code:</b>	<b>MPCL012</b>				
<b>Module Name:</b>	Research, Interpersonal Skills and Social Psychology				
<b>Assessment Criteria</b>	Students must be able to apply a basic understanding of cognitive processes Students must be able to explain the role of social interaction and apply it to their specific field. Students must be able to describe and explain the basic principles of interpersonal skills as well as research and be able to apply it to their specific field				
<b>Assessment Methods</b>	Examinations, Tests and Assignments				
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	Final Mark =		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> Psychology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PSYC100

<b>Module Code:</b>	<b>MPSA021</b>				
<b>Module Name:</b>	Research, Assessment and Developmental Psychology				
<b>Content:</b>	Research Methods Psychological Assessment Developmental Psychology (Child)				
<b>Learning outcomes</b>	At the end of the module the student will: <ul style="list-style-type: none"> <li>Know, understand and apply the basic principles in social research</li> <li>Know and understand the basic aspects of assessment across cultures and the different steps in social research</li> <li>Know, understand and integrate the basic concepts and theories in child development</li> <li>Know and integrate the ethical principles applicable in research, assessment, child development.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		3		180101
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1	2	0	2 hrs
<b>Pre-requisite module/s:</b>	MPCL011, MPCL012				
<b>Co-requisite module/s:</b>	None				
<b>Assessment criteria</b>	At the end of the module you will: <ul style="list-style-type: none"> <li>Name, describe and apply the basic principles in social research</li> <li>State and explain the basic aspects of assessment across cultures and the different steps in social research</li> <li>List, describe and apply the basic concepts and theories in child development</li> <li>List, describe and integrate the ethical principles applicable in research, assessment, child development.</li> </ul>				
<b>Assessment methods</b>	Comprehensive, summative (includes group and individual assignments, and tests) and summative (examination) assessment will be used. Practical work seminars, as well as the presentation of specific allocated case studies relevant to the thrust of the degree will also be used.				

<b>Module Code:</b>	<b>MPSA021</b>			
<b>Module Name:</b>	Research, Assessment and Developmental Psychology			
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Psychology</b>	<b>School:</b>	Medicine
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	PSYC200

<b>Module Code:</b>	<b>MPSA022</b>			
<b>Module Name:</b>	Personality, Medical and Social Psychology			
<b>Model Content:</b>	Social Psychology Personality Theories Medical Psychology			
<b>Learning outcomes</b>	At the end of the module the student will: <ul style="list-style-type: none"> <li>• Understand and apply the concepts applicable in social psychology.</li> <li>• Know and understand the different personality theories</li> <li>• Know and comprehend the position of medical psychology in within the discipline of psychology</li> <li>• Know and integrate the ethical principles applicable in social psychology, medical psychology and personality theories.</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	3	180101	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>
	5	1	2	0
<b>Independent Learning</b>	2 hour			
<b>Pre-requisite module/s:</b>	MPCL011,MPCL012			
<b>Co-requisite module/s:</b>	None			
<b>Assessment criteria</b>	At the end of the module you will: <ul style="list-style-type: none"> <li>• Name, describe and apply the basic principles in social research</li> <li>• State and explain the basic aspects of assessment across cultures and the different steps in social research</li> <li>• List, describe and apply the basic concepts and theories in child development</li> <li>• Explain and apply different concepts applicable in social psychology.</li> <li>• Name and describe the different personality theories</li> <li>• Recognize and explain the position of medical psychology in within the discipline of psychology</li> <li>• List, describe and integrate the ethical principles applicable in social psychology, medical psychology and personality theories.</li> </ul>			
<b>Assessment methods</b>	Comprehensive, summative (includes group and individual assignments, and tests) and summative (examination) assessment will be used. Practical work seminars, as well as the presentation of specific allocated case studies relevant to the thrust of the degree will also be used.			

<b>Module Code:</b>	<b>MPSA022</b>			
<b>Module Name:</b>	Personality, Medical and Social Psychology			
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

<b>CURRICULUM INFORMATION</b>			
<b>Department:</b>	<b>Psychology</b>	<b>School:</b>	Medicine
<b>Last Revision date:</b>	2012	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	N/A

<b>Module Code:</b>	<b>MPSB022</b>			
<b>Module Name:</b>	Environmental Psychology and Management skills			
<b>Model Content:</b>	The origins and nature of environmental Psychology, ecological psychology, personal space, privacy and territoriality, place attachment, crime and the environment. The environmental psychologist as facilitator of the design, Poverty and the environment. Mental health and the built environment.			
	Occupational health and safety. <ul style="list-style-type: none"> <li>• Explore management principals</li> <li>• Planning, setting objectives and the benefits of good organisational skills</li> <li>• Organising resources to match the task objectives</li> <li>• Maintaining control – monitoring and assessing</li> <li>• Developing your leadership style</li> <li>• Empowering yourself by perfecting your management skills</li> <li>• Improving problem solving and decision making skills</li> <li>• Developing people skills – maximising effective communication</li> <li>• Leading successful teams – motivation and the importance of trust</li> <li>• Implementing skills and strategies to manage and resolve conflict</li> </ul>			
<b>Learning outcomes</b>	<ul style="list-style-type: none"> <li>• The student must be able to define the basic concepts of Environmental Psychology.</li> <li>• The student must be able describe and apply the basic concepts of Environmental Psychology in the work environment.</li> <li>• The student must be able to describe the role of mental health in the work environment.</li> <li>• The student must be able to define all principles of management</li> <li>• The student must be able to determine and evaluate his/her own management style</li> <li>• The student must be able to describe and apply the principles of management skills in a work setting</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	20		3	
<b>Periods per week:</b>	<b>Classes</b>		<b>Tutorial</b>	<b>Seminars</b>
	4 x 45 min.		Per arrangement	0
<b>Independent Learning</b>	8 h			
<b>Pre-requisite module/s:</b>	MPCL011, MPCL012			
<b>Co-requisite module/s:</b>	None			

<b>Module Code:</b>	<b>MPSB022</b>			
<b>Module Name:</b>	Environmental Psychology and Management skills			
<b>Assessment criteria</b>	Define the basic concepts of Environmental Psychology. Describe and apply the basic concepts of Environmental Psychology in the work environment. Describe the role of mental health in the work environment. Define all principles of management Determine and evaluate his/her own management style Describe and apply the principles of management skills in a work setting			
<b>Assessment methods</b>	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment at the end of the module			
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory/Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

<b>CURRICULUM INFORMATION</b>			
<b>Department:</b>	<b>Psychology</b>	<b>School:</b>	Medicine
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	PSYC300

<b>Module Code:</b>	<b>MPSA031</b>			
<b>Module Name:</b>	Psychopathology, Research and Community Psychology			
<b>Content:</b>	Research Methodology 2; Community Psychology; Psychopathology			
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>Students should have knowledge of/and understanding of survey research, sampling, data collection (scales of measurement and techniques of data collection), questionnaire design and community-centred research. They must further understand how to interpret results and write report.</li> <li>Students must have knowledge and understanding of the following aspects of community psychology: the emergence and relevant of community psychology internationally and in developing societies and the South African context, The conceptual orientation of community psychology and the multidisciplinary knowledge base &amp; planned community change. They must further have the ability to critically analyse perspectives of different paradigms.</li> <li>Students must have knowledge and understanding of abnormal behaviour in historical context, clinical assessment and diagnosis, anxiety disorders, somatoform and dissociative disorders, as well mood disorders and suicide. They must understand and insight to apply and critically analyse personality disorders, schizophrenia and other psychotic disorders, as well as developmental disorders.</li> <li>Students must have knowledge and understating of legal and ethical issues relating to research, community psychology and psychopathology.</li> </ul>			
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
	32		3	
<b>Periods per week:</b>	<b>Classes</b>		<b>Practicals</b>	
	5		1	
<b>Pre-requisite modules:</b>	<b>Tutorial</b>		<b>Seminars</b>	
	2		0	
		<b>Independent Learning</b>		3 hour
MPSA021,MPSA022				

<b>Module Code:</b>	<b>MPSA031</b>			
<b>Module Name:</b>	Psychopathology, Research and Community Psychology			
<b>Co-requisite modules:</b>	None			
<b>Assessment criteria</b>	<ul style="list-style-type: none"> <li>Students should be able to describe, explain, discuss, analyse and evaluate concepts such as survey research, sampling, data collection (scales of measurement and techniques of data collection), questionnaire design and community-centred research. They must further be able to interpret results of report writing.</li> <li>Students must be able to define, describe, discuss, criticise, assess as well as differentiate between the following aspects of community psychology: the emergence and relevance of community psychology internationally and in developing societies and the South African context, the conceptual orientation of community psychology and the multidisciplinary knowledge base &amp; planned community change. They must further have the ability to demonstrate, explain critically analyse and differentiate perspectives of paradigms.</li> <li>Students must be able to name, describe, demonstrate, define, differentiate, evaluate concepts of psychopathology such as abnormal behaviour in historical context, clinical assessment and</li> </ul>			
<b>Assessment criteria</b>	<ul style="list-style-type: none"> <li>diagnosis, anxiety disorders, somatoform and dissociative disorders, as well as mood disorders and suicide. They must further be able to apply, differentiate, explain and critically analyse personality disorders, schizophrenia and other psychotic disorders, as well as developmental disorders.</li> <li>Students must be able to describe, demonstrate responsible legal and ethical values relating to research, community psychology and psychopathology.</li> </ul>			
<b>Assessment methods</b>	Comprehensive, summative (includes group and individual assignments, and tests) and summative (examination) assessment will be used. Practical work seminars, as well as the presentation of specific allocated case studies relevant to the thrust of the degree will also be used.			
<b>Assessment Weighting</b>	Minimum Form Assessment Mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b> Psychology	<b>School:</b> Medicine
<b>Last Revision date:</b> 2012	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> N/A

<b>Module Code:</b>	<b>MPSA032</b>
<b>Module Name:</b>	Statistics, Therapeutic and Development Psychology
<b>Content:</b>	Behavioural Statistics; Therapeutic Psychology; Developmental Psychology (Adolescence and Adulthood)
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>Students should have knowledge and understanding of introduction to behavioural statistics, variables and levels of measurement, dealing with data, basic descriptive statistics, tables, measures of central tendency, measures of dispersion and the normal curve.</li> </ul>

<b>Module Code:</b>	<b>MPSA032</b>				
<b>Module Name:</b>	Statistics, Therapeutic and Development Psychology				
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>Students must have knowledge and understanding, as well as apply and critically analyse the following concepts of therapeutic psychology: counseling, common themes, characteristics of the counseling relationship, characteristics of a successful counselor, and stages of the counseling process. They must further have the ability to apply and evaluate helping skills, probing skills, discovering skills and possible problems in the counseling relationship.</li> <li>Students must have knowledge and understanding research methods in developmental psychology. They must also apply and critically analyse theories of development. They must further have knowledge and understating of middle childhood, adolescence and social development.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	32	3		180101	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	1	2	0	3 Hour
<b>Pre-requisite module/s:</b>	MPSA021, MPSA022				
<b>Co-requisite module/s:</b>	None				
<b>Assessment methods</b>	Comprehensive, summative (includes group and individual assignments, and tests) and summative (examination) assessment will be used. Practical work seminars, as well as the presentation of specific allocated case studies relevant to the thrust of the degree will also be used.				
<b>Assessment Weighting:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory/Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# Bachelor of Science (*Honours*)

## Rules for the Honours Degree

The General rules for honours degree apply

### Admission into the BSc honours programme

**SSTH1** For admission into honours degree, a candidate must have

- A Bachelor of Science (or equivalent) degree
- At least 60% obtained as an average final mark in the appropriate academic third-year level major module or course which is the prerequisite for access to the honours programme

**SSTH2** For admission into honours in Statistics

- At least 60% pass in Statistics is required, and
- A pass in Mathematics

## Programmes Offered

The School offers the following **BSc Honours Programmes**

### APPLIED MATHEMATICS (Qualification: HSCT01)

Module code	Module Name
MAPA080	Research Project (Applied Mathematics)
MAPB080	Mathematical Modelling with ODEs
MAPC080	Hydrodynamic Stability
MAPD080	Financial Mathematics
MAPE080	Advanced Mathematical Programming
MAPF080	General Theory of Relativity

### BIOCHEMISTRY (Qualification: HSCP01)

MBIC080	Research Project (Biochemistry)
MBIA081	Research Methodology
MBIB081	Medical Biochemistry
MBIA082	Advanced Protein Chemistry
MBIB082	Applied Molecular Biology

### CHEMISTRY (Qualification: HSCN01)

MCHM080	Research Project (Chemistry)
MCHA081	Advanced Organic Chemistry
MCHB081	Advanced Inorganic Chemistry
MCHA082	Advanced Physical Chemistry
MCHB082	Advanced Analytical Chemistry

### COMPUTER SCIENCES (Qualification: HONCIT)

CSIT700	Research Project (Computer and Information Technology)
CSIT701	Advanced Database Systems Development
CSIT703	Artificial Intelligence
CSIT705	Health Informatics (Object-Oriented Approach)
CSIT706	Computer Networks
CSIT708	Computer Security
CSIT709	Mobile Application Development (Intermediate)
CSIT710	Special Topics

**MATHEMATICS (Qualification: HSCU01)**

MMTH080	Research Project (Mathematics)
MMTA081	Group and Field Theory
MMTB081	General Topology
MMTC081	Complex Analysis
MMTD081	Measure Theory and Integration
MMTD082	Functional Analysis
MMTE082	Category Theory
MMTG082	Number Theory
MMTH082	Ring Theory

**PHYSICS (Qualification: HSCO01)**

MPHS080	Research Project (Physics)
MPHA081	Quantum Mechanics
MPHB081	Statistical Mechanics
MPHA082	Electrodynamics
MPHB082	Solid State Physics

**STATISTICS (Qualification: HSCV01)**

MSTS080	Research Project (Statistics)
MSTA081	Probability Theory
MSTA082	Statistical Inference
MSTB081	Sampling Theory
MSTC081	Biostatistics
MSTB082	Nonparametric Statistical Inference
MSTD081	Multivariate Analysis
MSTC082	Stochastic Processes
MSTE081	Categorical Data Analysis

**BIOLOGY (Qualification: HSCR01)**

MZOO080	Research Project (Zoology)
MZOA081	Environmental Biology
MZOA082	Tick Biology
MZOB081	Palaeontology and Philosophy of Biological Science
MZOB082	Parasitology

# DEPARTMENT : APPLIED MATHEMATICS

## CURRICULUM INFORMATION

<b>Department:</b>	Mathematical and Physical Sciences	<b>School:</b> Science & Technology
<b>Discipline:</b>	<b>Mathematics and Applied Mathematics</b>	
<b>Last Revision date:</b> 2011		<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> NO		<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MAPA080M</b>				
<b>Module Name:</b>	Research Project				
<b>Module Content:</b>	The student, in consultation with supervisor, selects a research topic in applied mathematics, does independent research and writes a report.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>Select a research topic.</li> <li>Do independent research.</li> <li>Write a research report.</li> <li>Give a presentation to the Department.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	40		6		150201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	0	Res Project	0	1	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that he has the ability to do independent research in applied mathematics.				
<b>Assessment Methods:</b>	The final mark will be obtained from an extended project essay or research paper				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>N/A</b>
	<b>Final Mark =</b>		% Formative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Research Project			
	Duration	Year			
	Sub minimum	N/A			

CURRICULUM INFORMATION			
<b>Department:</b>	Mathematical and Physical Sciences	<b>School:</b>	Science & Technology
<b>Discipline:</b>	<b>Mathematics and Applied Mathematics</b>		
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	AMAT701

<b>Module Code:</b>	<b>MAPB080</b>				
<b>Module Name:</b>	Mathematical Modelling with ODEs				
<b>Content:</b>	Linear systems, Non-Hermitian systems, Non-homogeneous systems, Qualitative systems and stability; Modelling population dynamics, Modelling infectious diseases: the SIR model: (1) recurrent diseases and (2) recruitments.				
<b>Learning Outcomes:</b>	At the end of the module students should be able to: <ul style="list-style-type: none"> <li>• Define and distinguish between linear and non-linear systems,</li> <li>• Define and distinguish between Hermitian and non-Hermitian systems,</li> <li>• Explain and draw phase diagrams for qualitative systems,</li> <li>• Conceptualise apply the concept of stability,</li> <li>• Explain the concepts used in modeling problems in population dynamics,</li> <li>• Design and solve the SIR epidemiological model</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	0	0	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practicals and Tests. Summative assessment will be done at the end of the module				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	AMAT702

<b>Module Code:</b>	<b>MAPC080</b>				
<b>Module Name:</b>	Hydrodynamic Stability				
<b>Content:</b>	The stability theory: Absolute instability and convergence instability, Thermal instability; Linearised stability equations: Tollmien-Schlichting waves, Parallel instability, Orr-Sommerfeld equation; Spatial and temporal stability theories: Rayleigh equation, Rayleigh criterion for instability; Stability analysis of pipe flow.				
<b>Learning Outcomes:</b>	<p>At the end of the module students should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the concept of stability</li> <li>• Define and differentiate between absolute, convergence, thermal and parallel instabilities,</li> <li>• Linearise non-linear stability equation</li> <li>• Derive Orr-Sommerfeld and Squires equations</li> <li>• Derive Tollmien-Schlichting's wave equation</li> <li>• Derive the Rayleigh equation</li> <li>• Apply the Rayleigh criterion for instability to solve problems</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	6		150201	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	0	0	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>		% Formative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	AMAT703

<b>Module Code</b>	<b>MAPD080</b>				
<b>Module Name:</b>	Financial Mathematics				
<b>Content:</b>	Probability; Normal Random Variables; Theory of Interest Rates and Present Value Analysis; Geometric Brownian Motion and ITO Formula; Arbitrage Pricing; The Black-Scholes Formula and Markets, Numerical Schemes for Pricing Options.				
<b>Learning Outcomes:</b>	<p>At the end of the module students should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the concept of probability,</li> <li>• Understand and use random variables and probability distributions,</li> <li>• Define and differentiate between simple and compound interest,</li> <li>• Distinguish between the present value and the future value,</li> <li>• Define stocks and options,</li> <li>• Valuate options using the binomial tree and the Black-Scholes formula,</li> <li>• Discuss the Geometric Brownian Motion,</li> <li>• Explain and apply Ito's formula,</li> <li>• Understand Arbitrage pricing,</li> <li>• Show an understanding of the functioning of Financial Markets</li> <li>• Use Numerical Schemes for Pricing of Options (The Lattice Tree Method, The Finite Difference Method and The Monte Carlo Simulation).</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	0	0	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be a supplementary assessment.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	AMAT704

<b>Module Code:</b>	<b>MAPE080</b>				
<b>Module Name:</b>	Advanced Mathematical Programming				
<b>Content:</b>	Optimization of 1-D functions, Multidimensional unconstrained optimization, Non-linear constrained optimization; Essence of mathematical programming.				
<b>Learning Outcomes:</b>	<p>At the end of the module students should be able to:</p> <ul style="list-style-type: none"> <li>• Design a simplex algorithms for linear equations with three variables</li> <li>• Apply the simplex algorithm to solve problems</li> <li>• Design the dual simplex algorithm</li> <li>• Apply the dual simplex algorithm to solve problems</li> <li>• Distinguish between various integer programming problems</li> <li>• Formulate Integer programming problems</li> <li>• Use the branch-and-bound methods to solve integer programming problems</li> <li>• Construct the objective function and the decision variables for a goal programming problem</li> <li>• Learn about advanced topics in linear programming</li> <li>• Differentiate between concave and convex functions</li> <li>• Solve non-linear programming problems in one variable</li> <li>• Solve unconstrained maximization and minimization problems with several variables</li> <li>• Understand and apply the Kuhn-Tucker conditions to solve problems</li> <li>• Learn about more advanced topics on non-linear programming</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		150201
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	0	0	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practical and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final Mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	AMAT705

<b>Module Code:</b>	<b>MAPF080</b>				
<b>Module Name:</b>	General Theory of Relativity				
<b>Content:</b>	Riemannian Geometry; Einstein equations; Weak field approximation of the field equations; The Schwarzschild solutions of Einstein's equation and its consequences; The Tolman solution; The Kerr solution; The cosmological principle; The effects of the non-causal bulk viscosity.				
<b>Learning Outcomes:</b>	<p>At the end of the module students should be able to:</p> <ul style="list-style-type: none"> <li>• Define the concept of Riemannian Geometry</li> <li>• Derive Einstein Equations</li> <li>• Apply the Weak field approximation</li> <li>• Derive the Schwarzschild solution to the Einstein equation</li> <li>• Derive the Tolman and the Kerr solutions</li> <li>• Define the concept of cosmology</li> <li>• Explain the concept of non-casual bulk viscosity</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20		6	150201	
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min	0	0	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous formative assessment based on Quizzes, Tutorials, Assignments, Practicals and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>			% Formative Assessment Mark	<b>60</b>
				% Summative Assessment Mark	<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# DEPARTMENT: BIOCHEMISTRY

## CURRICULUM INFORMATION

<b>Department:</b> Biochemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> ABIO600

<b>Module Code:</b>	<b>MBIC080</b>				
<b>Module Name:</b>	Research Project				
<b>Module Content:</b>	Conduct a supervised research project and write a mini-dissertation. Students are expected to present/discuss at least three research publications from reputable scientific journals during seminar sessions				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• After successfully completing the module, the student should be able to:</li> <li>• Construct a research project in Biochemistry</li> <li>• Conduct experiments, compile data and analyse the data constructively</li> <li>• Write a mini-dissertation on research performed in the laboratory</li> <li>• Present the research results obtained using Power Point</li> <li>• Present SAPSE accredited publications during seminar presentations</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	40		6		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	0	Research Project	0	1	Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Methods:</b>	Combination of quizzes after seminars, seminar presentations, mini-dissertation and summative assessment in the form of a project presentation and oral examination on general Biochemistry topics.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				N/A
	<b>Final mark =</b>		% Summative Assess Mark		60
			% Summative Assess Mark		40
	Min Final Assessment mark to pass (%)				50
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Research Project			
	Duration	Y			
	Sub minimum	N/A			

## CURRICULUM INFORMATION

<b>Department:</b> Biochemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> ABIO603
<b>Module Code</b>	<b>MBIA082</b>
<b>Module Name</b>	Advanced Protein Chemistry

<b>Module Content:</b>	<ul style="list-style-type: none"> <li>Protein purification: cell disruption methods, centrifugation, protein and enzyme assays, dialysis, protein precipitation, column chromatography, electrophoresis.</li> <li>Protein sequencing, mass spectrometry, three-dimensional structure determination.</li> </ul>				
<b>Learning Outcomes:</b>	In depth knowledge of the theory and techniques of Advanced Protein Chemistry included in this module				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9	continuous		2	5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	To test a sound knowledge all the theory and techniques involved in this module				
<b>Module Code:</b>	<b>MBIA080</b>				
<b>Module Name:</b>	Advanced Protein Chemistry				
<b>Assessment Methods:</b>	Summative theory assessments; written and power point presentation of assignments; seminars; summative theory assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Continuous assessment		<b>60</b>
			% Summative assessment		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>			<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical		Theory		
	Duration		3 hrs		
	Sub minimum		40%		

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Biochemistry</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	ABIO602

<b>Module Code:</b>	<b>MBIB082</b>				
<b>Module Name:</b>	Applied Molecular Biology				
<b>Module Content:</b>	Recombinant DNA molecules, PCR, isolation of cloned genes, in vitro mutagenesis, introduction of foreign genes into mammals, synthesis of oligonucleotides, genetic engineering of plants, oncogenes and molecular biology of cancer, generation of agriculturally important plants, animal biotechnology, recombinant DNA to fight AIDS, DNA –based diagnosis of genetic diseases, gene therapy.				
<b>Learning Outcomes:</b>	In depth knowledge of the theory and techniques of Applied Molecular Biology included in this module				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		130203
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9	continuous	0	2	5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	To test if a sound knowledge all the theory and techniques involved in this module is in place as required by the outcomes set for this module				

<b>Assessment Methods:</b>	Summative theory assessments Written and power point presentation of assignments Seminars Summative theory assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>	
	<b>Final mark =</b>	% Continuous assessment		<b>60</b>	
		% Summative assessment		<b>40</b>	
Min Final Assessment mark to pass (%)			<b>50</b>		
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Biochemistry</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> ABIO603

<b>Module Code:</b>	<b>MBIB081</b>				
<b>Module Name:</b>	Medical Biochemistry				
<b>Module Content:</b>	Structure and function of peptide hormones and steroids, antibody production and applications, enzymes as diagnostic tools, cancer biochemistry.				
<b>Learning Outcomes:</b>	In depth knowledge of the theory and techniques of Medical Biochemistry included in this module				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		130204
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9	continuous		2	5 hrs
<b>Pre-requisite module/s :</b>	None				
<b>Co-requisites module/s :</b>	None				
<b>Assessment Criteria:</b>	To test if a sound knowledge all the theory and techniques involved in this module is in place as required by the outcomes set for this module				
<b>Assessment Methods:</b>	Summative theory assessments Written and power point presentation of assignments Seminars Summative theory assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>	
	<b>Final mark =</b>	% Continuous assessment		<b>60</b>	
		% Summative assessment		<b>40</b>	
Min Final Assessment mark to pass (%)			<b>50</b>		
<b>Summative Assessment</b>	<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	

Paper:	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Biochemistry</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date:</b> 2011			<b>First Year Offered (New):</b> 2013		
<b>Replace this Module existing module(s)?</b> YES			<b>If YES, give the module codes:</b> ABIO604		
<b>Module Code:</b>	<b>MBIA081</b>				
<b>Module Name:</b>	Research Methodology				
<b>Module Content:</b>	Basic research concepts, proposal design, reporting, literature survey, data collection and interpretation, statistical analyses. With special reference to Biochemistry.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>□ To acquire an in depth knowledge of Basic Research Concepts and statistical analyses</li> <li>□ To acquire the skills for proposal design, reporting, literature survey, data collection and interpretation.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		6		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9	continuous		2	5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	To test if all the skills as required by the outcomes set for this module are in place				
<b>Assessment Methods:</b>	Summative theory assessments; written and power point presentation of assignments; seminars; summative theory assessment.				
<b>Assessment Weighting:</b>	Min Continuous Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Continuous assessment		<b>60</b>
			% Summative assessment		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>	N/A	<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# DEPARTMENT: BIOLOGY

## CURRICULUM INFORMATION

<b>Department:</b> Biology	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> BLGY700 MZOO070

<b>Module Code:</b>	<b>MZOO080</b>				
<b>Module Name:</b>	Research Project				
<b>Module Content:</b>	Students will undertake a research project of original research of the student's own choice from a list of suggested topics within the research scope of one of the modules presented.				
<b>Learning Outcomes:</b>	To perform, write up and present independent research				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	40	6		130601	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	1 day/week & 5 weeks in 2 <sup>nd</sup> semester	Research project	Per arrangement	2	Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	The research project has to be presented in: <ul style="list-style-type: none"> <li>Written publication format to be evaluated by the relevant lecturer;</li> <li>Poster format to be evaluated by all staff and the external examiners</li> </ul>				
<b>Assessment Methods:</b>	Research Project to be completed. presented in publication format and a poster presentation				
<b>Assessment Weighting:</b>	Min Continuous Assessment mark for exam admission (%)				<b>N/A</b>
	<b>Final mark =</b>		% Publication written format	<b>60</b>	
			% Poster & Presentation	<b>40</b>	
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical				
	Duration				
	Sub minimum				

## CURRICULUM INFORMATION

<b>Department:</b> Biology	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> BLGY701 MZOO071

<b>Module Code:</b>	<b>MZOA081</b>
<b>Module Name:</b>	Environmental Biology
<b>Module Content:</b>	The understanding of different environmental factors that affects animals and plants. The study will also focus on various forms of pollution and the general effects on plants and animals. Relationship between populations, natural resources, land use, agriculture, biodiversity, industrialization and pollution will be examined. A bio-monitoring approach will be used to understand and evaluate the impact of pollution on the environment.
<b>Learning Outcomes:</b>	In depth knowledge of: <ul style="list-style-type: none"> <li>Environmental (including pollution) factors affecting life</li> <li>Relationships between man &amp; nature</li> <li>To get accustomed to all techniques pertaining to this field of study</li> </ul>

<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20		6		130605	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>	
	9 for 5 weeks	continuous		2	5 hrs	
<b>Pre-requisite module/s:</b>	None					
<b>Co-requisite module/s:</b>	None					
<b>Assessment Criteria:</b>	Determine if the knowledge obtained complies with the outcomes set					
<b>Assessment Methods:</b>	Summative theory assessments, written, power point and poster presentation of assignments; summative theory assessment.					
<b>Assessment Weighting:</b>	Min Continuous Assessment mark for exam admission (%)					<b>40</b>
	<b>Final mark =</b>			% Continuous assessment		<b>60</b>
				% Summative assessment		<b>40</b>
	Min Final Assessment mark to pass (%)					<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory / Practical	Theory				
	Duration	3 hrs				
	Sub minimum	40%				

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Biology</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	BLGY703 MZOO072

<b>Module Code:</b>	<b>MZOA082</b>					
<b>Module Name:</b>	Tick Biology					
<b>Module Content:</b>	Identification and description of different tick species; the medical and economic importance of ticks; vector capacity of ticks; tick physiology and tick control. Techniques related to tick breeding, field collection of ticks, laboratory tick incubation, tick-host interaction and tick control.					
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• To obtain an in depth knowledge of all aspects of Acarology</li> <li>• To get accustomed to all techniques pertaining to this field of study</li> </ul>					
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20		6		130504	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>	
	9 for 5 weeks	continuous	0	2	5 hrs	
<b>Pre-requisite module/s:</b>	None					
<b>Co-requisite module/s:</b>	None					
<b>Assessment Criteria:</b>	Determine if the knowledge obtained complies with the outcomes set					
<b>Assessment Methods:</b>	Summative theory assessments, written, power point and poster presentation of assignments, summative theory assessment.					
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)					<b>40</b>
	<b>Final mark =</b>			% Continuous assessment		<b>60</b>
				% Summative assessment		<b>40</b>
	Min Final Assessment mark to pass (%)					<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>	
	Theory / Practical	Theory				
	Duration	3 hours				
	Sub minimum	40%				

MODULE INFORMATION			
<b>Department:</b>	<b>Biology</b>	<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	BLGY704 MZOB071

<b>Module Code:</b>	<b>MZOB081</b>				
<b>Module Name:</b>	Palaeontology and Philosophy of Biological Science				
<b>Module Content:</b>	Understanding of the principles of vertebrate evolution by integrating palaeontological, comparative anatomical and embryological information. Application of cladistics to the diversity of fossils, including remains of hominins found in South Africa and the identification of the strata where these fossils are found. The module prepares the student to do independent research and to think and present his thoughts scientifically.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>To gain an in depth knowledge about vertebrate evolution, in general and specifically human evolution</li> <li>To get accustomed to all techniques pertaining to this field of study</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	6		131203	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9 for 5 weeks	continuous		2	5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Determine if the knowledge obtained complies with the outcomes set				
<b>Assessment Methods:</b>	Summative theory assessments, Written, power point and poster presentation of assignments Summative theory assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =	% Continuous assessment			<b>60</b>
		% Summative assessment			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>n/a</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hours			
	Sub minimum	40%			

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Biology</b>	<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	BLGY705 MZOO072

<b>Module Code:</b>	<b>MZOB082</b>		
<b>Module Name:</b>	Parasitology		
<b>Module Content:</b>	<b>Fish as host for parasites.</b> The classification, identification, morphology and life cycles of different protozoan, trematode, cestode and arthropod parasites occurring on fish. The course also includes sampling techniques and techniques required to fix, stain and mount these parasites for light microscopy, as well as techniques to study these parasites using the scanning electron microscope.		
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>To gain an in depth knowledge of protozoan, trematode, cestode and arthropod parasites occurring on/in fish</li> <li>To get accustomed to all techniques pertaining to this field of study</li> </ul>		

<b>Module Code:</b>	<b>MZOB082</b>				
<b>Module Name:</b>	Parasitology				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	6		130504	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	9 for 5 weeks	continuous		2	5 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Determine if the knowledge obtained complies with the outcomes set				
<b>Assessment Methods:</b>	Summative theory assessments, written, power point and poster presentation of assignments, summative theory assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	Final mark =		% Continuous assessment		<b>60</b>
			% Summative assessment		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## DEPARTMENT : COMPUTER SCIENCE & INFORMATION TECHNOLOGY

### CURRICULUM INFORMATION

<b>Department:</b> Computer Science and Information Technology	<b>School:</b> Science and Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2017
<b>Is this Module replacing existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>CSIT700 (T2, T3 &amp; T4)</b>				
<b>Module Name:</b>	<b>RESEARCH PROJECT</b>				
<b>Module Content:</b>	A research topic from one of several computer science specializations offered in the Department is chosen in consultation with the academic staff member responsible				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to demonstrate knowledge of different types of research methods, research framework, acquisition of research skills and methodologies required for the research report				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	40	8		060101	
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>		<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>	
	SMU	Contact, Full Time		1 <sup>st</sup> & 2 <sup>nd</sup> Semester	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	0	Research Project	0	1	Research Project
<b>Pre-requisite modules for this module:</b>	None				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to develop a relevant research report of a given research topic by a supervisor				

<b>Assessment Methods:</b>	The final mark will be obtained from the research project report and presentation.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)			N/A	
	Final mark =	% Formative Assess Mark		N/A	
		% Summative Assess Mark		100%	
	Min Final Assessment mark to pass (%)			50%	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Research Project			
	Duration	Year			
	Sub minimum	N/A			

CURRICULUM INFORMATION				
<b>Department:</b> Computer Science and Information Technology		<b>School:</b> Science and Technology		
<b>Last Revision date:</b> 2011		<b>First Year Offered (New):</b> 2017		
<b>Is this Module replacing existing module(s)?</b> No		<b>If YES, give the module codes:</b>		
<b>Module Code:</b> CSIT701 S1(T1 & T2)				
<b>Module Name:</b> ADVANCED DATABASE SYSTEMS DEVELOPMENT				
<b>Module Content:</b>		<ul style="list-style-type: none"> <li>• Design, implement and maintain Relational and Object Oriented Databases</li> <li>• LAMP (Linux, Apache, MySQL and PHP)</li> <li>• Server-side programming using PHP</li> <li>• Knowledge of Apache server and how to set it up</li> <li>• Database design using MySql</li> <li>• Integrating PHP and MySQL database</li> <li>• Web page development including HTML and CSS</li> <li>• The use of templates</li> </ul>		
<b>Learning Outcomes:</b>		After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• Apply skills for web-based development and implementation of a database system</li> <li>• Query the database and retrieve decision making information.</li> <li>• Apply knowledge of XML and XSLT</li> <li>• Apply knowledge of styles using CSS in professional designs</li> <li>• Extract hidden knowledge from unstructured data</li> <li>• Develop dynamic database systems</li> </ul>		
<b>Module Information:</b>		<b>SAQA Credits</b> 20	<b>ITS Course Level Code</b> 8	<b>CESM Code (3<sup>rd</sup> Order)</b> 061002
<b>Delivery Information:</b>		<b>Campus</b> SMU	<b>Full/Part Time</b> Contact, Full Time	<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b> 1st Semester
<b>Periods per Week:</b>		<b>Classes</b> 5	<b>Practicals</b> 2	<b>Tutorial</b> 1
			<b>Seminars</b> 0	<b>Independent Learning</b> 10 Hours
<b>Pre-requisite modules for this module:</b>		COSC311		
<b>Co-requisites modules for module:</b>		None		
<b>ASSESSMENT:</b>				
<b>Assessment Criteria:</b>		A student should be able to demonstrate that s/he can design a reliable database, apply access control measures, run transactions, and provide stored information needed by the organization to carry out its business.		
<b>Assessment Methods:</b>		A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark		
<b>Assessment Weighting:</b>		Min Formative Assessment mark for exam admission (%)		40%
		Final mark =	% Formative Assess Mark	60%
			% Summative Assess Mark	40%
		Min Final Assessment mark to pass (%)		50%
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
		Theory / Practical	Theory	
		Duration	3 Hours	
		Sub minimum	40%	

CURRICULUM INFORMATION					
<b>Department</b> Computer Science and Information Technology			School: Science and Technology		
Last Revision date: 2011			First Year Offered (New): 2017		
Is this Module replacing existing module(s)? No			If YES, give the module codes:		
<b>Module Code:</b> CSIT703 S1(T1 & T2)					
<b>Module Name:</b> ARTIFICIAL INTELLIGENCE					
<b>Module Content:</b> Basic Definitions and Concepts of Artificial Intelligence (AI) game engine programming; An AI Engine: the Basic Components and Design; Asteroids: Our AI Test Bed; Role-Playing Games (RPGs); Adventure Games; Real-Time Strategy (RTS) Games; First-Person Shooters/Third-Person Shooters (FPS); Platform Games; Shooter Games; Sports Games; Racing Games; Classic Strategy Games; Fighting Games; Miscellaneous Genres of Note; Finite-State Machines; Fuzzy-State Machines (FuSMs);					
<b>Learning Outcomes:</b> At the end of this course students are expected to have mastered the following: <ul style="list-style-type: none"> <li>• Knowledge of the tools and information developers need to create modern game AI engines.</li> <li>• Knowledge of the four principle elements of game artificial intelligence</li> <li>• Acquiring of actual game development skills going beyond merely discussing how a technique might be used.</li> <li>• Knowledge of the common terminology, the underlying concepts of AI, and discovery of the different parts of the game AI engine.</li> <li>• AI design considerations, solutions, and even common pitfalls, covering the majority of modern game genres and examining concrete examples of AI used in actual commercial games.</li> <li>• Knowledge of the actual code implementations for each AI technique presented, both in skeletal form and as part of a real-world example, learning how it works in an actual game engine and how it can be optimized in the future.</li> </ul>					
<b>Module Information:</b>		<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	
		20		8	
				<b>CESM Code (3<sup>rd</sup> Order)</b>	
				060102	
<b>Delivery Information:</b>		<b>Campus</b>		<b>Full/Part Time</b>	
		SMU		Contact, Full Time	
				<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>	
				1 <sup>st</sup> Semester	
<b>Periods per Week:</b>		<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>
		5	2	1	0
					<b>Independent Learning</b>
					10 Hours
<b>Pre-requisite modules for this module:</b>		COSC211			
<b>Co-requisites modules for module:</b>		None			
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>		A student should be able to demonstrate that s/he understands the important concepts of artificial intelligence and can apply them to computer applications or game programming.			
<b>Assessment Methods:</b>		A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark.			
<b>Assessment Weighting:</b>		Min Formative Assessment mark for exam admission (%)		40%	
		Final mark =	% Formative Assess Mark	60%	
			% Summative Assess Mark	40%	
		Min Final Assessment mark to pass (%)		50%	
<b>Summative Assessment Paper:</b>			<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
		Theory / Practical	Theory		
		Duration	3 Hours		
		Sub minimum	40%		

CURRICULUM INFORMATION	
<b>Department</b> Computer Science and Information Technology	<b>School:</b> Science and Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2017
<b>Is this Module replacing existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>CSIT705 S2(T3 &amp; T4)</b>				
<b>Module Name:</b>	<b>HEALTH INFORMATICS (OBJECT-ORIENTED APPROACH)</b>				
<b>Module Content:</b>	Introduction to Healthcare IT; Healthcare Organization and Operations; Desktop IT Operations; Network IT Operations; Medical Business Operations; Document Imaging and Problem Solving; Basic Healthcare Security; Advanced Healthcare Security.				
<b>Learning Outcomes:</b>	Students should be able to: <ul style="list-style-type: none"> <li>• Appreciate the rapid pace of growth of the healthcare industry</li> <li>• Understand the most significant changes in the industry as the use of electronic health records increase.</li> <li>• Understand the in-depth and comprehensive view of health information technology by examining healthcare regulatory requirements</li> <li>• Learn about the functions of a healthcare organization and its medical business operations in addition to IT hardware, software, networking, and security.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	20	8	061001		
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>	<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>		
	SMU	Contact, Full Time	2 <sup>nd</sup> Semester		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1	0	10 Hours
<b>Pre-requisite modules for this module:</b>	None				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has understood the concepts as outlined in the module content and outcomes outlined above.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on presentations, assignments and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				40%
	Final mark =	% Formative Assess Mark			60%
		% Summative Assess Mark			40%
	Min Final Assessment mark to pass (%)				50%
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department</b>	<b>Computer Science and Information Technology</b>			<b>School:</b> Science and Technology	
<b>Last Revision date:</b>	2011			<b>First Year Offered (New):</b> 2017	
<b>Is this Module replacing existing module(s)?</b>	No			<b>If YES, give the module codes:</b>	
<b>Module Code:</b>	<b>CSIT706 S2 (T3 &amp; T4)</b>				
<b>Module Name:</b>	<b>COMPUTER NETWORKS</b>				
<b>Module Content:</b>	Hands-on analysis of packets from different protocols; Client-server operations; Protocol analysers to filter and analyse data packets; Different network architectures (tiered); Stand-alone and client-server computing; Static and dynamic routing; Shortest path routing; Network Subnetting; Cloud computing				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to: <ul style="list-style-type: none"> <li>• Understand and appreciate the hands-on analysis of packets from different protocols and client-server operations</li> <li>• Use Open-Source and free protocol analysers available: Wireshark, NAST, Zenmap, Capsa, Zenoss, and NetworkMiner</li> <li>• Understand the different network architectures (tiered)</li> <li>• Distinguish between stand-alone and client-server computing</li> <li>• Design networks and their subnets for an organisation</li> <li>• Appreciate the power of cloud computing</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	8		060902	
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>		<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>	
	SMU	Contact, Full Time		2 <sup>nd</sup> Semester	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1	0	10 Hours
<b>Pre-requisite modules for this module:</b>	None				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he understands the concepts of as outlined in the module content and outcomes.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)			40%	
	Final mark =	% Formative Assess Mark		60%	
		% Summative Assess Mark		40%	
	Min Final Assessment mark to pass (%)			50%	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

SECTION F: MODULAR INFORMATION REQUIRED			
<b>Department:</b>	<b>Computer Science and Information Technology</b>	<b>School:</b>	Science and Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2017
<b>Is this Module replacing existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>CSIT708 S2(T3 &amp; T4)</b>				
<b>Module Name:</b>	<b>COMPUTER SECURITY</b>				
<b>Content::</b>	Network security fundamentals (common attacks and defense mechanisms); Data Encryptions Algorithms; Public-key Cryptography and key management; Data Authentication; Network security protocols; Network security applications (Kerberos, web security (SSL/TLS)); Wireless network security; Cloud security; Intrusion detection and risk management				
<b>Module Outcomes:</b>	At the end of this course students are expected to: <ul style="list-style-type: none"> <li>• Demonstrate an understanding of network security concepts and applications</li> <li>• Identify network security threats and determine mechanisms to counter them</li> <li>• Implement common Encryption and Cryptographic algorithms</li> <li>• Analyse and design network security protocols</li> <li>• Demonstrate knowledge of information security governance and the associated legal and regulatory issues</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	20	8	060903		
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>	<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>		
	SMU	Contact, Full Time	2 <sup>nd</sup> Semester		
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	0	1	0	10 Hours
<b>Pre-requisites for this module:</b>	None				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate application of computer security techniques.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, presentations and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)			40%	
	Final mark =	% Formative Assess Mark		60%	
		% Summative Assess Mark		40%	
	Min Final Assessment mark to pass (%)			50%	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

SECTION F: MODULAR INFORMATION REQUIRED			
<b>Department:</b>	<b>Computer Science and Information Technology</b>	<b>School:</b>	Science and Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2017
<b>Is this Module replacing existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>CSIT709 S2(T3 &amp; T4)</b>			
<b>Module Name:</b>	<b>MOBILE APPLICATION DEVELOPMENT (INTERMEDIATE)</b>			
<b>Module Content::</b>	Part I: OBJECTIVE C Introduction to the fundamentals: Variables, Constants, and Data Types; Decisions and Conditions; Looping; Functions; Foundation Framework; Object-Oriented Programming Part II: PROGRAMMING Understanding and Implementing Open Source Environments; Understanding and Creating User Interfaces;			

	Passing Data Between View Controllers, Delegates, and Protocols; Table Views; Tab Bar View and Picker View Controls; Multimedia: Images and Sound; Data Persistence				
<b>Module Outcomes:</b>	At the end of this course students are expected to: <ul style="list-style-type: none"> <li>Acquire thorough knowledge of mobile application development using Open Source environment and Objective-C programming</li> <li>Acquire practical application skills in developing third part phone apps</li> <li>Integrate business topics into the world of app development</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		8		060799
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>
	SMU		Contact, Full Time		2 <sup>nd</sup> Semester
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1	0	10 Hours
<b>Pre-requisites for this module:</b>	COS321				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate the concepts outlined in the module content and outcomes above.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, presentations and tests. The final mark will be obtained from a three-hour written examination and the continuous assessment module mark.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)				40%
	Final mark =	% Formative Assess Mark			60%
		% Summative Assess Mark			40%
	Min Final Assessment mark to pass (%)				50%
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

**SECTION F: MODULAR INFORMATION REQUIRED**

<b>Department:</b> Computer Science and Information Technology	<b>School:</b> Science and Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2017
<b>Is this Module replacing existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>CSIT710 S1 or S2</b>				
<b>Module Name:</b>	<b>SPECIAL TOPICS</b>				
<b>Content::</b>	The content will be generic based on the expertise of visiting lecturer or researcher over a period of not less than a term.				
<b>Module Outcomes:</b>	At the end of this course students are expected to have mastered the concepts covered based on the field of expertise of the visiting lecturer or researcher.				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		8		069999
<b>Delivery Information:</b>	<b>Campus</b>		<b>Full/Part Time</b>		<b>Period (1<sup>st</sup>/2<sup>nd</sup>Sem)</b>
	SMU		Contact, Full Time		Semester
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	5	2	1	0	10 Hours
<b>Pre-requisites for this module:</b>	None				
<b>Co-requisites modules for module:</b>	None				
<b>ASSESSMENT:</b>					
<b>Assessment Criteria:</b>	A student should be able to demonstrate application of information technology aspects as presented by the expert.				
<b>Assessment Methods:</b>	A module mark will be obtained from continuous assessment based on quizzes, assignments, presentations and tests. The final mark will be obtained from a three-hour written examination and the continuous				

	assessment module mark.				
<b>Assessment Weighting:</b>	Min Formative Assessment mark for exam admission (%)			40%	
	Final mark =	% Formative Assess Mark		60%	
		% Summative Assess Mark		40%	
	Min Final Assessment mark to pass (%)			50%	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

## DEPARTMENT: CHEMISTRY

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Chemistry</b>			<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011			<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES			<b>If YES, give the module codes:</b>	CHEM750

<b>Module Code:</b>	<b>MCHM080</b>				
<b>Module Name:</b>	Research Project				
<b>Module Content:</b>	Students will be introduced to many of the skills required to carry out independent research. The exact skills taught will depend on the type of research project to be undertaken. However, the skills will include laboratory techniques, word processing, literature searching, and oral presentation.				
<b>Learning Outcomes:</b>	<p>By the end of this module students will have :</p> <ul style="list-style-type: none"> <li>Acquired laboratory skills necessary for independent research</li> <li>Developed further skills in operating different types of instrumentation.</li> <li>Developed computational and data-processing skills related to chemical information and data.</li> <li>Be aware of the techniques required for successful information retrieval from primary and secondary sources.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	40		06		140499
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
		Res Project		3	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	A combination of seminar presentations, mini desertation and summative assessment in the form of a project presentation.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>N/A</b>
	Final mark =	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Research Project			
	Duration	Year			
	Sub minimum	N/A			

**CURRICULUM INFORMATION**

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> CHEM711

<b>Module Code:</b>	<b>MCHA081</b>				
<b>Module Name:</b>	Advanced Organic Chemistry				
<b>Module Content:</b>	Functional Group Interconversion. Retrosynthetic analysis. Advanced Organic Synthesis: Strategy and Control. Advanced Organic Spectroscopy. <b>Miscellaneous Topics:</b> Heteroatom-stabilised carbanions, neighbouring participation, peptide synthesis, natural products.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Students should have a coherent and critical understanding of the use in organic synthesis of a range of chemical transformations which exploit reactions involving main group elements and transition metal complexes and be able to devise syntheses of molecules of varying structural complexity using this knowledge.</li> <li>Design strategies for the efficient synthesis of a range of organic molecules, including the use of suitable reagents to effect chemo-, regio- and stereoselective reactions.</li> <li>Know the principles that govern chemical reactivity and use them to make predictions about the mechanisms and outcomes of chemical reactions.</li> <li>Determine molecular structures from Nuclear Magnetic Resonance (NMR) and other organic spectroscopic techniques.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		06		140404
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 × 90 min	None	None	None	12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Demonstrate proficiency in applying in a logical manner the principles, concepts and facts related to Functional Group Interconversion. Retrosynthetic analysis. Advanced Organic Synthesis: Strategy and Control. Advanced Organic Spectroscopy.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40			

**CURRICULUM INFORMATION**

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> CHEM721

<b>Module Code:</b>	<b>MCHB081</b>				
<b>Module Name:</b>	Advanced Inorganic Chemistry				
<b>Module Content:</b>	Electronic Spectra of Transition Metal Complexes; Magnetic Properties of Transition Metal Complexes; Inorganic reaction mechanisms; Advanced Main Group Chemistry; Inorganic chains, cages and Metal Clusters; Further Organometallic Chemistry [including key reactions in catalysis and some important industrial reactions such as olefin polymerization, olefin metathesis (ROMP and SHOP), Fischer-Tropsch synthesis and water-gas shift reactions]. <b>Miscellaneous Topics:</b> Aqueous and non-aqueous solutions; Nanomaterials, nanoscience and nanotechnology.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Students should be able to demonstrate advanced and critical knowledge of aqueous and non-aqueous solutions.</li> <li>• Know and apply key reactions in catalysis</li> <li>• On the basis of electronic structure, interpret electronic spectra and magnetic properties of d-metal complexes</li> <li>• Demonstrate a clear understanding of Organometallic Chemistry and its application to important industrial reactions</li> <li>• Be familiar with the concepts of inorganic chains, cages and clusters; nanomaterials, nanoscience and nanotechnology.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		06		140403
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 × 90 min	None	None	None	12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Demonstrate proficiency in applying in a logical manner the principles, concepts and facts related to aqueous and non-aqueous solutions, key reactions in catalysis; electronic structure, electronic spectra, and magnetic properties of d-metal complexes, organometallic chemistry and industrially- important reactions, inorganic chains, cages and clusters; nanomaterials, nanoscience and nanotechnology.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 h			
	Sub minimum	40			

**CURRICULUM INFORMATION**

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> CHEM732

<b>Module Code:</b>	<b>MCHA082</b>				
<b>Module Name:</b>	Advanced Physical Chemistry				
<b>Module Content:</b>	Catalysis on surface (Surface chemistry); Statistical Thermodynamics; <b>Miscellaneous Topics:</b> Kinetics; Catalysis in solution; Macromolecular catalytic applications; Crystallography; [molecular symmetry, techniques and applications of quantum chemistry, the atomic structure and atomic spectra, molecular structure, molecular spectroscopy].				
<b>Learning Outcomes:</b>	<p>At the end of this module, students should be able to:</p> <ul style="list-style-type: none"> <li>Describe the structure, electronic and mechanical properties of polymers.</li> <li>Describe colloidal systems and how different types of micelles are formed.</li> <li>Be familiar with techniques used in the study of material properties.</li> <li>Describe the structures of solids in terms of crystal lattices and unit cells.</li> <li>Master the techniques for studying crystal structures.</li> <li>Describe the Bragg method and the Debye-Scherrer method of X-ray structural analysis.</li> <li>Index reflections and identify the unit cell from X-ray diffraction patterns.</li> <li>Understand and satisfactorily describe the dynamics of molecular motion, particularly in the gas phase.</li> <li>Be able to derive the rate laws, and apply the steady state approximation to derive rate laws for complex reactions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20	06		140405	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 × 90 min	None	None	None	12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Demonstrate proficiency in applying in a logical manner the principles, concepts and facts related to substitution and elimination reactions, carbonyl chemistry, the chemistry of carboxylic acids and their derivatives, organic spectroscopy, organometallics.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass(%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40			

## DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

CURRICULUM INFORMATION					
<b>Department:</b> Mathematics	<b>School:</b> School of Technology				
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013				
<b>Replace this Module existing module(s)?</b> NO	<b>If YES, give the module codes:</b>				
<b>Module Code</b>	<b>MMTH080</b>				
<b>Module Name:</b>	Research Project				
<b>Module Content:</b>	The student, in consultation with supervisor, selects a research topic in mathematics, does independent research and writes a report.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>Select a research topic.</li> <li>Do independent research.</li> <li>Write a research report.</li> <li>Give a presentation to the Department.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	40		6	150101	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	0	Res Project	0	1	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	A student should be able to demonstrate that s/he has the ability to do independent research in mathematics.				
<b>Assessment Methods:</b>	The final mark will be obtained from an extended project essay or research paper				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>N/A</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Research Project			
	Duration	Semester			
	Sub minimum	N/A			

### CURRICULUM INFORMATION

<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> MATH710

<b>Module Code:</b>	<b>MMTA081</b>				
<b>Module Name:</b>	Group and Field Theory				
<b>Module Content:</b>	Groups: Review of group theory, examples of groups, cyclic groups, permutation groups, groups up to order 16. Group actions and conjugacy classes. The isomorphism theorems; normality, the Jordan Holder theorem, solvable and simple groups. Direct products. Finitely Generated Abelian groups, free groups.				
<b>Module Content:</b>	<b>Fields:</b> Field extensions, splitting fields, Main Theorem of Galois, solution of polynomial Equations by radicals.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should <ul style="list-style-type: none"> <li>• have a clear understanding of groups.</li> <li>• be able to determine whether a group is cyclic or not.</li> <li>• have a good understanding of free groups.</li> <li>• have a good understanding of Galois 's theory.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> Mathematics & Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> MATH720

<b>Module Code:</b>	<b>MMTB081</b>				
<b>Module Name:</b>	General Topology				
<b>Module Content:</b>	Metric spaces, topological spaces, continuous functions, weak topologies, quotient spaces, convergent sequences, separation axioms, normal spaces, countability, compact spaces, metrization, connectedness and uniform spaces.				
<b>Learning Outcomes:</b>	After successful completion of the module, the student should be able to <ul style="list-style-type: none"> <li>• construct, independently, non-routine mathematical proofs.</li> <li>• verify whether a given collection of subsets of a set X forms a topology on X.</li> <li>• to investigate from third mathematics which results in metric spaces are translatable to topological spaces.</li> <li>• justify why some examples do not satisfy certain properties.</li> </ul>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• to construct a subspace topology.</li> <li>• determine whether a topological space is connected, compact, normal</li> <li>• understand the concepts of separation axioms, and how these axioms relate to one another</li> <li>• have a sound understanding of nets and filters in a topological space.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150105
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3 x 1 hours	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Mathematics Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> NO	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MMTC081</b>				
<b>Module Name:</b>	Complex Analysis				
<b>Module Content:</b>	Maximum Modulus Principle; Residue Calculus; Argument Principle; Uniform Convergence & Infinite Products; Entire Functions; Weierstrass' Theorem; Approximation by Rational Functions & Polynomials; Conformal Mappings; Riemann's Mapping Theorem				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Students should be able to independently construct non-routine mathematical proofs and to reconstruct known mathematical proofs in a way that exhibit profound understanding on the material listed in the module content.</li> <li>• Students should be able to critique given mathematical proofs on complex analysis and affirm their validity or invalidity.</li> <li>• Students should be able to use complex methods to evaluate real definite integrals.</li> <li>• Students should be able to prove the relationship between infinite products and uniform convergence.</li> <li>• Students should be able to apply complex analysis' techniques in other branches of mathematics like Number Theory..</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	16	6	150199		
<b>Module Code:</b>	<b>MMTC081</b>				
<b>Module Name:</b>	Complex Analysis				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	3 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module. Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

**CURRICULUM INFORMATION**

<b>Department:</b> <b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> MATH740

<b>Module Code:</b>	<b>MMTD082</b>				
<b>Module Name:</b>	Functional Analysis				
<b>Module Content:</b>	Topology and completion of metric spaces. Normed spaces and Banach spaces: linear operators and functionals, dual spaces, adjoint operators, Hahn-Banach theorem, Open Mapping Theorem, Closed Graph Theorem, Banach Fixed Point Theorem, Spectral theory of linear compact operators. <b>Hilbert spaces:</b> Orthogonal complement and direct sums, Riesz representative theorem, Hilbert Adjoint, self-adjoint, unitary and normal operators, spectral theory of bounded self-adjoint operators.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• To have a good understanding of introductory topics in analysis which will form a sound basis for students to advance in this field.</li> <li>• To develop problem solving skills in the area of analysis and communicate clearly their knowledge and ideas.</li> <li>• To develop the ability to learn and advance independently</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	16	6		150103	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department:</b> Mathematics and Applied Mathematics			<b>School:</b> Science & Technology		
<b>Last Revision date:</b> 2011			<b>First Year Offered (New):</b> 2013		
<b>Replace this Module existing module(s)?</b> YES			<b>If YES, give the module codes:</b> MATH730		
<b>Module Code:</b>	<b>MMTD081</b>				
<b>Module Name:</b>	Measure Theory and Integration				
<b>Module Content:</b>	Algebra of sets and limits; set functions. Outer and inner measure; extension of measure; $\sigma$ - finite measures, Lebesgue measure, Riemann-Stieltjes Measure, Measurable functions, Measure space, convergence in measure. Lebesgue integrable functions, convergence in mean, properties in integrals. Countable additive set functions, Hahn and Jordan decomposition, Radon-Nikodym theorem. Differentiation: Functions of bounded variation, Vitali's theorem.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Students should be able to independently construct non-routine mathematical proofs and to reconstruct known mathematical proofs in a way that exhibit profound understanding on the material listed in the module content.</li> <li>• Students should be able to critique given mathematical proofs on measure theory and affirm their validity or invalidity.</li> <li>• Students should be able to investigate if a given set function is a measure, an outer-measure on a given structure and its substructures or superstructure and their interrelations.</li> <li>• Students should be able to prove the relation between types of convergence.</li> <li>• Students should be able to calculate Lebesgue integrals and see it as a generalization of the Riemann integral.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150199
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module. Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department:</b> Mathematics and Applied Mathematics			<b>School:</b> Science & Technology		
<b>Last Revision date:</b> 2011			<b>First Year Offered (New):</b> 2013		
<b>Replace this Module existing module(s)?</b> YES			<b>If YES, give the module codes:</b> MATH750		
<b>Module Code:</b>	<b>MMTE082</b>				
<b>Module Name:</b>	Category Theory				

<b>Module Content:</b>	Abstract and Concrete categories, The duality principle. <b>Properties of morphisms:</b> Sections, retractions, monomorphisms, epimorphisms, bismorphisms and isomorphisms. <b>Properties of special objects:</b> initial and terminal objects, zero objects and quotients. <b>Properties of functors.</b> <b>Universal construction:</b> Equalizers, regular and extremal monomorphisms and epimorphisms, (Co)products, mono-sources and epic-links, (Co)limits and pullbacks' pullouts.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>To have a good understanding of category theory.</li> <li>To develop problem solving skills in the area of category theory and communicate clearly their knowledge and ideas.</li> <li>To develop the ability to learn and advance independently</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b> 16	<b>ITS Course Level Code</b> 6		<b>CESM Code (3<sup>rd</sup> Order)</b> 150101	
<b>Periods per Week:</b>	<b>Classes</b> 2 x 1 hrs	<b>Practicals</b> 0	<b>Tutorial</b> 1	<b>Seminars</b> 0	<b>Independent Learning</b> 10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTA071 and MMTB071				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	YES	<b>If YES, give the module codes:</b>	MATH750

<b>Module Code:</b>	<b>MMTF082</b>				
<b>Module Name:</b>	Combinatorics				
<b>Module Content:</b>	Permutations and Combinations, Pigeonhole Principle, Binomial Coefficients, Principle of Inclusion – Exclusion, Recurrence relations, Generating functions, Combinatorial structures, Discrete probability.				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Be able to able apply combinatorial methods to solve counting problems.</li> <li>Apply combinatorial techniques in other mathematical fields.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b> 16	<b>ITS Course Level Code</b> 6		<b>CESM Code (3<sup>rd</sup> Order)</b> 150101	
<b>Periods per Week:</b>	<b>Classes</b> 3 x 1 hrs	<b>Practicals</b> 0	<b>Tutorial</b> 1	<b>Seminars</b> 0	<b>Independent Learning</b> 10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTA071 and MMTA072				

<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.			
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative ment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011		<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES		<b>If YES, give the module codes:</b> MATH760

<b>Module Code:</b>	<b>MMTG082</b>				
<b>Module Name:</b>	Number Theory				
<b>Module Content:</b>	Prime Number Theorem, Partition Function, Sequences with Arithmetic Progression, Sums & Differences, Products & Divisibility, Riemann Zeta Function				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Understand the Prime number theorem and its applications</li> <li>• Understand the Riemann Zeta Function and its relationship to other areas of mathematics</li> <li>• Understand the complexity of the Riemann's Hypothesis</li> <li>• Understand the properties of primes</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTC072 and MMTB071				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark			<b>60</b>
		% Summative Assessment Mark			<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b> MATH780

<b>Module Code:</b>	<b>MMTH082</b>				
<b>Module Name:</b>	Ring Theory				
<b>Module Content:</b>	Ideals & Quotient Rings, Modules, Properties of Rings, Unique Factorisation Theorem				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Understand the algebraic structure of rings and their applications in related algebraic areas</li> <li>Understand the Unique Factorisation Theorem.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTC072 and MMTB071				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> YES	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MMTC082</b>				
<b>Module Name:</b>	Approximation Theory				
<b>Module Content:</b>	Best Approximations, Existence of Approximations, Possibility of Approximation, Uniqueness of Approximations, Muntz Theorem				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Understand the main approximation theory techniques/theorems and their applications in general mathematical analysis</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTC072 and MMTB071				

<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.			
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.			
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>
		% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)			<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>
	Theory / Practical	Theory		
	Duration	3 hrs		
	Sub minimum	40%		

CURRICULUM INFORMATION			
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>		<b>School:</b> Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	No	<b>If YES, give the module codes:</b>	

<b>Module Code:</b>	<b>MMTA082</b>				
<b>Module Name:</b>	Graph Theory				
<b>Module Content:</b>	Graphs, Planar graphs, Platonic graphs, Colouring, Genus of a graph, Euler Walks & Hamilton Walks				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• Be able to identify the various types of graphs</li> <li>• Understand the relationship between Graph Theory &amp; Combinatorics</li> <li>• Be able to draw the different types of graphs</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTC072 and MMTB071				
<b>Assessment Criteria:</b>	Continuous summative assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)			<b>40</b>	
	<b>Final mark =</b>	% Summative Assessment Mark		<b>60</b>	
		% Summative Assessment Mark		<b>40</b>	
	Min Final Assessment mark to pass (%)			<b>50</b>	
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MMTB082</b>				
<b>Module Name:</b>	Potential Theory				
<b>Module Content:</b>	Harmonic Functions, Subharmonic Functions, Potentials, Polar Sets, Equilibrium Measures, The Generalized Laplacian, The Dirichlet Problem, Capacity, Applications of Potential Theory				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Understand potential theory in the complex plane.</li> <li>Apply potential theoretic techniques in solving analytic problems</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	16		6		150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	2 x 1 hrs	0	1	0	10 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	MMTC072 and MMTB071				
<b>Assessment Criteria:</b>	Continuous assessment based on Quizzes, Tutorials, Assignments, and Tests. Summative assessment will be done at the end of the module.				
<b>Assessment Methods:</b>	A module mark will be calculated from continuous assessment and be combined with summative assessment in the ratio 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
<b>Assessment Weighting:</b>	Min continuous assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

## DEPARTMENT: PHYSICS

CURRICULUM INFORMATION	
<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS700

<b>Module Code</b>	<b>MPHS080</b>
<b>Module Name:</b>	Research Project
<b>Module Content:</b>	Students will be introduced to many of the skills required to carry out independent research. The exact skills taught will depend on the type of research project to be undertaken. However, the skills will include laboratory techniques, word processing, literature searching, and oral presentation.

<b>Module Code</b>	<b>MPHS080</b>				
<b>Module Name:</b>	Research Project				
<b>Learning Outcomes:</b>	By the end of this module students will have : <ul style="list-style-type: none"> <li>• Acquired laboratory skills necessary for independent research</li> <li>• Developed further skills in operating different types of instrumentation.</li> <li>• Developed computational and data-processing skills related to chemical information and data.</li> <li>• Be aware of the techniques required for successful information retrieval from primary and secondary sources.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	40		06		140701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
		14 hrs		3/module	2 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Demonstrate proficiency in writing a proposal, performing literature review, referencing, collecting data, analysing data, writing the research report, presenting results.				
<b>Assessment Methods:</b>	A combination of seminar presentations, mini desertation and summative assessment in the form of a project presentation.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				n/a
	<b>Final mark =</b>	% Summative Assess Mark	40 (10% seminars:30% project presentation)		
		% Summative Assess Mark	60 (Evaluation of project write-up)		
	Min Final Assessment mark to pass (%)				
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Res Project			
	Duration				
	Sub minimum	40%			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Physics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS711

<b>Module Code:</b>	<b>MPHA081</b>
<b>Module Name:</b>	Quantum Mechanics
<b>Module Content:</b>	Quantum and wave Mechanics: Introductory mechanics. Axiomatic statement of the Schrodinger equation. Rectangular potential well of finite and infinite depth. The hydrogen atom. Identical particles. Occupation of energy states by electrons. Heisenberg's interpretation. Dirac's quantum mechanics. Plane wave solution of the Dirac equation. Spin of a particle. A charged particle in electromagnetic fields. The Zeeman effect in a strong external magnetic field. Time dependant perturbation. Semi-classical theory of radiation. Spectral analysis. Many body problems.
<b>Learning Outcomes:</b>	Students should be able to: <ul style="list-style-type: none"> <li>• Describe the formal principles of quantum mechanics and apply these to some atomic systems</li> <li>• Describe general methods for solving atomic systems with emphasis on the significant quantum properties</li> <li>• Use perturbation methods to analyze more complex situation</li> <li>• Solve mathematical problems</li> </ul>

<b>Module Code:</b>	<b>MPHA081</b>				
<b>Module Name:</b>	Quantum Mechanics				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>	
	20		06	140701	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min		1 x 45 min	1 x semester	12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Axiomatic statement of the Schrodinger equation. Rectangular potential well of finite and infinite depth. The hydrogen atom. Identical particles. Occupation of energy states by electrons. Heisenberg's interpretation. Dirac's quantum mechanics. Plane wave solution of the Dirac equation. Spin of a particle. A charged particle in electromagnetic fields. The Zeeman effect in a strong external magnetic field. Time dependant perturbation. Semi-classical theory of radiation. Spectral analysis. Many body problems.				
<b>Assessment Methods:</b>	Summative Tests; Tutorials; Assignments. Summative written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Physics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS721

<b>Module Code:</b>	<b>MPHB081</b>
<b>Module Name:</b>	Statistical Mechanics
<b>Module Content:</b>	Boltzman's velocity distribution law. The Gamma space. The micro canonic ensemble. The canonic ensemble. Quantum Statistics. Bose-Einstein and Fermi-Dirac Statistics. Gas degeration with examples of strongly and weakly degenerate Fermi-Dirac and Bose Einstein gases. Einstein and Debye expressions for heat capacity. Plank's radiation formula. Applications.
<b>Learning Outcomes:</b>	<p>After completing this module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• describe the role of statistical concepts in understanding macroscopic systems;</li> <li>• deduce the Boltzmann distribution for the probability of finding a system in a particular quantum state;</li> <li>• apply statistical theory to determine the magnetisation of a paramagnetic solid as a function of temperature;</li> <li>• deduce the Einstein and Debye expressions for the heat capacity of an insulating solid and compare the theory with accepted experimental results;</li> <li>• deduce the equation of state and entropy for an ideal gas;</li> <li>• deduce the Fermi-Dirac and Bose-Einstein distributions;</li> <li>• describe superfluidity in liquid helium and Bose-Einstein condensation</li> <li>• deduce the heat capacity of an electron gas.</li> </ul>

<b>Module Code:</b>	<b>MPHB081</b>				
<b>Module Name:</b>	Statistical Mechanics				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		06		140701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min		1 x 45 min		12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Boltzman's velocity distribution law. The Gamma space. The micro canonic ensemble. The canonic ensemble. Quantum Statistics. Bose-Einstein and Fermi-Dirac Statistics. Gas degeration with examples of strongly and weakly degenerate Fermi-Dirac and Bose Einstein gases. Einstein and Debye expressions for heat capacity. Plank's radiation formula. Applications.				
<b>Assessment Methods:</b>	Summative Tests; Tutorials; Assignments. Summative written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Physics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS732

<b>Module Code:</b>	<b>MPHA082</b>
<b>Module Name:</b>	Electrodynamics
<b>Module Content:</b>	Maxwell's equations. The wave equation. Plane wave solutions of Maxwell's equations. Energy density in an electromagnetic field. Behavior of field vectors at interfaces. Electromagnetic waves in non-conducting media. Electromagnetic waves in conductors. Guided waves. Retarded potentials. Radiation from a point charge and from an oscillating dipole. Bremstrahlung. Scattered radiation. Coherence of radiation. Scatter in X-rays. Developments of opto-electronic properties of matter.
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>• At the end of the course the student will be able to:</li> <li>• Apply Maxwell's equation to variety of physical systems</li> <li>• Describe electromagnetic phenomena with the aid of potentials</li> <li>• Demonstrate understanding how electric potential and fields transform</li> <li>• Solve problems applying potential formalism and understand that the results are independent of the approaches one used</li> <li>• Demonstrate understanding of the process of electromagnetic radiation</li> <li>• Relate electrodynamics with relativity</li> <li>• Solve the time-independent Maxwell equations using standard mathematical techniques for boundary value problems</li> <li>• Solve the time-dependent Maxwell equations for elementary problems including the propagation of plane electromagnetic waves</li> <li>• Understand guided waves</li> </ul>

<b>Module Code:</b>	<b>MPHA082</b>				
<b>Module Name:</b>	Electrodynamics				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		06		140701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min		1 x 45 min		12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to Maxwell's equations. The wave equation. Plane wave solutions of Maxwell's equations. Energy density in an electromagnetic field. Behavior of field vectors at interfaces. Electromagnetic waves in non-conducting media. Electromagnetic waves in conductors. Guided waves. Retarded potentials. Radiation from a point charge and from an oscillating dipole. Bremsstrahlung. Scattered radiation. Coherence of radiation. Scatter in X-rays. Developments of opto-electronic properties of matter.				
<b>Assessment Methods:</b>	Tests, Tutorials and/or Assignments. Summative examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

### CURRICULUM INFORMATION

<b>Department:</b> <b>Physics</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS742

<b>Module Code:</b>	<b>MPHB082</b>		
<b>Module Name:</b>	Solid State Physics		
<b>Module Content:</b>	<p><b>Core Topics</b>  <b>Defect Solid State:</b> classifications of imperfections, point defects and ordering, dislocations, elasticity, Burger's vectors and energy of alloys.  <b>Miscellaneous Topics:</b>  <b>Electron Microscopy:</b> Interactions of electrons with matter, kinematical theory of electron diffraction, electron diffraction patterns and indexing.  <b>Semiconductor Physics:</b> Semiconductor theory; p-n junction devices; BJTs; FETs. Silicon Processing and IC fabrication; Lasers.</p>		
<b>Learning Outcomes:</b>	<p>After completion of this course students are expected to:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> describe various one, two, and three dimensional defect types</li> <li><input type="checkbox"/> describe forces and energies involved in dislocation interactions</li> <li><input type="checkbox"/> explain the various crystal structures from the given diffraction patterns</li> <li><input type="checkbox"/> Understand electron microscopy</li> <li><input type="checkbox"/> Understand what semiconductor physics is all about</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	20		140701
	<b>ITS Course Level Code</b>		
	06		

<b>Module Code:</b>	<b>MPHB082</b>				
<b>Module Name:</b>	Solid State Physics				
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4 x 45 min		1 x 45 min		12.9 hrs
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Describe, explain and apply in a logical manner the principles, concepts and facts related to classifications of imperfections, point defects and ordering, dislocations, elasticity, Burger's vectors and energy of alloys.				
<b>Assessment Methods:</b>	Summative (60%): Tests, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
<b>Assessment Weighting:</b>	Min Summative Assessment mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Min Final Assessment mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40 %			

# DEPARTMENT: STATISTICS & OPERATIONS RESEARCH

## CURRICULUM INFORMATION

<b>Department:</b> Statistics & Operations Research	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> No	<b>If YES, give the module codes:</b>

<b>Module Code:</b>	<b>MSTA081</b>				
<b>Module Name:</b>	Probability Theory				
<b>Content:</b>	<ul style="list-style-type: none"> <li>Definition of Probability Measure, Conditional Probability, Dependence and Independence, Random Variables and Distribution Functions, Joint Marginal and Conditional Distribution, Expectations and moments, Generating Functions, Distributions of Random Functions, Convergence, Law of Large Numbers, Central Limit Theorem.</li> </ul>				
<b>Learning Outcomes:</b>	After learning this course the students will be able to <ul style="list-style-type: none"> <li>Describe mathematical models and stochastic processes</li> <li>Demonstrate knowledge of advanced probability methods</li> <li>Model life random processes using appropriate statistical distributions.</li> <li>Compute the reliability of different stochastic systems</li> <li>Apply the knowledge of random processes in signal processing operations research.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50% The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Statistics &amp; Operations Research</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date: 2011</b>			<b>First Year Offered (New): 2013</b>		
<b>Replace this Module existing module(s)? No</b>			<b>If YES, give the module codes:</b>		
<b>Module Code:</b>	<b>MSTA082</b>				
<b>Module Name:</b>	Statistical Inference				
<b>Content:</b>	<ul style="list-style-type: none"> <li>• Methods of finding estimators, Criteria for evaluating estimators, Sufficiency and completeness. Confidence intervals: pivotal quantity method and general method. Theory of hypothesis testing, Tests for Normal populations, UMP test, Generalized likelihood ratio test.</li> </ul>				
<b>Learning Outcomes:</b>	<p>Upon successful completion of the requirements of this course, students should have the knowledge and skills to:</p> <ul style="list-style-type: none"> <li>• Explain in detail the notion of a parametric model and point estimation of the parameters of those models.</li> <li>• Explain in detail and demonstrate approaches to include a measure of accuracy for estimation procedures and our confidence in them by examining the area of interval estimation.</li> <li>• Demonstrate the plausibility of pre-specified ideas about the parameters of the model by examining the area of hypothesis testing.</li> <li>• Explain in detail and demonstrate the use of non-parametric statistical methods, wherein estimation and analysis techniques are developed that are not heavily dependent on the specifications of an underlying parametric model.</li> <li>• Demonstrate computational skills to implement various statistical inferential approaches</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>• A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>• A summative assessment will consist of one three-hour paper.</li> <li>• A student is admitted to the formal assessment based on a module mark of 50% The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>• Assignments</li> <li>• Practical's</li> <li>• Case Studies</li> <li>• Tests</li> <li>• examinations</li> <li>• presentations</li> </ul> <p>all of the above consistent with continuous assessment (summative and summative)</p>				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Statistics &amp; Operations Research</b>	School: Science & Technology
Last Revision date: 2011	First Year Offered (New): 2013
Replace this Module existing module(s)? No	If YES, give the module codes:

Module Code:	<b>MSTB081</b>				
Module Name:	Sampling Theory				
Content:	<ul style="list-style-type: none"> <li>Review of Simple and Stratified Random Sampling, Sampling with Probability Proportional to size, Systematic Sampling, Multistage Sampling, Sources of Errors.</li> </ul>				
Learning Outcomes:	After learning this course the students will be able to <ul style="list-style-type: none"> <li>Demonstrate advanced knowledge in</li> <li>Gain more advanced insight into stratified random sampling; systematic and cluster sampling.</li> <li>Demonstrate understanding of estimation of the sample size; ratio and regression estimation; sampling with unequal probabilities; complex surveys.</li> <li>Explain and offset cases of non-response in surveys.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order)
	12				
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4	2	2	2	4
Pre-requisite module/s:	All four Statistics III modules				
Co-requisite module/s :	None				
Assessment criteria:	A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests. <ul style="list-style-type: none"> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
Assessment methods:	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)				40
	Final mark =		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Minimum final mark to pass (%)				50
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Statistics &amp; Operations Research</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date: 2011</b>			<b>First Year Offered (New): 2013</b>		
<b>Replace this Module existing module(s)? No</b>			<b>If YES, give the module codes:</b>		
<b>Module Code:</b>	<b>MSTC081</b>				
<b>Module Name:</b>	Biostatistics				
<b>Content:</b>	<ul style="list-style-type: none"> <li>Design of biomedical studies: Bias elimination, control, randomization, precision, replication, one-two way analyses of variance; factorial, crossed, nested, repeated measures designs. Multiple comparisons. Multiple regression, Analysis of covariance.</li> </ul>				
<b>Learning Outcomes:</b>	<p>After learning this course the students will be able to</p> <ul style="list-style-type: none"> <li>Apply parametric and nonparametric statistical methods to numerical data from the life sciences.</li> <li>Understand different aspects of survival analysis as data analysis methodology.</li> <li>Analyse a wide spectrum of problems on time to event data.</li> <li>Demonstrate understanding of Survival Analysis and its multitude of applications in the fields of health, engineering, economics, biology and the physical sciences.</li> <li>Describe the distribution of failure times (time to event), analysis times and Hazard models (Parametric &amp; Semi-parametric), Censoring, truncation and the recording of survival data.</li> <li>Demonstrate knowledge of nonparametric analysis of survival data, the Cox proportional hazards model, building a Cox proportional hazards model, diagnostics to check model for misspecification, outliers, and influential points.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> <p>all of the above consistent with continuous assessment (summative and summative)</p>				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Statistics &amp; Operations Research</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date: 2011</b>			<b>First Year Offered (New): 2013</b>		
<b>Replace this Module existing module(s)? No</b>			<b>If YES, give the module codes:</b>		
<b>Module Code:</b>	<b>MSTB082</b>				
<b>Module Name:</b>	Non-Parametric Statistics				
<b>Content:</b>	Nonparametric inference. Order statistics and their distributions. Tests of goodness of fit. Nonparametric tests Single sample tests, Independent samples tests, Dependent samples tests. Measures of association. Regression				
<b>Learning Outcomes:</b>	After learning this course the students will be able to <ul style="list-style-type: none"> <li>• Demonstrate knowledge of different aspects of nonparametric regression as an explorative tool and non-linear relationships in a wide variety of applications.</li> <li>• Understand the differences between parametric and nonparametric regression and the difference between model driven and data driven approaches.</li> <li>• Explain nonparametric density estimation in practice and theory for univariate and multivariate analyses as well as models for nonparametric regression and the smoothing parameters.</li> <li>• Demonstrate understanding of advanced tools such as semi-parametric regression, additive models and in particular generalised additive models are also included.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>• A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>• A summative assessment will consist of one three-hour paper.</li> <li>• A student is admitted to the formal assessment based on a module mark of 50%</li> <li>• The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>• Assignments</li> <li>• Practical's</li> <li>• Case Studies</li> <li>• Tests</li> <li>• examinations</li> <li>• presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Statistics &amp; Operations Research</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date: 2011</b>			<b>First Year Offered (New): 2013</b>		
<b>Replace this Module existing module(s)? No</b>			<b>If YES, give the module codes:</b>		
<b>Module Code:</b>	<b>MSTD081</b>				
<b>Module Name:</b>	Multivariable Analysis				
<b>Content:</b>	<ul style="list-style-type: none"> <li>Review of matrix algebra. Multivariate distributions; Multivariate normal distribution. Sampling from multivariate normal population; Inference about multivariate means, multivariate analysis of variance, multivariate regression. Inference about covariance structure including principal components.</li> </ul>				
<b>Learning Outcomes:</b>	After learning this course the students will be able to <ul style="list-style-type: none"> <li>Apply matrix notation and theory extensively.</li> <li>Demonstrate knowledge of multivariate distributions in the families of the normal, gamma, beta, t, and F distributions.</li> <li>Demonstrate understanding of concepts of jointly distributed random variables, marginal distributions, moments, conditional distributions, and independence as well as characteristic functions.</li> <li>Demonstrate understanding of multivariate normal distribution and its properties, as well as spherical and elliptical distributions.</li> <li>Demonstrate knowledge of the Jacobean of transformations</li> <li>Describe mathematical philosophies of the Wishart and multivariate beta distributions.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: <b>Statistics &amp; Operations Research</b>	School: Science & Technology
Last Revision date: 2011	First Year Offered (New): 2013
Replace this Module existing module(s)? No	If YES, give the module codes:

Module Code:	<b>MSTC082</b>				
Module Name:	Stochastic Processes				
Content:	<ul style="list-style-type: none"> <li>Basic concept of stochastic processes. The Poisson process and generalizations. Renewal processes. Discrete and continuous time Markov chains and applications. Random walk and Brownian motion.</li> </ul>				
Learning Outcomes:	After learning this course the students will be able to <ul style="list-style-type: none"> <li>Understand the mathematical bases of probability; conditional probability and conditional expectation.</li> <li>Demonstrate understanding of Markov chains.</li> <li>Exponential distribution and the Poisson Process.</li> <li>Continuous time Markov chains.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order)
	12				
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4	2	2	2	4
Pre-requisite module/s:	All four Statistics III modules				
Co-requisite module/s :	None				
Assessment criteria:	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
Assessment methods:	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)				40
	Final mark =		% Summative Assessment Mark		60
			% Summative Assessment Mark		40
	Minimum final mark to pass (%)				50
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
<b>Department: Statistics &amp; Operations Research</b>			<b>School: Science &amp; Technology</b>		
<b>Last Revision date: 2011</b>			<b>First Year Offered (New): 2013</b>		
<b>Replace this Module existing module(s)? No</b>			<b>If YES, give the module codes:</b>		
<b>Module Code:</b>	<b>MSTE081</b>				
<b>Module Name:</b>	Categorical Data Analysis				
<b>Content:</b>	<ul style="list-style-type: none"> <li>Distribution and inference for Categorical Data, Two-Dimensional Tables: Test of Independence, Test of Homogeneity, Relative Risk and the Odds Ratio, Independence and the Odds Ratio, Long Linear Models for Three-Dimensional Tables, Model Selection Criteria; Logistics Regression and Logistic Models: Multiple Logistics Regression, Logistic Regression Diagnostic, Model Selection Methods, Logit Models for Multinomial Responses</li> </ul>				
<b>Learning Outcomes:</b>	<ul style="list-style-type: none"> <li>Upon successful completion of this module, the students should have knowledge and skills</li> <li>Analyse categorical (or count) responses and categorical or continuous predictor variables</li> <li>Analyse two-way and multi-way tables</li> <li>Demonstrate theoretical and applied knowledge of logistic regression</li> <li>Apply deviance tables to real problems</li> <li>Apply CDA to bio-data and business environments</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	12				
<b>Periods per week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	4	2	2	2	4
<b>Pre-requisite module/s:</b>	All four Statistics III modules				
<b>Co-requisite module/s :</b>	None				
<b>Assessment criteria:</b>	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
<b>Assessment methods:</b>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
<b>Mark Structure:</b>	Minimum Form Assessment Mark for exam admission (%)				<b>40</b>
	<b>Final mark =</b>		% Summative Assessment Mark		<b>60</b>
			% Summative Assessment Mark		<b>40</b>
	Minimum final mark to pass (%)				<b>50</b>
<b>Summative Assessment Paper:</b>		<b>Paper 1</b>	<b>Paper 2</b>	<b>Paper 3</b>	<b>Paper 4</b>
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION					
Department: <b>Statistics &amp; Operations Research</b>			School: Science & Technology		
Last Revision date: 2011			First Year Offered (New): 2013		
Replace this Module existing module(s)? No			If YES, give the module codes:		
Module Code:	<b>MSTS080</b>				
Module Name:	Research Project ( Statistics)				
Content:	<ul style="list-style-type: none"> <li>The student, in consultation with supervisor, selects a research topic in Statistics, does independent research and writes a report.</li> </ul>				
Learning Outcomes:	<ul style="list-style-type: none"> <li>Students completing this module successfully will be able to</li> <li>Plan and conduct statistical research under supervision.</li> <li>Present the findings of the research in an appropriately structured written research report.</li> <li>Adopt a critical and ethical approach to conducting statistical analysis and research.</li> <li>Report on research conducted, both in their own work and in that of others.</li> </ul>				
Module Information:	SAQA Credits		ITS Course Level		CESM Code (3 <sup>rd</sup> Order)
	12				
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4	2	2	2	4
Pre-requisite module/s:	All four Statistics III modules				
Co-requisite module/s :	None				
Assessment criteria:	<ul style="list-style-type: none"> <li>A module mark will be obtained from continuous assessment based on quizzes, assignments, practical work and tests.</li> <li>A summative assessment will consist of one three-hour paper.</li> <li>A student is admitted to the formal assessment based on a module mark of 50%</li> <li>The final mark is the average of the summative and summative assessment marks.</li> </ul>				
Assessment methods:	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical's</li> <li>Case Studies</li> <li>Tests</li> <li>examinations</li> <li>presentations</li> </ul> all of the above consistent with continuous assessment (summative and summative)				
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)				40
	Final mark =	% Summative Assessment Mark		60	
		% Summative Assessment Mark		40	
	Minimum final mark to pass (%)				50
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3	Paper 4
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

# Master of Science Degree

## Rules for Master of Science Degree

The General Rules for master's degree apply.

### **SSTM 1** Requirements for Awarding a Master's Degree

In complement to the General Rules, the following requirements must be met for the Master of Science Degree by Research:

- Completed dissertation to be submitted, and
- At least one manuscript based on the candidate's research and of which the candidate is the first author

## Programmes Offered

The School offers the following *Master's Programmes*

MAMA090	Master of Science in Applied Mathematics
MBIA090	Master of Science in Biochemistry
MBOA090	Master of Science in Botany
MCHA090	Master of Science in Chemistry
MMAA090	Master of Science in Mathematics
MPHA090	Master of Science in Physics
MPCB090	Master of Science in Psychology
MSTA090	Master of Science in Statistics

## CURRICULUM – MODULE INFORMATION

### DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

CURRICULUM INFORMATION					
<b>Department:</b> Mathematics and Applied Mathematics	<b>School:</b> Science & Technology				
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013				
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> AMAT800				
<b>Module Code:</b>	<b>MAMA090</b>				
<b>Module Name:</b>	Master of Science in Applied Mathematics				
<b>Module Content:</b>	The Master of Science in Applied Mathematics comprises a dissertation based on the research results of an approved supervised research project in the field of Applied Mathematics, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Applied Mathematics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</p> <p>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	180		8		150201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res Project	N/A	2 per year	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate an ability and proficiency by means of a comprehensive dissertation, which may be supplemented by an oral presentation of their research findings. The dissertation is assessed by a panel of both internal and an external				
<b>Assessment Methods:</b>	Dissertation evaluated or assessed by internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

# DEPARTMENT: BIOCHEMISTRY

## CURRICULUM INFORMATION

<b>Department:</b> Biochemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> BIOC800

<b>Module Code:</b>	<b>MBIA090</b>				
<b>Module Name:</b>	Master of Science in Biochemistry				
<b>Module Content:</b>	The Master of Science in Biochemistry comprises a dissertation based on the research results of an approved supervised research project in the field of Biochemistry, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Biochemistry. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to design experiments and sampling programmes</li> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> <li>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	180		8		130201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Research project	N/A	2	Research project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Internal and external evaluation				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

## DEPARTMENT: BIOLOGY

### CURRICULUM INFORMATION

<b>Department:</b> Biology	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> BLGY808

<b>Module Code:</b>	<b>MZOA090</b>				
<b>Module Name:</b>	Master of Science in Zoology				
<b>Module Content:</b>	The Master of Science in Zoology comprises a dissertation based on the research results of an				
<b>Module Content:</b>	Approved supervised research project in the field of Zoology, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Zoology. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>• to design experiments and sampling programmes</li> <li>• to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>• to access, extract and synthesize scientific information from multimedia sources</li> <li>• to critically interpret and evaluate published scientific information.</li> <li>• The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>• The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	180		8		130601
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Research project	N/A	2	Research project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Internal and external evaluation				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

# DEPARTMENT :CHEMISTRY

## CURRICULUM INFORMATION

<b>Department:</b> Chemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> CHMY800

<b>Module Code:</b>	<b>MCHA090</b>				
<b>Module Name:</b>	Master of Science in Chemistry				
<b>Module Content:</b>	The Master of Science (Chemistry) comprises a dissertation based on the research results of an approved supervised research project in the field of Chemistry, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Chemistry. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>• to design experiments and sampling programmes</li> <li>• to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>• to access, extract and synthesize scientific information from multimedia sources</li> <li>• to critically interpret and evaluate published scientific information.</li> <li>• to operate different types of instrumentation.</li> </ul> <p>• to operate different types of instrumentation.</p> <ul style="list-style-type: none"> <li>• The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>• The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	180		8		140401
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Research project	N/A	1	Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their ability and proficiency by means of a comprehensive dissertation, which may be supplemented by an oral presentation, of their research findings. The dissertation is assessed by an assessment panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Dissertation evaluated / assessed by internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

## DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

MODULE INFORMATION					
<b>Department:</b> Mathematics & Applied Mathematics	<b>School:</b> Science & Technology				
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013				
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> MAH808				
<b>Module Code:</b>	<b>MMAA090</b>				
<b>Module Name:</b>	Master of Science in Mathematics				
<b>Module Content:</b>	The Master of Science in Mathematics comprises a dissertation based on the research results of an approved supervised research project in the field of Mathematics, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Mathematics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>• to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>• to access, extract and synthesize scientific information from multimedia sources</li> <li>• to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results. The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>				
<b>Module Information:</b>	<b>SAQA Credits</b> 180	<b>ITS Course Level Code</b> 8	<b>CESM Code (3<sup>rd</sup> Order)</b> 150101		
<b>Periods per Week:</b>	<b>Classes</b> N/A	<b>Practicals</b> Research Project	<b>Tutorial</b> N/A	<b>Seminars</b> 2 per year	<b>Independent Learning</b> Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate an ability and proficiency by means of a comprehensive dissertation, which may be supplemented by an oral presentation of their research findings. The dissertation is assessed by a panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Dissertation evaluated or assessed by internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)			50	

# DEPARTMENT: PHYSICS

## MODULE INFORMATION

<b>Department</b> : Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS800

<b>Module Code:</b>	<b>MPHA090</b>				
<b>Module Name:</b>	Master of Science in Physics				
<b>Module Content:</b>	The Master of Science (Physics) comprises a dissertation based on the research results of an approved supervised research project in the field of Physics, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Physics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>• to design experiments and sampling programmes</li> <li>• to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>• to access, extract and synthesize scientific information from multimedia sources</li> <li>• to critically interpret and evaluate published scientific information.</li> <li>• to operate different types of instrumentation.</li> <li>• The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>• The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	180		8		140701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Research project	N/A	1	Research project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their ability and proficiency by means of a comprehensive dissertation, which may be supplemented by an oral presentation, of their research findings. The dissertation is assessed by an assessment panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Dissertation evaluated / assessed by internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

**DEPARTMENT: STATISTICS and OPERATIONS RESEARCH**

**MODULE INFORMATION**

<b>Department:</b> Statistics and Operations Research	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> STAT800

<b>Module Code:</b>	<b>MSTA090</b>				
<b>Module Name:</b>	Master of Science in Statistics				
<b>Module Content:</b>	The Master of Science in Statistics comprises a dissertation based on the research results of an approved supervised research project in the field of Statistics or Operations Research, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Statistics or Operations Research. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results. The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	180	8	150302		
<b>Delivery Information:</b>	<b>Campus</b>	<b>Full/Part Time</b>	<b>Period</b>		
	SMU Campus	Contact, Full Time or Part Time	Minimum 2 years		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res Project	N/A	2 per year	Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisites module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate an ability and proficiency by means of a comprehensive dissertation, which may be supplemented by an oral presentation of their research findings. The dissertation is assessed by a panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Dissertation evaluated / assessed by internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)			50	

# Doctor of Philosophy

## Rules for Doctoral Degree Study

The General Rules for doctoral degrees apply.

### SSTD 1 PhD by Publication

If determined by pre-approved research protocol, a collection of published articles could be accepted as a thesis provided the following conditions are satisfied:

- A minimum of three articles is published in peer reviewed accredited journals
- Student is first author in all the publications
- Publications are bound into a monograph incorporating substantial introductory and conclusion chapters

## Programmes Offered

The School offers the following **Doctor of Philosophy Programmes**

MAMA100	Doctor of Philosophy in Applied Mathematics
MBIA100	Doctor of Philosophy in Biochemistry
MBOA100	Doctor of Philosophy in Botany
MCHA100	Doctor of Philosophy in Chemistry
MMAA100	Doctor of Philosophy in Mathematics
MPHA100	Doctor of Philosophy in Physics
MPCF100	Doctor of Philosophy in Psychology
MSTA100	Doctor of Philosophy in Statistics

## CURRICULUM INFORMATION

School:	Science & Technology	Faculty:	
Qualification Name:	Doctor of Philosophy in <i>the specific Discipline</i>	Qualification Code:	PHD in <i>the specific Discipline</i>
Campus:	SMU Campus	Last Revision date:	2011
Total SAQA Credits for Qualification:	360	Is this a fixed Curriculum:	Yes

## DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

CURRICULUM INFORMATION					
<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>			<b>School:</b> Science & Technology	
<b>Last Revision date:</b>	2011			<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes			<b>If YES, give the module codes:</b>	AMAT900
<b>Module Code:</b>	<b>MAMA100</b>				
<b>Module Name:</b>	Doctor of Philosophy in Applied Mathematics				
<b>Module Content:</b>	The Doctor of Philosophy in Applied Mathematics comprises a thesis based on the research results of an original, approved and supervised research project in the field of Applied Mathematics, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Applied Mathematics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</p> <p>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>				
<b>Module Information:</b>	<b>SAQA Credits</b>		<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>
	360		10		150201
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res Project	N/A	2 per year	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their research ability and proficiency by means of a comprehensive thesis of their research findings. The thesis is assessed by an assessment panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

# DEPARTMENT: BIOCHEMISTRY

## MODULE INFORMATION

<b>Department:</b> Biochemistry	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> ABIO909

<b>Module Code:</b>	<b>MBIA100</b>				
<b>Module Name:</b>	Doctor of Philosophy in Biochemistry				
<b>Module Content:</b>	The Doctor of Philosophy in Biochemistry comprises a thesis based on the research results of an original, approved and supervised research project in the field of Biochemistry, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Biochemistry. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to design experiments and sampling programmes</li> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	360	10	130201		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res project	N/A	2	Res project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Thesis evaluated and assessed by both internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50%

## DEPARTMENT: BIOLOGY

### CURRICULUM INFORMATION

<b>Department: Biology</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> BLGY990

<b>Module Code:</b>	<b>MZOA100</b>				
<b>Module Name:</b>	Doctor of Philosophy in Zoology				
<b>Module Content:</b>	The Doctor of Philosophy in Zoology comprises a thesis based on the research results of an original, approved and supervised research project in the field of Zoology, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Zoology. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>• to design experiments and sampling programmes</li> <li>• to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>• to access, extract and synthesize scientific information from multimedia sources</li> <li>• to critically interpret and evaluate published scientific information.</li> <li>• The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>• The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	360	10		130601	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res project	N/A	2	Res project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Methods:</b>	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50%

## DEPARTMENT: CHEMISTRY

### MODULE INFORMATION

<b>Department: Chemistry</b>	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> CHEM900

<b>Module Code:</b>	<b>MCHA100</b>				
<b>Module Name:</b>	Doctor in Philosophy in Chemistry				
<b>Module Content:</b>	The Doctor of Philosophy in Chemistry comprises a thesis based on the research results of an original, approved and supervised research project in the field of Chemistry, presented in a form suitable for publication.				
<b>Module Content:</b>	The Doctor of Philosophy in Chemistry comprises a thesis based on the research results of an original, approved and supervised research project in the field of Chemistry, presented in a form suitable for publication.				
<b>Learning Outcomes:</b>	At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Chemistry. The learner will have the ability:				

	<ul style="list-style-type: none"> <li>to design experiments and sampling programmes</li> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> <li>to operate a variety of instrumentation.</li> <li>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>		<b>CESM Code (3<sup>rd</sup> Order)</b>	
	360	10		140401	
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Research project	N/A	1	Research Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their research ability and proficiency by means of a comprehensive thesis of their research findings. The thesis is assessed by an assessment panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50%

## DEPARTMENT : MATHEMATICS AND APPLIED MATHEMATICS

### CURRICULUM INFORMATION

<b>Department:</b>	<b>Mathematics and Applied Mathematics</b>	<b>School:</b>	Science & Technology
<b>Last Revision date:</b>	2011	<b>First Year Offered (New):</b>	2013
<b>Replace this Module existing module(s)?</b>	Yes	<b>If YES, give the module codes:</b>	MATH900

<b>Module Code:</b>	<b>MMAA100 (T2, T3 &amp; T4)</b>		
<b>Module Name:</b>	Doctor of Philosophy in Mathematics		
<b>Module Content:</b>	The Doctor of Philosophy in Mathematics comprises a thesis based on the research results of an original, approved and supervised research project in the field of Mathematics, presented in a form suitable for publication.		
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Mathematics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</p> <p>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>

	360	10	150101
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>
	N/A	Res Project	N/A
<b>Pre-requisite module/s:</b>	None		
<b>Co-requisite module/s:</b>	None		
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their research ability and proficiency by means of a comprehensive thesis of their research findings. The thesis is assessed by an assessment panel of both internal and an external assessors.		
<b>Assessment Methods:</b>	Thesis evaluated and assessed by both internal and external assessors.		
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)		50

## DEPARTMENT : PHYSICS

### CURRICULUM INFORMATION

<b>Department:</b> Physics	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> PHYS900

<b>Module Code:</b>	<b>MPHA100</b>		
<b>Module Name:</b>	Doctor of Philosophy in Physics		
<b>Module Content:</b>	The Doctor of Philosophy in Physics comprises a thesis based on the research results of an original, approved and supervised research project in the field of Physics, presented in a form suitable for publication.		
<b>Module Code:</b>	<b>MPHA100</b>		
<b>Module Name:</b>	Doctor of Philosophy in Physics		
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Physics. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to design experiments and sampling programmes</li> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> <li>to operate a variety of instrumentation.</li> <li>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</li> <li>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</li> </ul>		
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>
	360	10	140701
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>
	N/A	Res project	N/A
<b>Pre-requisite module/s:</b>	None		
<b>Co-requisite module/s:</b>	None		
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their research ability and proficiency by means of a comprehensive thesis of their research findings. The thesis is assessed by an assessment panel of both internal and an external assessors.		
<b>Assessment Methods:</b>	Thesis evaluated and assessed by both internal and external assessors.		
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)		50

## DEPARTMENT : STATISTICS AND OPERATIONS RESEARCH

### MODULE INFORMATION

<b>Department:</b> Statistics and Operations Research	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> STAT900

<b>Module Code:</b>	<b>MSTA100 (T2, T3 &amp; T4)</b>
<b>Module Name:</b>	Doctor of Philosophy in Statistics
<b>Module Content:</b>	The Doctor of Philosophy in Statistics comprises a thesis based on the research results of an original, approved and supervised research project in the field of Statistics or Operations Research, presented in a form suitable for publication.
<b>Learning Outcomes:</b>	<p>At this level the learner will acquire graduate level knowledge of research philosophy and research methods in an approved specialized field of Statistics or Operations Research. The learner will have the ability:</p> <ul style="list-style-type: none"> <li>to plan and conduct a research project, including written and verbal presentations of the research proposal and research report</li> <li>to access, extract and synthesize scientific information from multimedia sources</li> <li>to critically interpret and evaluate published scientific information.</li> </ul> <p>The graduate will further have an appreciation for the environmental and social responsibilities associated with planning, conducting and communicating scientific research results.</p> <p>The graduate will also have developed a scientifically ethical approach to the collection, analysis, presentation and publication of research results.</p>

### MODULE INFORMATION

<b>Department:</b> Statistics and Operations Research	<b>School:</b> Science & Technology
<b>Last Revision date:</b> 2011	<b>First Year Offered (New):</b> 2013
<b>Replace this Module existing module(s)?</b> Yes	<b>If YES, give the module codes:</b> STAT900

<b>Module Code:</b>	<b>MSTA100 (T2, T3 &amp; T4)</b>				
<b>Module Name:</b>	Doctor of Philosophy in Statistics				
<b>Module Information:</b>	<b>SAQA Credits</b>	<b>ITS Course Level Code</b>	<b>CESM Code (3<sup>rd</sup> Order)</b>		
	360	10	150302		
<b>Periods per Week:</b>	<b>Classes</b>	<b>Practicals</b>	<b>Tutorial</b>	<b>Seminars</b>	<b>Independent Learning</b>
	N/A	Res Project	N/A	2 per year	Res Project
<b>Pre-requisite module/s:</b>	None				
<b>Co-requisite module/s:</b>	None				
<b>Assessment Criteria:</b>	Candidates will be required to demonstrate their research ability and proficiency by means of a comprehensive thesis of their research findings. The thesis is assessed by an assessment panel of both internal and an external assessors.				
<b>Assessment Methods:</b>	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
<b>Assessment Weighting:</b>	Min Final Assessment mark to pass (%)				50

