SCHOOL OF SCIENCE
&
TECHNOLOGY

SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY

2021
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 2021

FIRST SEMESTER	:	23 March	2021	-	23 July	2021
SECOND SEMESTER	:	10 August	2021	-	15 December	2021
AUTUMN Recess(for students)	:	06 April	2021	-	09 April	2021
WINTER Recess	:	26 July	2021	-	06 August	2021
SUMMER Recess	:	17 December 2021		-	05 January	2022

Correspondence

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CONTENTS

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 = 2021

Thursday	15	April	2021	13h00
Thursday	21	July	2021	13h00
Thursday	09	September	2021	13h00

MEMBERS OF STAFF

Office of the Dean

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

Academic Departments

Biochemistry

Acting Head of Department	Gololo SS, PhD (SMU)
Lecturer	Kgopa AH, PhD (SMU)
Lecturer	Makhubela SD, MSc (WITS)
Lecturer	Mathe EH, MSc (VENDA)
Laboratory Assistant	Mtileni NS, BSc (Hons) (UNIN)

Biology

Head of Department	**King PH,** 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

Acting Head of Department	**Maseko RB,**PhD (UNISA)
Senior Lecturer	Debeila MA, PhD (WITS)
Senior Lecturer	Molefe DM,PhD (UNISA)
Lecturer	Rapulenyane N, PhD (RHODES)
Lecturer	Mogane MG, PhD (UNISA)
Lecturer	Makhubela NFH, MSc (MEDUNSA)
Lecturer	Mofokeng MJ, MSc (UFH)
Lecturer	Mosebo B, MSc (NWU)
Lecturer	Olivier MT,MSc (SMU)
Natural Scientist	Masilela ZI,MSc (WSU)
Natural Scientist	Sethoga LS, MSc (UNISA)
Senior Technical Officer	Semenya CJ,MSc(SMU)
Technical Officer	Kgasi AN, B.Tech (UNISA)
Laboratory Assistant	Mokose R

Computer Science

Head of Department	**Dandadzi TA,** PhD (UL)
Lecturer	Hungwe T, MSc (WITS)
Lecturer	Mafike S, MSc (Engineering) (Central South Univ.China)
Lecturer	Mathiba NS,MSc (Southern Univ. USA)
Lecturer	Ndobe TV, MSc (WITS)
LaboratoryTechnician	Nkosi MI, BSc (UL)

Language Proficiency

Head of Department	**Seleka ME,** PhD (UNW)
Senior Lecturer	Nair P, PhD (Univ of Kerala, India)
Senior Lecturer	Coetzer A, PhD (UL)
Senior Lecturer	Hungwe V, PhD (UL)
Junior Lecturer	Diphofa SLA, B.Ed (VISTA)
Junior Lecturer	Lesufi RT, B.Ed (NWU)

Mathematics and Applied Mathematics

Head of Department	**Aphane M,**PhD (UNISA)
Senior Lecturer	Adem K, PhD (North West Univ.)
Senior Lecturer	Chin PWM, PhD (UP)
Senior Lecturer	Tegegn TA, PhD (UP)
Lecturer	Thabane JL, PhD (SMU)
Lecturer	Bambe Moutsing CB, MSc (UP)
Lecturer	Vijayasenan D, MSc (MAHATMA GANDHI)
Lecturer	Fatlane MJ, MSc(SMU)
Lecturer	Maluleka R, MSc(SMU)
Lecturer	Nkwanazana M, MSc(North West Univ)
Junior Lecturer	Kanyane MLS, Hons(SMU)

Physics

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

Statistics and Operations Research

Head of Department	**SeeletseSM,** PhD (OR) (PU for CHO)
Lecturer/Biostatistician	Ntuli TS, PhD (UL)
Lecturer	Ramarumo T, PhD(SMU)
Lecturer	Lekganyane MM, MSc (UL)
Lecturer	Miyambu GR, MSc (UL)
Lecturer	Sesale EL, MSc(SMU)
Lecturer	Mokoena OP,MSc (Stellenbosh)
Junior Lecturer	Rakale G, BSc (Hons) (SMU)
Junior Lecturer	Tshabalala KD, BSc (Hons)(UL)
Junior Lecturer	Molaba MM, 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 it 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
Any two other NSC subjects with a minimum NSC score of 4 each	

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	MCOB000	E	24
MPHS000	E	24	MPHB000	E	24
MSTS000	E	24	MSTB000	E	24
	Total Credits	**120**		**Total Credits**	**120**

(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
BSc(ECP) Level 1	*To be presented from 2013*		
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	Linear and Introductory Abstract Algebra		

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**
BSc(ECP) Level 2	*To be presented from 2014*		
MBIB000	Introduction to Life Science Studies II	MBIO000	
MCHB000	General Chemistry 1B	MMTH000 MCHM000	
MCOB000	Introduction to Data Organization and Artificial Intelligence	MMTH000 MCSC000	
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 Name:	Bachelor of Science (Life Sciences)	**Qualification Code:**	**BSCK01**
Campus:	SMU Campus	**Last Revision date:**	2012
Total SAQA Credits for Qualification:	488	**Is this a fixed Curriculum:**	No

PERIOD OF STUDY / YEAR LEVEL 1					
Year					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** module/s are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

PERIOD OF STUDY / YEAR LEVEL 2					
Year					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** module/s are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

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

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **3** of the following **ELECTIVES**				
	MBIA021	S1	Y	20	0.167
	MCHB021 and MCHA021	Q1 Q2	Y Y	10 10	0.083 0.083
	MPLA021	S1	Y	20	0.167
	MZOA021	S1	Y	20	0.167
Total credits for Semester 1 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	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
Total credits for Semester 2 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 4					
1st Semester / 1st & 2nd Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	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
Total credits for Semester 1 modules				**64**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1**

PERIOD OF STUDY / YEAR LEVEL 4					
2nd Semester / 3rd & 4th Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **at least 2** of the following **ELECTIVES**				
	MBIA 032	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
Total credits for Semester 2 modules				**64**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1**

MATHEMATICAL SCIENCES - BSCL01

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

PERIOD OF STUDY / YEAR LEVEL 1					
	Year				
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** module/s are **COMPULSORY**				
	MMTH000	Year	Y	24	0.1
	MHEL000	Year	N	24	0.1
	MCSC000	Year	Y	24	0.1
	MPHS000	Year	Y	24	0.1
	MSTS000	Year	Y	24	0.1
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

PERIOD OF STUDY / YEAR LEVEL 2					
	Year				
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following 5 module/s are **COMPULSORY**				
	MMTB000	Year	Y	24	0.1
	MHEB000	Year	N	24	0.1
	MCOB000	Year	Y	24	0.1
	MPHB000	Year	Y	24	0.1
	MSTB000	Year	Y	24	0.1
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following module is **COMPULSORY**				
	MMTA021	S1	Y	20	0.167
	Choose **2** of the following **ELECTIVES**				
	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
Total credits for Semester 1				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following module is **COMPULSORY**				
	MMTA022	S2	Y	20	0.167
	Choose **2** of the following **ELECTIVES**				
	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
Total credits for Semester 2				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1**

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

PERIOD OF STUDY / YEAR LEVEL 4					
1st Semester / 1st & 2nd Quarter					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **2** of the following **ELECTIVE/S**				
	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
	MPHA031and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
Total credits for Semester 1 Year level 4				**64**	**0.500**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1.000**
TOTAL CREDITS FOR QUALIFICATION				**488**	**3.000**

PERIOD OF STUDY / YEAR LEVEL 4					
2nd Semester / 3rd & 4th Quarter Modules					
P	**Module Code**	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **2** of the following **ELECTIVE/S**				
	MMTA032 and MMTB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MCOA032and MCOB032	Q3 Q4	Y Y	16 16	0.125 0.125
Two from	MSTB032 MSTC032	Q3 Q4	Y Y	16 16	0.125 0.125
	MPHA032 and MPHB032	Q3 Q4	Y Y	16 16	0.125 0.125
Total credits for Semester 2 Year level 4				**64**	**0.500**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1.000**
TOTAL CREDITS FOR QUALIFICATION				**488**	**3.000**

PHYSICAL SCIENCES - BSCM01

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

PERIOD OF STUDY / YEAR LEVEL 1					
Year					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** modules are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

PERIOD OF STUDY / YEAR LEVEL 2					
Year					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** modules are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**0.5**

CURRICULUM INFORMATION			
School:	School of Science & Technology		
Qualification Name:	Bachelor of Science (Physical Sciences)	**Qualification Code:**	**BSCM01**
Total SAQA Credits for Qualification:	488	**Is this a fixed Curriculum:**	No

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

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following modules are **COMPULSORY**				
	MCHA022 and MCHB022	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 **ELECTIVES**				
	MMTA022	S2	Y	20	0.167
	MBIA022	S2	Y	20	0.167
Total credits for Semester 2				**60**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1.00**

PERIOD OF STUDY / YEAR LEVEL 4					
1st Semester / 1st & 2nd Quarter					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **2 or 3** of the following **ELECTIVES**				
	MCHA031 and MCHB031	Q1 Q2	Y	16	0.125 0.125
	MPHA031 and MPHB031	Q1 Q2	Y	16	0.125 0.125
	MMTA031 and MMTB032	Q1 Q2		16	0.125 0.125
	MBIA031	S1	Y	32	0.25
	Physics and Biochemistry cannot be paired				
Total credits for Semester 1				**64**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1.00**

PERIOD OF STUDY / YEAR LEVEL 4					
2nd Semester / 3rd & 4th Quarter					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **2 or 3** from the following **ELECTIVES**				
	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
	MMTA032 and MMTB032	Q3 Q4	Y y	16 16	0.125 0.125
	MMBIA032	S2	Y	32	0.25
	Physics and Biochemistry cannot be paired				
Total credits for Semester 2				**64**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 4				**128**	**1.00**

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
A		7
B	A	6
C	B	5
D	C	4
E	D	3
F	E	2
G	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
MAPA011	Introduction to Applied Mathematics	**Selection Criteria**	**MMTH011 / MMTH012**
MAPM012	Computational Mathematics		**MAPA011 MMTH011 / MMTH012**
MBIO011	Introduction to Biological Studies	**Selection Criteria**	**MZOO012**
MZOO012	Animal Biology		**MBIO011**
MCHM011	General Chemistry 1A	**Selection Criteria**	**MMTH011 / MMTH012**
MCHM012	General Chemistry 1B		**MCHM011 MMTH011 / MMTH012**
MCOA011	Computing Concepts and Algorithms	**Selection Criteria**	**MMTH011 MSTS011**
MCOA012	Data Organization and Artificial Intelligence		**MCOA011 MMTH012 MSTS012**
MHEL011	Health Education and Life Competencies I	**Selection Criteria**	**MHEL012**
MHEL012	Health Education and Life Competencies II		**MHEL011**
MMTH011	Differential and Integral Calculus	**Selection Criteria**	**MMTH012**
MMTH012	Set Theory, Linear and Abstract Algebra		**MMTH011**
MPCL011	Introduction to Psychology	**Selection Criteria**	**MPCL012**
MPCL012	Interpersonal Skills and Social Psychology		**MPCL011**
MPHS011	General Physics IA	**Selection Criteria**	**MMTH011 MPHS012**
MPHS012	General Physics IB		**MMTH012 MPHS011**

6

BSc Level 2 / BSc ECP Level 3

EHS201	Fundamentals of Environmental Health Science	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**EHS202 MBIA021 / MBIA022**
EHS202	Food borne Diseases and Human Parasitic Diseases	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**EHS201 MBIA021 / MBIA022**
MAPA022	Numerical Analysis	**MAPA011 / MAPM012 MMTH011 / MMTH012**	**MMTA022 MAPA021**
MBIA021	Essential biomolecules, functions and signal transduction	**MCHM011 / MCHM012 MBIO011 / MZOO012**	**MBIA022**
MBIA022	Bioenergetics and intermediary metabolisms	**MCHM011 / MCHM012 MBIO011 / MZOO012**	**MBIA021**
MZOA021	Invertebrates and Botany	**MBIO011 / MZOO012**	**MZOB022**
MZOB022	Adaptive Biodiversity of Vertebrates	**MBIO011 / MZOO012**	**MZOA021**
BTEC201	Cellular Biology	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**BTEC202 / BTEC203 BTEC204 MBIA021 / MBIA022**
BTEC202	Introduction to Biotechnology	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**BTEC201 / BTEC203 BTEC204 MBIA021 / MBIA022**
BTEC203	Introduction to Microbiology	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**BTEC201 / BTEC202 BTEC204 MBIA021 / MBIA022**
BTEC204	Immunology	**MBIO011 / MZOO012 MCHM011 / MCHM012 MMTH011 / MMTH012 MHEL011 / MHEL012 MPHS011 / MPHS012**	**BTEC201 / BTEC202 BTEC203 MBIA021 / MBIA022**
MCHA021 MCHB021	Organic Chemistry 2 Inorganic Chemistry 2	**MCHM011 / MCHM012 MMTH011 / MMTH012**	**MCHA022 / MCHB022**
MCHA022 MCHB022	Analytical Chemistry 2 Physical Chemistry 2	**MCHM011 / MCHM01 MMTH011 / MMTH012**	**MCHA021 / MCHB021**
MCOA021	Data Structures	**MCOA011 / MCOB011 MMTH011 / MMTH012**	**MCOA022**
MCOA022	Computer Organisation and Architecture	**MCOA011 / MCOB011 MMTH011 / MMTH012**	**MCOA021**

BSc Level 2 / BSc ECP Level 3

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

BSc Level 3 / BSc ECP Level 4

Module code	Module Name	Pre-requisites	Co-requisites
MCOA031	Database Systems	**MCOA021 / MCOA022** **MMTH011 / MMTH012**	**MCOB031** **MCOA032 /** **MCOB032**
MCOB031	Operating Systems	**MCOA021 / MCOA022** **MMTH011 / MMTH012**	**MCOA031 /** **MCOA032** **MCOB032**
MAPA031	Fluid Mechanics	**MAPA021 / MAPA022** **MMTA021 / MMTA022**	**MAPA031**
MAPB031	Numerical Analysis	**MAPA021 / MAPA022** **MMTA021 / MMTA022**	**MAPA031**
MAPA032	Mathematical Theory of Electromagnetism	**MAPA021 / MAPA022** **MMTA021 / MMTA022**	**MAPA031**
MAPB032	Introduction to Financial Mathematics	**MAPA021 / MAPA022** **MMTA021 / MMTA022**	**MAPA031**
MBIA031	Proteins, enzymes and biochemical techniques	**MBIA021 / MBIA022**	**MMIA032**
MBIA032	Gene structure, function and molecular biology techniques	**MBIA021 / MBIA022**	**MMIA031**
MZOA031	Ecology	**MZOA021 / MZOB022**	**MZOB032**
MZOB032	Conservation Genetics	**MZOA021 / MZOB022**	**MZOA031**
BTEC301	Industrial and Environmental Biotechnology	**BTEC201 / BTEC202** **BTEC203 / BTEC204**	**BTEC302 / BTEC303** **BTEC304**
BTEC302	Plant and Microbial Biotechnology	**BTEC201 / BTEC202,** **BTEC203 / BTEC204**	**BTEC301 / BTEC303** **BTEC304**
BTEC303	Biosensors and Biochips	**MBIA021 / MBIA022** **BTEC201 / BTEC202** **BTEC203 / BTEC204**	**BTEC301 / BTEC302** **BTEC304**
BTEC304	Biotechnology and Health Care	**MBIA021 / MBIA022** **BTEC201 / BTEC202** **BTEC203 / BTEC204**	**BTEC301 / BTEC302** **BTEC303**
MCHA031	Physical Chemistry 3	**MCHA021/ MCHB021** **MCHA022 / MCHB022**	**MCHB031** **MCHA032 /** **MCHB032**
MCHB031	Inorganic Chemistry 3	**MCHA021 / MCHB021** **MCHA022 / MCHB022**	**MCHA031** **MCHA032 /** **MCHB032**
MCHA032	Analytical Chemistry 3	**MCHA021 / MCHB021** **MCHA022 / MCHB022**	**MCHA031 /** **MCHB031** **MCHB032**

BSc Level 3 / BSc ECP Level 4

Module code	Module Name	Pre-requisites	Co-requisites
MCHB032	Organic Chemistry 3	**MCHA021 / MCHB021 MCHA022 / MCHB022**	**CHA031 / MCHB031 MCHA032**
MCOA032	Artificial Intelligence	**MCOA021 / MCOA022 MAH101M / MAH102M MMTH011 / MMTH012**	**MCOA031 / MCOB031 MCOB032**
MCOB032	Computer Networks	**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	**MMTA021 / MMTA022**	**MMTB031 / MMTA032 MMTB032**
MMTB031	Abstract Algebra	**MMTA021 / MMTA022**	**MMTA031 / MMTA032 MMTB032**
MMTA032	Complex Analysis	**MMTA021 / MMTA022**	**MMTA031 / MMTB031 MMTB032**
MMTB032	Mathematical Analysis II	**MMTA021 / MMTA022**	**MMTA031 / MMTB031 MMTA032**
MPHA031	Quantum Mechanics	**MPHA021/MPHB021 MPHA022 / MPHB022 MMTA021 / MMTA022**	**MPHB031**

BSc Level 3 / BSc ECP Level 4

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

BIOTECHNOLOGY – BSCG01

SECTION E: CURRICULUM INFORMATION			
School:	School of Science and Technology		
Qualification Name:	Bachelor of Science (Biotechnology)	**Qualification Code:**	BSCG01
Campus:	SMU Campus	**Last Revision date:**	2019

EXISTING PROGRAMMES

PERIOD OF STUDY / YEAR LEVEL 1

Year Modules

X[1]	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following module/s are **COMPULSORY**				
TOTAL CREDITS FOR YEAR					

PROPOSED NEW PROGRAMME

PERIOD OF STUDY / YEAR LEVEL 1

Year Modules

X[1]	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following module/s are **COMPULSORY**				
	MBIO011	S1	N	12	0.1
	MZOO012	S2	N	12	0.1
	MCHM011	S1	N	12	0.1
	MCHM102	S2	N	12	0.1
	MPHS011	S1	Y	12	0.1
	MPHS012	S2	N	12	0.1
	MMTH011	S1	N	12	0.1
	MMTH022	S2	N	12	0.1
	MHEL011	S1	N	12	0.1
	MHEL012	S2	N	12	0.1
TOTAL CREDITS FOR YEAR 1				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 2

Year Modules

X[1]	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following module/s are **COMPULSORY**				
	MBIA021	S1	Y	20	0.25
	MBIA022	S2	Y	20	0.25

PERIOD OF STUDY / YEAR LEVEL 3

Year Modules

X[1]	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following module/s are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR LEVEL 2				**120**	

	BTEC303	S2	Y	30	0.25
	BTEC304	S2	Y	30	0.25
TOTAL CREDITS FOR YEAR LEVEL 3				**120**	**1**

ENVIRONMENTAL MANAGEMENT & TOXICOLOGY - BSCG01

SECTION E: CURRICULUM INFORMATION REQUIRED			
School:	Science & Technology		
Qualification Name:	Bachelor of Science (Environmental Management and Toxicology)	**Qualification Code:**	BSCG01
Campus:	SMU Campus	**Last Revision date:**	2019

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

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

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

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

ENVIRONMENTAL BIOLOGY – BSCG01

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

EXISTING PROGRAMME					
PERIOD OF STUDY / YEAR LEVEL 1					
Year Modules					
X[1]	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following module/s are **COMPULSORY**				
	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
TOTAL CREDITS FOR YEAR 1				**120**	**1**

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

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

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

LIFE SCIENCES - BSCG01

CURRICULUM INFORMATION			
School:	School of Science & Technology		
Qualification Name:	Bachelor of Science (Life Sciences)	**Qualification Code:**	**BSCG01**
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					
1st Semester					
P	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following 5 modules are **COMPULSORY**				
	MBIO011	S1	Y	12	0.1
	MCHM011	S1	Y	12	0.1
	MHEL011	S1	N	12	0.1
	MMTH011	S1	Y	12	0.1
	MPHS011	S1	Y	12	0.1
Total credits for Semester 1 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**1**

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

PERIOD OF STUDY / YEAR LEVEL 2					
1st Semester / 1st & 2nd Quarter Modules					
	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	Choose **at least 3 or 4** of the following **ELECTIVES**				
	MBIA021	S1	Y	20	0.167
	MCHA021 and MCHB021	Q1 Q2	Y Y	10 10	0.083 0.083

PERIOD OF STUDY / YEAR LEVEL 2					
2nd Semester / 3rd & 4th Quarter Modules					
	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	Choose **at least 3 or 4** of the following **ELECTIVES**				
	MBIA022	S2	Y	20	0.167
	MCHA022 and MCHB022	Q3 Q4	Y Y	10 10	0.083 0.083

	MPLA021	S1	Y	20	0.167
	MZOA021	S1	Y	20	0.167
Total credits for Semester 1 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 2				**120**	**1**

	MPLA022	S2	Y	20	0.167
	MZOB022	S2	Y	20	0.167
Total credits for Semester 2 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 2				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter Modules					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **at least 2** of the following **ELECTIVES**				
	MBIA031	S1	Y	32	0.25
	MCHA031 and MCHA032	Q1 Q2	Y Y	16 16	0.125 0.125
	MPLC031	S1	Y	32	0.25
	MZOA031	S1	Y	32	0.25
Total credits for Semester 1 modules				**64**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**128**	**1**

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 1st & 2nd Quarter Modules					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	Choose **at least 2** of the following **ELECTIVES**				
	MBIA032	S2	Y	32	0.25
	MCHB031 and MCHB032	Q3 Q4	Y Y	16 16	0.125 0.125
	MPLC032	S2	Y	32	0.25
	MZOB032	S2	Y	32	0.25
Total credits for Semester 2 modules				**64**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**128**	**1**

MATHEMATICAL SCIENCES - BSCH01

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 1					
1st Semester					
	Module Code	**Offering Period**	**Possible major**	**SAQA Credit**	**Hemis Credit**
	The following **2** modules are **COMPULSORY**				
	MMTH011	S1	Y	12	0.1
	MHEL011	S1	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**

PERIOD OF STUDY / YEAR LEVEL 1					
2nd Semester					
	Module Code	**Offering Period**	**Possible major**	**SAQA Credit**	**Hemis Credit**
	The following **2** modules are **COMPULSORY**				
	MMTH012	S2	Y	12	0.1
	MHEL012	S2	Y	12	0.1
	Choose **3** of the following **ELECTIVES**				
	MAPM012	S2	Y	12	0.1
	MCOA012	S2	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**

PERIOD OF STUDY / YEAR LEVEL 2					
1st Semester / 1st & 2nd Quarter					
	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following 1 modules is **COMPULSORY**				
	MMTA021	S1	Y	20	0.167
	Choose 2 of the following **ELECTIVES**				
	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[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following 1 modules is **COMPULSORY**				
	MMTA022	S2	Y	20	0.167
	Choose 2 of the following **ELECTIVES**				
	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[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	Choose 2 of the following **ELECTIVES**				
	MAPA031 and MAPA033	Q1 Q2	Y Y	16 16	0.125 0.125
	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
	MPHA031and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
Total credits for Semester 1					**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3					**1**
TOTAL CREDITS FOR QUALIFICATION					**3**

PERIOD OF STUDY / YEAR LEVEL 3					
2nd Semester / 3rd & 4th Quarter					
	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	Choose 2 of the following **ELECTIVES**				
	MAPA032 and MAPA034	Q3 Q4	Y Y	16 16	0.125 0.125
	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
Two	MSTB032 and MSTC032	Q3 Q4	Y Y	16 16	0.125 0.125
Total credits for Semester 2					**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3					**1**
TOTAL CREDITS FOR QUALIFICATION					**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[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following **4** modules are **COMPULSORY**				
	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 **ELECTIVES**				
	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**
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**1.00**

PERIOD OF STUDY / YEAR LEVEL 1

2nd Semester /3rd & 4th Quarter

P	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following **4** modules are **COMPULSORY**				
	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 **ELECTIVES**				
	MSTS012	S2	N	12	0.100
	MAPM012	S2	N	12	0.100
	MCOA012	S2	N	12	0.100
	MZOO012	S2	N	12	0.100
Total credits for Semester 2				**60**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**1.00**

PERIOD OF STUDY / YEAR LEVEL 2

1st Semester / 1st & 2nd Quarter

P	Module Code	Offering Period[2]	Possible major[3]	SAQA Credit	Hemis Credit[4]
	The following **4** modules are **COMPULSORY**				
	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 **ELECTIVES**				
	MMTA021	S1	Y	20	0.167
	MBIA021	S1	Y	20	0.167
Total credits for Semester 1				**60**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 2					**1.00**

PERIOD OF STUDY / YEAR LEVEL 2

2nd Semester / 3rd & 4th Quarter

P	Module Code	Offering Period[2]	Possibl e major[3]	SAQA Credit	Hemis Credit[4]
	The following **4** modules are **COMPULSORY**				
	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 **ELECTIVES**				
	MMTA022	S2	Y	20	0.167
	MBIA022	S2	Y	20	0.167
Total credits for Semester 2				**60**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 2					**1.00**

PERIOD OF STUDY / YEAR LEVEL 3

1st Semester / 1st & 2nd Quarter

	Module Code	Offering Period[2]	Possibl e major[3]	SAQA Credit	Hemis Credit[4]
	Choose **2 or 3** of the following **ELECTIVES**				
	MCHA031 and MCHB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MPHA031and MPHB031	Q1 Q2	Y Y	16 16	0.125 0.125
	MMTA031 and MMTB031	Q1 Q2	Y y	16 16	0.125 0.125
	MBIA031	S1	Y	32	0.25
	Physics and Biochemistry cannot be paired				
Total credits for Semester 1				**64**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 3				**128**	**1.00**
TOTAL CREDITS FOR QUALIFICATION				**368**	**3**

PERIOD OF STUDY / YEAR LEVEL 3

2nd Semester / 3rd & 4th Quarter

	Module Code	Offering Period[2]	Possibl e major[3]	SAQA Credit	Hemis Credit[4]
	Choose **2 or 3** of the following **ELECTIVES**				
	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
	MMTA032 and MMTB032	Q3 Q4	Y y	16 16	0.125 0.125
	MBIA032	S2	Y	32	0.25
	Physics and Biochemistry cannot be paired				
Total credits for Semester 2				**64**	**0.50**
TOTAL CREDITS FOR YEAR LEVEL 3				**128**	**1.00**
TOTAL CREDITS FOR QUALIFICATION				**368**	**3**

OCCUPATIONAL AND ENVIRONMENTAL SCIENCES - BSCJ01

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

PERIOD OF STUDY / YEAR LEVEL 1					
1st Semester					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** modules are **COMPULSORY**				
	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
Total credits for Semester 1 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**1**

PERIOD OF STUDY / YEAR LEVEL 1					
2nd Semester					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **5** modules are **COMPULSORY**				
	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
Total credits for Semester 2 modules				**60**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 1				**120**	**1**

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

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

PERIOD OF STUDY / YEAR LEVEL 3					
1st Semester / 1st & 2nd Quarter Modules					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **2** module/s are **COMPULSORY**				
	MPLC031	S1	Y	32	0.25
	MPSA031	S1	Y	32	0.25
Total credits for Semester 1 modules				**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 / 1st & 2nd Quarter Modules					
	Module Code	**Offering Period[2]**	**Possible major[3]**	**SAQA Credit**	**Hemis Credit[4]**
	The following **2** module/s are **COMPULSORY**				
	MPLC032	S2	Y	32	0.25
	MPSA032	S2	Y	32	0.25
Total credits for Semester 2 modules				**64**	**0.5**
TOTAL CREDITS FOR YEAR LEVEL 3				**128**	**1**
TOTAL CREDITS FOR QUALIFICATION				**368**	**3**

CURRICULUM INFORMATION

DEPARTMENT: BIOCHEMISTRY

MODULE INFORMATION	
Department: Biochemistry	**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:	**MBIA021**				
Module Name:	Essential biomolecules, functions and signal transduction				
Module Content:	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)				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Explain water as a component of living organisms, as universal solvent, and how it influences the properties of many important components of the cell • 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 • 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 • Know the properties, functions, basic kinetics of enzymes and their applications • Discuss the structures, stereochemistry, reactions and functions of monosaccharides, polysaccharides and oligosaccharides • Describe the similarities and differences between the structures and functions of DNA and RNA • Demonstrate an understanding of lipid chemistry and structure • Demonstrate an understanding of the structure and composition of biological membranes • 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				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

Module Code:	**MBIA021**				
Module Name:	Essential biomolecules, functions and signal transduction				
Pre-requisite modules :	MCHM011 & MCHM012				
Co-requisite modules :	None				
Assessment Methods:	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment 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	3 hrs			
	Sub minimum	40%			

MODULE INFORMATION	
Department: **Biochemistry**	**School:** Science & Technology
Last Revision date: **2**011	**First Year Offered (New):** 2013
Replace this Module existing module(s)? No	**If YES, give the module codes:**

Module Code:	**MBIA022**				
Module Name:	Bioenergetics and intermediary metabolisms				
Module Content:	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				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the principles of Thermodynamics • Know the metabolism of carbohydrates and lipids • Calculate ATP used/produced during metabolism • Know the metabolism of nitrogen and amino acids • Understand the biosynthesis and degradation of purine and pyrimidine ribonucleotides				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

Module Code:	**MBIA022**				
Module Name:	Bioenergetics and intermediary metabolisms				
Pre-requisite modules :	MCHM011 & MCHM012				
Co-requisite module:	MBIA021				
Assessment Methods:	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment 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	3 hrs			
	Sub minimum	40%			

MODULE INFORMATION	
Department: Biochemistry	**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:	**MBIA031**				
Module Name:	Proteins, enzymes and biochemical techniques				
Module Content:	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				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Master the information on protein structure and function and apply it to varying practical situations and problem solving • Use a multidisciplinary approach to evaluate information given on protein structure and function to give evidence for and against different theories • Communicate an understanding of the subject matter in both the oral and written forms • Create new information on protein structure and function using the concepts learnt • Holistically use the information in the module to solve problems on protein isolation and characterisation techniques				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	32		3		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	2 x 3 hrs	Per arrangement	0	10 hrs
Pre-requisite modules :	MBIA021 and MBIA022				
Co-requisite modules :	None				
Assessment Methods:	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				

Module Code:	**MBIA031**				
Module Name:	Proteins, enzymes and biochemical techniques				
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: **Biochemistry**		**School:** Science & Technology	
Last Revision date: **2**011		**First Year Offered (New):**	2013
Replace this Module existing module(s)? No		**If YES, give the module codes:**	BIOC302

Module Code:	**MBIA032**				
Module Name:	Gene structure, function and molecular biology				
Module Content:	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				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the chemistry and structure of DNA and RNA, and to understand their functional importance in biochemical reactions • Understand the complexity of DNA organization, replication, mutation, damage and repair, recombination & transposition • Understand the meaning of genes and genomes • 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				
Learning Outcomes:	• Understand all concepts regarding recombinant DNA technology i.e., gene cloning, cloning vectors, gene libraries and associated screening techniques • To discuss tumour viruses and oncogenes • To discuss different types of PCRs and their applications • To understand the molecular mechanisms of the regulation of eukaryotic cell division cycle. • Discuss different kinds of sequencing and sequence analysis using a GENEBANK • To understand the molecular mechanisms of cancer and the types of genetic change involved in carcinogenesis • Discuss the molecular biology advances that have potential for development of new cancer therapies • Describe nucleic acid isolation/purification and hybridization techniques • Demonstrate an understanding of some latest functional genomics techniques				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	32		3		130203
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	2 x 3 hrs	Per arrangement	0	10 hrs
Pre-requisite modules	MBIA021 and MBIA022				

Module Name:	Gene structure, function and molecular biology				
Co-requisite modules for	None				
Assessment Methods:	Combination of class tests/quizzes, summative theoryassessments, assignments, short summative practical assessments, practical reports and summative theory assessment 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	3 hrs			
	Sub minimum	40%			

DEPARTMENT - BIOCHEMISTRY

CURRICULUM INFORMATION	
Department: Biochemistry	**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:	**MBIA 021**				
Module Name:	Essential biomolecules, functions and signal transduction				
Module Content:	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)				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Explain water as a component of living organisms, as universal solvent, and how it influences the properties of many important components of the cell • 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 • 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 • Know the properties, functions, basic kinetics of enzymes and their applications • Discuss the structures, stereochemistry, reactions and functions of monosaccharides, polysaccharides and oligosaccharides • Describe the similarities and differences between the structures and functions of DNA and RNA • Demonstrate an understanding of lipid chemistry and structure • Demonstrate an understanding of the structure and composition of biological membranes • 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				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

Module Code:	**MBIA 021**				
Module Name:	Essential biomolecules, functions and signal transduction				
Pre-requisite modules :	MCHM011 & MCHM012				
Co-requisite modules :	None				
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =		% Formative 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%			

MODULE INFORMATION	
Department: **Biochemistry**	**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:	**MBIA 022**				
Module Name:	Bioenergetics and intermediary metabolisms				
Module Content:	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				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the principles of Thermodynamics • Know the metabolism of carbohydrates and lipids • Calculate ATP used/produced during metabolism • Know the metabolism of nitrogen and amino acids • Understand the biosynthesis and degradation of purine and pyrimidine ribonucleotides				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	Per arrangement	0	8 hrs

MODULE INFORMATION					
Department:	**Biochemistry**			**School:**	Sciences & 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:	**BTEC201**
Module Name:	Cellular Biology
Content:	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
Learning Outcomes:	• Understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information. • Appreciate that molecular biology is a dynamic and ever-changing experimental science. • 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. • Compare and contrast the mechanisms of bacterial and eukaryotic DNA replication, DNA repair, transcription, and translation. • Explain how DNA topology and chromatin structure affects the processes of DNA replication, repair, and transcription. • Give examples of DNA and histone modifications and predict how they will affect gene expression. • Describe mechanisms by which DNA can be damaged and describe the molecular mechanisms by which protein complexes repair different forms of DNA damage. • Explain how endogenous biological processes like site-specific recombination, transposition, and the bacterial CRISPR-Cas9 system are being used to modify eukaryotic genomes. • Describe how pre-mRNA splicing occurs and explain how alternative splicing generates protein diversity..

Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd Order) (Six Numbers)**
	20	2	130401

Delivery Information:	**Campus**	**Full/Part Time**	**Period Year/1st/2nd Semester**
	SMU	Full	2/1ST 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 203 and BTEC 204
Assessment	**Formative assessment:** • Theoretical and Practical testing at end of Module with feedback. • Draft Portfolio of Cellular Biology Theory and Practice assessed mid-year.

			Summative assessment: Final Portfolio of Cellular Biology Theory and Practice assessed at end of programme.			
Assessment criteria (see Annex 1 for assessment criteria grid)			Specific educational outcome 1: • Understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information . Specific educational outcome 2: • 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.			
Assessment methods			**Formative assessment:** • Theoretical and Practical Assessment. • During the programme students to develop a Portfolio of Cellularr 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. **Summative assessment: Test 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	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**	**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:	**BTEC202**
Module Name:	Introduction to Biotechnology
Content:	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
Learning Outcomes:	• Define Biotechnology and explain the scope Biotechnology • Understand the concepts of Bioethics and Bioinformatics and their application in Biotechnology • Understand the concept of genetic engineering • Understand the principles of recombinant DNA technology • Understand and explain the use of and recombinant DNA methods to genetically alter

<table>
<tr><td colspan="2"></td><td colspan="5">plants, animals and microbes</td></tr>
<tr><td colspan="2" rowspan="2">Module Information:</td><td colspan="2">SAQA Credits</td><td colspan="2">ITS Course Level</td><td>CESM Code (3rd Order) (Six Numbers)</td></tr>
<tr><td colspan="2">20</td><td colspan="2">2</td><td>131101</td></tr>
<tr><td colspan="2" rowspan="2">Delivery Information:</td><td colspan="2">Campus</td><td colspan="2">Full/Part Time</td><td>Period Year/1st/2nd Semester</td></tr>
<tr><td colspan="2">SMU</td><td colspan="2">Contact/Full Time</td><td>2/2nd Sem</td></tr>
<tr><td colspan="2" rowspan="2">Periods per week:</td><td>Classes</td><td>Practicals</td><td>Tutorial</td><td>Seminars</td><td>Independent Learning</td></tr>
<tr><td>5</td><td>3 hours</td><td>1</td><td></td><td>40 hours</td></tr>
<tr><td colspan="2">Pre-requisite modules for this module:</td><td colspan="5">MBIO011, MZOO012, MCHM011, MCHM012</td></tr>
<tr><td colspan="2">Co-requisites modules for module:</td><td colspan="5">BTEC201. BTEC 203 and BTEC 204</td></tr>
<tr><td colspan="2">Assessment</td><td colspan="5">Formative assessment:
• Theoretical and Practical Assessment.
• Draft Portfolio of Biotechnology Theory and Practice assessed mid-year.
Summative assessment:
Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.</td></tr>
<tr><td colspan="2">Assessment criteria (see Annex 1 for assessment criteria grid)</td><td colspan="5">Specific educational outcome 1:
• Understand the scope Biotechnology
• Understand the concepts of Bioethics and Bioinformatics and their application in Biotechnology

Specific educational outcome: Explain how vaccines are distributed
• Understand the concept of genetic engineering
• Understand the principles of recombinant DNA technology</td></tr>
<tr><td colspan="2">Assessment methods</td><td colspan="5">Formative assessment:
• Theoretical and Practical Assessment
• 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.

Summative assessment: Test, Quiz and Practicals</td></tr>
<tr><td rowspan="4">Mark Structure:</td><td colspan="2">Minimum Form Assessment Mark for exam admission (%)</td><td colspan="5">40%</td></tr>
<tr><td rowspan="2"></td><td>% Formative Assessment Mark</td><td colspan="5">60%</td></tr>
<tr><td>% Summative Assessment Mark</td><td colspan="5">40%</td></tr>
<tr><td colspan="2">Minimum final mark to pass (%)</td><td colspan="5">50%</td></tr>
<tr><td rowspan="5">Summative Assessment Paper:</td><td></td><td>Paper 1</td><td>Paper 2</td><td>Paper 3</td><td>Paper 4</td></tr>
<tr><td>Theory/Practical</td><td>Theoryal</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Duration</td><td>3hrs</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>% contribution to Summative Assessment Mark</td><td>100%</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Sub minimum</td><td>40%</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
</table>

MODULE INFORMATION			
Department:	**Biochemistry**	**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:	• Understand the history and development of microbiology • Discuss key concepts in microbiology • Classify and characterize different types of microorganisms • Differentiate between prokaryotic and eukaryotic cells • Describe the nutritional requirements of bacteria • Discuss the nature and uses of different types of bacteria growth media • Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components • Understand and describe different methods for identification of bacteria

Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd Order) (Six Numbers)**
	20	2	130501

Delivery Information:	**Campus**	**Full/Part Time**	**Period Year/1st/2nd Semester**
	SMU	Contact	2/1st 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	**Formative assessment:** • Theoretical and Practical Assessment • Draft Portfolio of introduction to microbiology Theory and Practice assessed mid-year. **Summative assessment: Test, Quiz and Practicals**
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: • Classify and characterize different types of microorganisms • Differentiate between prokaryotic and eukaryotic cells Specific educational outcome 2: • Describe the nutritional requirements of bacteria • Discuss the nature and uses of different types of bacteria growth media • Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components • Understand and describe different methods for identification of bacteria

Assessment methods			**Formative assessment:** • Theoretical and Practical Assessment • **Summative assessment: Test, Quiz and Practical.** 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.
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)		40%
		% Formative Assessment Mark	60%
		% Summative Assessment Mark	40%
	Minimum final mark to pass (%)		50%

		Paper 1	**Paper 2**	**Paper 3**	**Paper 4**
Summative Assessment Paper:	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			
Department:	**Biochemistry**	**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 204**		
Module Name:	Immunology: Concepts, Mechanisms and Applications in Biotechnology		
Content:	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.		
Learning Outcomes:	▪ Differentiate between innate and adaptive immunity ▪ Describe the development of both B-lymphocytes and T-lymphocytes ▪ Describe the classification and structure of antibodies ▪ Understand the biochemical, molecular, cellular, and organ-level principles that govern the workings of the mammalian immune system. ▪ Describe molecular mechanisms of antigen processing and presentation ▪ Describe the application of immunology in Biotechnology		
Module Information:	**SAQA Credits**		**CESM Code (3rd Order) (Six Numbers)**
	20	2	130505
Delivery Information:	**Campus**	**Full/Part Time**	**Period**

					Year/1st/2nd Semester
	SMU		Contact		Year
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:	BTEC201. BTEC 202 and BTEC 203				
Assessment	**Formative assessment:** • Theoretical and Practical Assessment. **Summative assessment:** Theoretical and Practical Assessment				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: • Differentiate between innate and adaptive immunity • Describe the development of both B-lymphocytes and T-lymphocytes • Describe the classification and structure of antibodies Specific educational outcome 2: • Understand the biochemical, molecular, cellular, and organ-level principles that govern the workings of the mammalian immune system. • Describe molecular mechanisms of antigen processing and presentation • Describe the application of immunology in BiotechnologyUnderstand and describe ecological aspects of biodegradation				
Assessment methods	**Formative assessment:** • Theoretical and Practical Assessment. **Summative assessment:** 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				
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	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**	**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:	• Understand the principles of Biocatalysis and Biotransformation • Describe the production of enzymes used in Industrial Biotechnology • Describe the different methods of modifying enzymes for industrial usage • Understand and describe the different applications of enzymes in Biotechnology • Understand and describe the concept of enzyme engineering • Describe the different methods of mobilizing enzymes • Describe the properties of immobilized enzymes • Describe the use of biotechnology in Forensic medicine and Environmental science				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		131101
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd 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	**Formative assessment:** • Theoretical and Practical Assessment • Draft Portfolio of Environmental ScienceTheory and Practice assessed mid-year. **Summative assessment:** Test, Quiz and Practicals.				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: • Understand the principles of Biocatalysis and Biotransformation • Describe the production of enzymes used in Industrial Biotechnology • Describe the different methods of modifying enzymes for industrial usage Specific educational outcome 2: • Understand and describe the different applications of enzymes in Biotechnology • Understand and describe the concept of enzyme engineering • Describe the different methods of mobilizing enzymes • Describe the properties of immobilized enzymes				
Assessment methods	**Formative assessment: Theoretical and Practical Exam-** **Summative assessment: Test 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%

		Paper 1	**Paper 2**	**Paper 3**	**Paper 4**
Summative Assessment Paper:	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

Department:	**Biochemistry**	**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 302**				
Module Name:	Plant and Microbial Biotechnology				
Content:	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				
Learning Outcomes:	• Define and explain the concept of micro-propagation • Describe the production and use of transgenic plants • Describe the production and use of genetically modified crops • Describe the production and development of man-made pharmaceuticals • Describe the process and use of microbial fermentation • Describe the different types of bacteria that are used in Biotechnology • Understand the production and use of genetically altered microorganism for production of pharmaceuticals and antibiotics				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		131101
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**
	SMU		Full		Year
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	3hours	1		30 hours
Pre-requisite modules for this module:	BTEC 201 2, BTEC 203, BTEC 204, MBIA021 and MBIA022				

Co-requisites modules for module:			BTEC 301, BTEC 302 and BTEC 304			
Assessment			**Formative assessment:** • Practical and Theoretical Assessment **Summative assessment:** Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.			
Assessment criteria (see Annex 1 for assessment criteria grid)			Specific educational outcome 1: • Define and explain the concept of micro-propagation • Describe the production and use of transgenic plants • Describe the production and use of genetically modified crops • Describe the production and development of man-made pharmaceuticals Specific educational outcome 2: • Describe the process and use of microbial fermentation • Describe the different types of bacteria that are used in Biotechnology • Understand the production and use of genetically altered microorganism for production of pharmaceuticals and antibiotics.			
Assessment methods			**Formative assessment:** • Theoretical and Practical Assessment • For the practicals students visit a company and understand various processes involve in monitoring pollutants. Students are expected to submit a report. **Summative assessment:** Report on visit to Industrial Companies, Practical and Tests			
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	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			
Department:	**Biochemistry**	**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 303**				
Module Name:	Biosensors and Biochips				
Content:	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.				
Learning Outcomes:	▪ Understand the basic principles of biosensors design and their applications. ▪ Understand the basic principles of biochip design and its applications. ▪ Describe and understand the applications of biosensors and biochips in health care, medical diagnostics, defense and other areas.				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		131101
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**
	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:	BTEC 201 and BTEC 202, BTEC 203, BTEC 204, MBIA 021 & MBIA 022				
Co-requisites modules for module:	BTEC 301, BTEC 302 and BTEC 304				
Assessment	**Formative assessment:** • Theoretical and Practical Assessment. **Summative assessment:** Final Portfolio of Biotechnology Theory and Practice assessed at end of programme.				
Assessment criteria: (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: • Understand and describe the central dogma of molecular biology (DNA replication, transcription and translation) in prokaryocytes • Describe the causes, types and mechanisms of mutation in prokaryocytes • Describe microbial sex and conjugation Specific educational outcome 2: • Understand the nature and use of plasmids and bacteriophages • Understand concepts and use of genetic engineering • Understand and describe the principles of nucleic acid mapping, hybridization, sequencing and self-directed mutagenesis				
Assessment methods	**Formative assessment:** • Theoretical and Practical Assessment. • For the practicals students attend visit a Micro Biology laboratory and understand various management practices.				

		Summative assessment:	
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	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**	**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: (4 alphabetic & 3 numeric)	**BTEC 304**				
Module Name:	Biotechnology and Health Care				
Content:	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				
Learning Outcomes:	• Understand the role of biotechnology in health care systems • Understand and describe the principle of and application of stem cell research in health care • Understand and describe the principle and application of therapeutic cloning • Describe the Human Genome Project and its implication for health care • Describe epigenetic and epigenetic modification mechanisms and their roles in disease				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		131101
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**
	SMU		Full		Year
Periods per week:	**Classes**	**Practical's**	**Tutorial**	**Seminars**	**Independent Learning**
	5	3 hours	1		30 hours
Pre-requisite modules for this module:	BTEC 201 and BTEC 202, BTEC 203, BTEC 204, MBIA 021 & MBIA 022				
Co-requisites modules for module:	BTEC 301, BTEC 302 and BTEC 303				

Assessment			**Formative assessment:** • Practical and Theoretical Assessment • Draft Portfolio of Environmental Science Theory and Practice assessed mid-year. **Summative assessment:** Final Portfolio of Environmental ScienceTheory and Practice assessed at end of programme.			
Assessment criteria (see Annex 1 for assessment criteria grid)			Specific educational outcome 1: • Understand different concepts in environmental legislation. • Understand the need for environmental sustainability. Specific educational outcome 2: • Explain various methods of environmental administration in South Africa.			
Assessment methods			**Formative assessment:** • Theoretical and Practical Assessment. • 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 **Summative assessment:**			
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

DEPARTMENT: BIOLOGY

CURRICULUM INFORMATION	
Department: **Biology**	**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:** MBIO000 (in part)

Module Code:	**MBIO000**
Module Name:	Introduction to Life Science Studies I
Module Content:	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

<table>
<tr><td>Learning Outcomes:</td><td colspan="5">After successfully completing the module, the student should be able to:
• Understand the historical ideas of the “evolution” of evolutionary thinking
• Know the changes that occurred on planet earth throughout time
• Apply genetics as background of evolution and evaluate the evidence for macroevolution
• List the elements of the chemistry of life
• Compare the structure of cells
• Distinguish between mitosis and meiosis
• Apply the principles of genetics, Mendelian patterns of inheritance and exceptions
• Understand the phenomenon known as a mutation, and the types of mutations
• Understand the importance of human genetics and genetics in agriculture, forensics and medicine
• Describe the basic ecological concepts, biomes of the world
• Distinguish between the carbon, water, nitrogen and phosphorous cycles
• Evaluate the threat of pollution, destruction of the environment by man
• Discuss the measures of ecosystem health, the impact of alien plant and animal invasion
• Discuss the impact of the use of insecticides on the environment
• Discuss the cause of man-made disasters, pollution, ozone depletion and greenhouse effects
• Apply the binomial nomenclature system, taxonomic Kingdom.

• List the characteristics of the Kingdom Protista, Phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata and Chordata
• Describe the reproductive system, gametogenesis, the ultrastructure of gametes (of humans);
• Discuss the process of fertilization, cleavage and gastrulation in mammals
• Apply the early development of Branchiostoma and avian embryo to human embryology
• Discuss the early development of the mammalian embryo in terms of general embryology</td></tr>
<tr><td rowspan="2">Module Information:</td><td colspan="2">SAQA Credits</td><td colspan="2">ITS Course Level Code</td><td>CESM Code (3rd Order)</td></tr>
<tr><td colspan="2">24</td><td colspan="2">3</td><td>130101</td></tr>
<tr><td rowspan="2">Periods per Week:</td><td>Classes</td><td>Practicals</td><td>Tutorial</td><td>Seminars</td><td>Independent Learning</td></tr>
<tr><td>4 x 40 min</td><td>1 x 3 hrs</td><td>Per arrangement</td><td>0</td><td>1.25 hrs</td></tr>
<tr><td>Pre-requisite module/s:</td><td colspan="5">None</td></tr>
<tr><td>Co-requisite module/s:</td><td colspan="5">None</td></tr>
<tr><td>Assessment Methods:</td><td colspan="5">Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module</td></tr>
<tr><td>Assessment Weighting:</td><td colspan="4">Min Formative Assessment mark for exam admission (%)</td><td>40</td></tr>
<tr><td rowspan="3"></td><td colspan="2" rowspan="2">Final mark =</td><td colspan="2">% Formative Assessments Mark</td><td>60</td></tr>
<tr><td colspan="2">% Summative Assessments Mark</td><td>40</td></tr>
<tr><td colspan="4">Min Final Assessment mark to pass (%)</td><td>50</td></tr>
<tr><td rowspan="4">Summative Assessment Paper:</td><td></td><td>Paper 1</td><td>Paper 2</td><td>Paper 3</td><td>Paper 4</td></tr>
<tr><td>Theory / Practical</td><td>Theory</td><td></td><td></td><td></td></tr>
<tr><td>Duration</td><td>3 hrs</td><td></td><td></td><td></td></tr>
<tr><td>Sub minimum</td><td>40</td><td></td><td></td><td></td></tr>
</table>

CURRICULUM INFORMATION	
Department: **Biology**	**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)

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

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

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

Module Code:	**MBIO011**
Module Name:	Introduction to Biological Studies
Module Content:	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)
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the historical ideas of the "evolution" of evolutionary thinking • Know the changes that occurred on planet earth throughout time • Apply genetics as background of evolution and evaluate the evidence for macroevolution • List the elements of the chemistry of life • Compare the structure of cells • Distinguish between mitosis and meiosis • Apply the principles of genetics, Mendelian patterns of inheritance and exceptions • Understand the phenomenon known as a mutation, and the types of mutations • Understand the importance of human genetics and genetics in agriculture, forensics and medicine • Describe the basic ecological concepts, biomes of the world • Distinguish between the carbon, water, nitrogen and phosphorous cycles • Evaluate the threat of pollution, destruction of the environment by man • Discuss the measures of ecosystem health, the impact of alien plant and animal invasion • Discuss the impact of the use of insecticides on the environment • Discuss the cause of man-made disasters, pollution, ozone depletion and greenhouse effects • Apply the binomial nomenclature system, taxonomic Kingdoms • List the characteristics of the Kingdom Protista, Phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata and Chordata • Describe the reproductive system, gametogenesis, the ultrastructure of gametes (of humans); • Discuss the process of fertilization, cleavage and gastrulation in mammals • Apply the early development of Branchiostoma and avian embryo to human embryology • Discuss the early development of the mammalian embryo in terms of general embryology

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	130101

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 40 min	1 x 3 hrs	Per arrangement	0	3.5 hrs

Pre-requisite module/s:	None
Co-requisite module/s:	None
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module

Assessment Weighting:			
	Min Formative Assessment mark for exam admission (%)		**40**
	Final Mark =	% Formative 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: **Biology**	**School:** Science & Technology
Last Revision date: 2018	**First Year Offered (New):** 2019
Replace this Module existing module(s)? Yes	**Give the module codes:** MZOO012 (in part)

Module Code:	**MZOO012**				
Module Name:	Animal Biology				
Module Content:	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)				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Define the general biological terms used in parasitology • Identify and discuss different types of medically important parasites • Define and explain different types of carriers/vectors of sickness-producing organisms • Name and describe the structure and functions of epithelia tissues, connective tissues, muscle tissue and nervous tissue • Explain the anatomy and growth of bones • Discuss the role of blood • Demonstrate the structure and function of the human respiratory system, digestive system, circulatory system, and skeletal system • Describe skeletal muscle contraction and aerobic and anaerobic muscle activity • Describe the autonomic nervous system • Differentiate between endocrine and exocrine systems • List the different functions of the different endocrine in the body • Discuss tropic hormones, pineal glands and circadian rhythm				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		3		130601
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 40 min	1 x 3 hrs	Per arrangement	0	3.5 hrs
Pre-requisite module/s:	Compulsory registration of BIO010M and/or MBIO011				
Co-requisites module/s :	None				
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =		% Formative 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: **Biology**	**School:** Science & Technology
Last Revision date: 2018	**First Year Offered (New):** 2019
Replace this Module existing module(s)? Yes	**Give the module codes:** MZOA021 (in part)

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

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

Module Code:	**MZOB022**				
Module Name:	Adaptive Biodiversity of Vertebrates				
Module Content:	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				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Discuss fish evolution and transition to amphibians and modern fish • Understand and compare between the diversity body structure and function of representatives of bony fishes • Recognize the integration of fishes with other relevant affecting human and environmental health • Understand the origin and evolution of tetrapods • Know the diversity, classification, structure and functional adaptation of modern day amphibians • Understand the status of modern day amphibians and identify the South African frogs • Critically evaluate the origin and evolution of higher vertebrate classes • Define and explain the external and internal morphology of the classes Reptilia and Aves • Recognize and demonstrate an understanding of the general physiology and special adaptations of reptiles and birds • Discuss the general and unique behavioural patterns occurring in reptiles and birds • Critically evaluate the classification of reptiles and birds				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	3	130601		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 40 min	1 x 3 hrs	2 x 40 min	0	5 hrs
Pre-requisite module/s:	MBIO011 & MZOO012				
Co-requisite module/s:	None				
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =	% Formative Assessment Mark			**60**
		% Summative Assessment Mark			**40**
	Min Final Assessment mark to pass (%)				**50**

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

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

Module Code:	**MZOA031**
Module Name:	Ecology
Module Content:	**Basic ecology**: 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 **Freshwater ecology**: 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 **Mammals and Wildlife Management**: 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
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the concepts of Ecology and vegetation types of South Africa • Prepare herbarium specimens and know how to manage a herbarium • Identify a variety of trees and grasses of South Africa • 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 • Describe pollution in the freshwater ecosystems • Understand the habitat requirements of terrestrial wildlife • Understand the factors determining habitat preferences of Southern African wildlife • Understand the factors influencing carrying capacity and population dynamics of wildlife species, and basic applications of such factors in wildlife management • Have knowledge of various economic- and conservation aims, and an understanding of selected strategies to achieve such aims by applying • Have knowledge of habitats influencing wildlife distribution and population dynamics • Critically evaluate the origin and evolution of the higher vertebrate classes • Define and explain the external morphology, physiology, special adaptation and unique behavioural patterns of mammals • Critically evaluate the classification of mammals

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	32	3	130605; 131201; 131204

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 40 min	1 x 3 hrs	Per arrangement	0	10 hrs

Pre-requisite module/s:	ZLY201M *(final code not available yet)* and MCHM011		
Co-requisite module/s:	None		
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module		
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)		**40**
	Final Mark =	% Formative 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: **Biology**	**School:** Science & Technology
Last Revision date: 2018	**First Year Offered (New):** 2019
Replace this Module existing module(s)? Yes	**Give the module codes:** BLGY302 & MZOB032 (in part)

Module Code:	**MZOB032**				
Module Name:	Conservation Genetics				
	Applied Biology				
Module Content:	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)				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand the forces that shaped the palaeo-environment of southern Africa over the past 3.2 billion years • Apply palaeontology knowledge of the major steps in plant and animal evolution in understanding the present day flora of southern Africa • Discuss human anatomical evolution in the light of information of the hominins out of Africa • Apply evolution as the underlying principle of Biological Science • Integrate knowledge of Genetics with the mechanism of evolution • Know how to defend Neo-Darwanism • Know the procedure to calibrate a microscope • Describe the procedure of a microscopic and macroscopic examination of material • Perform and describe a sedimentation technique • Describe and illustrate fixation techniques • Perform and describe staining with haematoxylin and silver nitrate • Describe the various techniques to isolate eggs in urine • Perform and describe thin and thick blood films and the staining process • Describe the technique to isolate microfilariae and pinworm eggs				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	32	3	130701		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 40 min.	1 x 3 h	Per arrangement	0	10 h
Pre-requisite module/s:	MZOB022 and MCHM012				
Co-requisite module/s:	None				
Assessment Methods:	Combination of class tests/quizzes, formative theory assessments, short formative practical assessments, practical reports and summative theory assessment at the end of the module				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =	% Formative Assessment Mark			**60**
		% Summative Assessment Mark			**40**
	Min Final Assessment mark to pass (%)				**50**

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

DEPARTMENT: CHEMISTRY

CURRICULUM INFORMATION	
Department: Chemistry	**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:** FCH010M

Module Code:	**MCHM000**
Module Name:	Introduction to General Chemistry 1A
Module Content:	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
Learning Outcomes::	At the end of this course students should: • Know the concept of significant figures and the use thereof in chemical calculations • Know the importance of accuracy in recording measurements • Know chemical symbols, formulae and equations • Have a clear idea of the atomic structure of atoms • 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 • Know how to use a balanced equations in stoichiometric calculations • Understand the basic concept of kinetic and potential energy • Know the energy changes involved during chemical reactions and be able to calculate heat of reactions occurring under constant pressure • Have a clear idea of Hess's law and heats of formation • 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 • Understand the importance of Gibbs free energy and its relation to the spontaneity of reactions • Know the worth of reaction rates • know the factors that influence the rate of chemical reactions • Have sound knowledge concerning all concepts about acids and bases. They will have the skills to balance these reactions • Know the different expressions for the concentration of solutions • Be able to calculate how the addition of a solute will influence the colligative properties of solutions • Understand the concept of reaction reversibility • Understand the basic concepts about chemical equilibrium and to implement the equilibrium law and have an understanding of the importance of K • Know how equilibrium influence the pH of aqueous solutions and how this knowledge is used in laboratories • Know the basic concepts concerning electrochemistry and how electricity is related to chemical equation • Understand cell potentials and be able to use reduction potentials in calculations

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	24	3	130101

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hrs

Pre-requisite module/s:	None
Co-requisite module/s:	None
Assessment Methods:	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 (%) **40**

Assessment Weighting:	**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: Chemistry	**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:** FCHM010

Module Code:	**MCHB000**
Module Name:	Introduction to General Chemistry 1B
Module Content:	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.
Learning Outcomes:	After completion of this module, students should: • Understand the basic ideas on studying the electronic structure of atoms using electromagnetic radiation • Understand the principles of electron configurations and how it explains the arrangement of atoms in the periodic table • Have a picture of how electronic structure explains atomic properties • Understand the concepts of ionic as well as covalent bonds and how Lewis dot notations help scientists to explain theseinteractions • Know the influence of polarity on the properties of molecules • Be able to use the Lewis dot structures to predict the shape of molecules • Know the basics on hybridization as well as the formation of double and triple bonds • Know the different intermolecular attractions found in liquids and how these attractions influence the physical properties ofthem • Be able to explain the concept of vapor pressure and know its importance • Understand a basic phase diagram and the energy changes that accompany state changes • Have a basic understanding of the solid state of matter • 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

<table>
<tr><td>Learning Outcomes:</td><td colspan="5">

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
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
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
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
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 cis or trans alkene without formation of a mixture of the two
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
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

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<tr><td rowspan="2">Module Information:</td><td colspan="2">SAQA Credits</td><td colspan="2">ITS Course Level Code</td><td>CESM Code (3rd Order)</td></tr>
<tr><td colspan="2">24</td><td colspan="2">03</td><td>140401</td></tr>
<tr><td rowspan="2">Periods per Week:</td><td>Classes</td><td>Practicals</td><td>Tutorial</td><td>Seminars</td><td>Independent Learning</td></tr>
<tr><td>4 x 45 min</td><td>1 x 3 h</td><td>2 x 1 hrs</td><td>0</td><td>1.25 hrs</td></tr>
<tr><td>Pre-requisite module/s:</td><td colspan="5">None</td></tr>
<tr><td>Co-requisite module/s:</td><td colspan="5">None</td></tr>
<tr><td>Assessment Methods:</td><td colspan="5">Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 x 3 hrs written examination</td></tr>
<tr><td rowspan="4">Assessment Weighting:</td><td colspan="4">Min Summative Assessment mark for exam admission (%)</td><td>40</td></tr>
<tr><td rowspan="2">Final Mark =</td><td colspan="3">% Summative Assessment Mark</td><td>60</td></tr>
<tr><td colspan="3">% Summative Assessment Mark</td><td>40</td></tr>
<tr><td colspan="4">Min Final Assessment mark to pass (%)</td><td>50</td></tr>
<tr><td rowspan="4">Summative Assessment Paper:</td><td></td><td>Paper 1</td><td>Paper 2</td><td>Paper 3</td><td>Paper 4</td></tr>
<tr><td>Theory / Practical</td><td>Theory</td><td></td><td></td><td></td></tr>
<tr><td>Duration</td><td>3 hrs</td><td></td><td></td><td></td></tr>
<tr><td>Sub minimum</td><td>40%</td><td></td><td></td><td></td></tr>
</table>

CURRICULUM INFORMATION	
Department: **Chemistry**	**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:**

Module Code:	**MCHM011**
Module Name:	General Chemistry 1A
Module Content:	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.
Learning Outcomes:	Students should • Understand the concept of significant figures and the use thereof in chemical calculations • Understand the importance of accuracy in recording measurements • Be able to understand chemical symbols, formulae and equations • Have a clear idea of the atomic structure ofatoms • 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 • Know how to use a balanced equations in stoichiometric calculations • Understand the basic concept of kinetic and potential energy • Know the energy changes involved during chemical reactions and be able to calculate heat of reactions occurring under constantpressure • Have a clear idea of Hess's law and heats of formation • 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 • Understand the importance of Gibbs free energy and its relation to the spontaneity of reactions • Know the worth of reaction rates • Understand the factors that influence the rate of chemical reactions • Have sound knowledge concerning all concepts about acids and bases. They will have the skills to balance these reactions • Understand the different expressions for the concentration of solutions • Be able to calculate how the addition of a solute will influence the colligative properties of solutions • Understand the concept of reaction reversibility • Understand the basic concepts about chemical equilibrium and to implement the equilibrium law and have an understanding of the importance ofK • Understand how equilibrium influence the pH of aqueous solutions and how this knowledge is used in laboratories • Know the basic concepts concerning electrochemistry and how electricity is related to chemical equation • Understand cell potentials and be able to use reduction potentials in calculations

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	140401

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1 x 90 min		1.9 hrs

Pre-requisite module/s:	None
Co-requisite module/s:	MMTH011 and MMTH012
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 x 3 hrs 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**

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

CURRICULUM INFORMATION	
Department: **Chemistry**	**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:	**MCHM012**
Module Name:	General Chemistry 1B
Module Content:	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
Learning Outcomes:	After completion of this module, students should: • Understand the basic ideas on studying the electronic structure of atoms using electromagnetic radiation • Understand the principles of electron configurations and how it explains the arrangement of atoms in the periodic table • Have a picture of how electronic structure explains atomic properties • Understand the concepts of ionic as well as covalent bonds and how Lewis dot notations help scientists to explain these interactions • Know the influence of polarity on the properties of molecules • Be able to use the Lewis dot structures to predict the shape of molecules • Know the basics on hybridization as well as the formation of double and triple bonds • Know the different intermolecular attractions found in liquids and how these attractions influence the physical properties of them • Be able to explain the concept of vapour pressure and know its importance • Understand a basic phase diagram and the energy changes that accompany state changes • Have a basic understanding of the solid state of matter • 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 • 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 • 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

<table>
<tr><td>Learning Outcomes:</td><td colspan="5">

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
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
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 cis or trans alkene without formation of a mixture of the two
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
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

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<tr><td rowspan="2">Module Information:</td><td colspan="2">SAQA Credits</td><td colspan="2">ITS Course Level Code</td><td>CESM Code (3rd Order)</td></tr>
<tr><td colspan="2">12</td><td colspan="2">3</td><td>140401</td></tr>
<tr><td rowspan="2">Periods per Week:</td><td>Classes</td><td>Practicals</td><td>Tutorial</td><td>Seminars</td><td>Independent Learning</td></tr>
<tr><td>4 × 45 min</td><td>1 × 3 hrs</td><td>1 × 90 min</td><td>N/A</td><td>1.9 hrs</td></tr>
<tr><td>Pre-requisite module/s :</td><td colspan="5">None</td></tr>
<tr><td>Co-requisites module/s :</td><td colspan="5">MMTH011/MMTH012</td></tr>
<tr><td>Assessment Methods:</td><td colspan="5">Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination.</td></tr>
<tr><td rowspan="4">Assessment Weighting:</td><td colspan="4">Min Summative Assessment mark for exam admission (%)</td><td>40</td></tr>
<tr><td colspan="2" rowspan="2">Final Mark =</td><td colspan="2">% Summative Assessment Mark</td><td>60</td></tr>
<tr><td colspan="2">% Summative Assessment Mark</td><td>40</td></tr>
<tr><td colspan="4">Min Final Assessment mark to pass (%)</td><td>50</td></tr>
<tr><td rowspan="4">Summative Assessment Paper:</td><td colspan="2"></td><td>Paper 1</td><td>Paper 2</td><td>Paper 3</td><td>Paper 4</td></tr>
<tr><td colspan="2">Theory / Practical</td><td>Theory</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Duration</td><td>3 hrs</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Sub minimum</td><td>40%</td><td></td><td></td><td></td></tr>
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CURRICULUM INFORMATION			
Department:	**Chemistry**	**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:	**MCHA021**
Module Name:	Organic Chemistry 2
Module Content:	Stereochemistry; Conjugation and Aromaticity; Substitution reactions of Aromatic compounds; Carboxylic acids and their derivatives; Amines: Preparation and their reactions. Epoxides:
Learning Outcomes	After completion of this module, students should be able to: • Define chiral carbons and identify them in molecules • Define enantiomers and racemic mixtures and recognize compounds capable of exhibiting these structures • Define and draw enantiomers , diastereomers and meso compounds with two chiral carbons • Assign *R* and *S* configurations to stereoisomers an draw compounds with these configurations • Draw pairs of enantiomers with one chiral center, using wedges/dashes and Fischer projections • Give the number of stereoisomers possible for a molecule having more than one stereogenic center • Describe how a plane of symmetry relates to whether or not a molecule is chiral • Explain optical activity as a property of chiral molecules, and calculate specific rotation and optical purity • Give an acceptable IUPAC names for aromatic compounds • Describe the structure of benzene using resonance. Name and draw aromatic compounds • Write chemical equations describing the electrophilic aromatic substitution reactions (halogenation, Friedel-Crafts alkylation and Friedel-Crafts acylation, nitration, and sulfonation), showing orientation of substitution • Write the mechanism for electrophilic aromatic substitution in general and then specifically for halogenation, Friedel-Crafts alkylation and Friedel-Crafts acylation, nitration, and sulfonation • Explain the mechanistic basis for the action of activating ortho, para-directing groups and deactivating meta-directing groups • Explain why the halogens are deactivating ortho, para-directing groups • 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 conjuction with electrophilic aromatic substitution reactions • Write coupling reactions of diazonium salts • Give an acceptable IUPAC names for alkyl and arylamines • Describe the influence of hydrogen bonding on the physical properties of amines • Write equations showing the reaction of amines with acids to form ammonium salts • Explain what is meant by K_b and pK_b for an amine • Explain why arylamines are weaker bases than alkylamines • Write equations showing the reactions of amines with acids to form ammonium salts • Write reaction equations and describe the mechanism for alkylation of amines • Write reaction equations illustrating synthesis of amines by reduction of nitro compounds, nitriles, amides, ketones and aldehydes • Write chemical equations describing the preparation of alkenes from amines using the Hofmann elimination • Explain how you can distinguish primary, secondary and tertiary amines using Hinsberg test. • Write the structures of epoxides and equations, illustrating their ring-opening reactions

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	10	3	140404

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	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, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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: **Chemistry**		**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:	**MCHB021**				
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:	After completing this module, students should be able to: • Define valence bond theory using homo and heteronuclear molecules • Understand molecular orbital theory and the bonding orbitals of H_2, the description of orbital overlap, bond strength, bond order and length, covalent radii as well as polarity in homo and heteronuclear molecules • Know the properties and structure of ionic substances • Discuss the lattice structures of a few typical examples • Show the application of lattice energy and Born-Haber cycle • Define ionic radius • Introduce the transition metals and the electronic surtaxes of transition metals • Understand the variable oxidation states of transition metals • Look at coordination number and geometry isomerism • Discuss the occurrence, physical and chemical properties of the s- block elements • Understand the reactivity of, and the typical compounds of s- block elements				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	10		3		140403
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	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, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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:	**Chemistry**	**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:**	CHEM202

Module Code:	**MCHA022**				
Module Name:	Analytical Chemistry 2				
Module Content:	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 titrimentry; Complexometric titrations; Oxidation-reduction titrimetry. Introduction to electrochemistry; Potentiometry				
Learning Outcomes:	After completion of the module, students should be able to: • Explain the theory of sampling and sample preparation • Handle and evaluate statistical data • Handle stoichiometric and equilibrium calculations • Understand and apply the basic theory of gravimetry • Understand and apply the basics of titrimetry				
Module Information:	**SAQA Credits**		**ITS Course Level Code**	**CESM Code (3rd Order)**	
	10		3	140402	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	6.1 hrs
Pre-requisite module/s:	MCHM011				
Co-requisite module/s:	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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**

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

CURRICULUM INFORMATION			
Department:	**Chemistry**	**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:**	CHEM202

Module Code:	**MCHB022**				
Module Name:	Physical Chemistry 2				
Module Content:	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				
Learning Outcomes:	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				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	10	3	140405		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	6.1 hrs
Pre-requisite module/s :	MCHM011 & MMTH011				
Co-requisites module/s:	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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:	**Chemistry**	**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:**	

Module Code:	**MCHA031**
Module Name:	Physical Chemistry 3
Module Content:	• Transport phenomena in gases and liquids. • Chemical kinetics/theories of chemical collisions. • Chemical bonding. • Quantum mechanics (properties of light, photoelectric effect), wave-particle nature of matter. • Molecular structure and symmetry. • Vibrational and rotational spectra.

Module Code:	**MCHA031**				
Module Name:	Physical Chemistry 3				
Module Content:	• Electronic transitions and magneticresonance. • **Miscellaneous Topics:** Molecules in motion: viscosity, diffusion, mobility. Surface chemistry: Processes at solid surfaces (Physisorption and chemisorption, adsorption isotherms, surface tension), Heterogeneous catalytic rate reactions, capillarity				
Learning Outcomes:	Students should be able to demonstrate knowledge of electro-analytical methods, spectrometric methods and separation methods				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	140405		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
Pre-requisite module/s:	MCHAB022				
Co-requisite module/s:	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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: **Chemistry**	**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:	**MCHB031**		
Module Name:	Inorganic Chemistry 3		
Module Content:	• Coordination chemistry andstereochemistry. • Redox reactions. • Bonding theories: • Valence bond theory (VBT), Crystal field theory (CFT), Ligand field theory (LFT) and Molecular orbital theory (MOT). • Inorganic reactions andmechanisms. • Introduction to f-block elements (lanthanides and actinides). • Organomentallic chemistry and Isolobal analogies. • Organometallic complexes in action: Homogeneous catalysis		
Learning Outcomes:	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 lanthanides), isolobal analogy and organometallic chemistry (with application to homogeneous catalysis)		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	16	3	140403

Module Code:	**MCHB031**				
Module Name:	Inorganic Chemistry 3				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
Pre-requisite module/s:	MCHB021				
Co-requisite module/s:	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs written examination				
Assessment Weighting:	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**

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

CURRICULUM INFORMATION	
Department: Chemistry	**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:	**MCHA032**				
Module Name:	Analytical Chemistry 3				
Module Content:	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). **Miscellaneous Topic(s):** Surface analysis techniques				
Learning Outcomes:	Students should be able to demonstrate knowledge of electro-analytical methods, spectrometric methods and separation methods				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		140402
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
Pre-requisite module/s :	MCHA022				
Co-requisites module/s :	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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**

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

CURRICULUM INFORMATION	
Department: Chemistry	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:	MCHB032				
Module Name:	Organic Chemistry 3				
Module Content:	• Substitution and elimination reactions: S_N1, S_N2, E1, E2. • Carbonyl chemistry: reactions at the α position (Aldol condensation and related reactions). • Carboxylkic acids and their derivatives: acyl compounds, enolate chemistry of esters. • Organic spectroscopy: systematic identification of organic compounds (mass spectrometry, infrared and UV/VIS spectroscopy, nuclear magnetic resonance). • Organometallics: Introduction to organometallic compounds.				
Learning Outcomes:	A successful student in this module will gain proficiency in: • Reactions and mechanisms of organic molecules • Identification of organic substances using spectroscopic techniques • Solving problems that involve organic molecules, their reactions, mechanisms and identification • Laboratory techniques used to synthesize, purify, and identify organic substances				
Module Information:	SAQA Credits	ITS Course Level Code	CESM Code (3rd Order)		
	16	3	140404		
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4 × 45 min	1 × 6 hrs	1 × 45 min	N/A	11.8 hrs
Pre-requisite module/s:	MCHA021				
Co-requisite module/s:	None				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hrs 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%			

DEPARTMENT: COMPUTER SCIENCE

CURRICULUM INFORMATION	
Department: Computer Science	**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:	**MCSC000**
Module Name:	Introduction to Computing concepts and algorithms
Module Content:	**COMPUTING CONCEPTS:** • Basic concepts in ICT • Concepts of operating systems and networks • Data storage and binary number system • Microsoft Office Software Applications **ALGORITHMS** • Fundamental Algorithmic concepts and problem solving • Concepts of Programming languages • Basic Logic gates and Karnaugh maps **FUNDAMENTALS OF C++ PROGRAMMING** • Introduction to Programming • Program components in C++ • Data types, Declarations, and Displays • Assignment and Interactive input • Control Structures (if, if/else, while, do/while, switch, for)
Learning Outcomes:	• The learner at this level should be able to: • Demonstrate a basic understanding of broad fundamental concepts and trends of computing. • Demonstrate a basic understanding of the modern computer-based problem solving paradigm. • Understand algorithms and how they are developed • Develop logical constructs for solving problems • Demonstrate problem solving capability • Understand and use information and communication technology (ICT) tools appropriately • Effectively use software productivity tools • Understand the basics of a C++ Integrated Development Environment (IDE) • Construct basic C++ statements a given simple problem specification • Write simple decision-making statements • Apply multiple selection using the **switch**, **while** and **do while** statements • Use if, if/else, for loops when necessary to perform repetition routines in a program • Implement counter-controlled repetition and sentinel-control repetition

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	24	3	060601

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	2 x 45 min	2 x 45 min	0	4 hrs

Pre-requisite module/s:	None
Co-requisite module/s:	None
Assessment Methods:	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

Module Code:	**MCSC000**				
Module Name:	Introduction to Computing concepts and algorithms				
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: **Computer Science**	**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:	**MCOB000**
Module Name:	Introduction to data organization and artificial Intelligence (AI)
Module Content:	**DATA ORGANIZATION** • Files and Data Structures; • Introduction to Database concepts • Advanced algorithm development and problem solving • Concepts of software development • Intermediate Object Oriented Programming using C++ compiler **ARTIFICIAL INTELLIGENCE** • Fundamentals of Artificial Neural Networks (ANN) • Expert Systems • Introduction to Theory of computations • Introduction to Web development **PROCEDURAL AND OBJECT ORIENTED PROGRAMMING** • Introduction to modularity using functions • Math Library Functions • C++ Standard Library Header Files • Basic arrays and pointers • Introduction to Object Oriented Programming – Classes
Learning Outcomes:	**After successful completion of the module, the student should be able to:** • Apply different search strategies in computer processing; • Explain how the Turing test works; • Interpret how Artificial Neural Networks are applied in general ; • Analyse Robotics and Expert Systems; • Understand fundamental concepts of web design • Design and write structured, efficient programs using C++ • Conduct basic program analysis and construct programs modularly from functions • Implement modularity using functions, pointers and classes • Apply various basic problem-solving techniques • Create functions with multiple parameters • Use common mathematical functions available in the C++ Standard Library

Module Code:	**MCOB000**				
Module Name:	Introduction to data organization and artificial Intelligence (AI)				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	24		3		060601
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	2 x 45 min	2 x 45 min	0	4 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	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.				
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:	**Computer Science**	**School:**	Science & Technology
Last Revision date:	**2**011	**First Year Offered (New):**	2013
Replace this Module existing module(s)?	No	**If YES, give the module codes:**	COSC101

Module Code:	**MCOA011**		
Module Name:	Computing Concepts and Algorithms		
Module Content:	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.		
Learning Outcomes:	The learner at this level should be able to: • Demonstrate a thorough understanding of broad fundamental concepts and trends of computing. • Demonstrate a thorough understanding of the modern computer-based problem solving paradigm. • Understand algorithms and how they are developed • Develop logical constructs for solving problems • Demonstrate problem solving capability • Understand and use information and communication technology (ICT) tools appropriately • Effectively use software productivity tools • Understand the basics of a specific object-oriented computer programming language for application development		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	060601

Module Code:	**MCOA011**				
Module Name:	Computing Concepts and Algorithms				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1.5	2	0	4
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH011, MSTS011				
Assessment Methods:	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.				
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: **Computer Science**	**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:	**MCOA012**		
Module Name:	Data Organization and Artificial Intelligence		
Module Content:	**DATA ORGANIZATION** • Files and Data Structures; • Introduction to Database concepts • Advanced algorithm development • Intermediate Object Oriented Programming using C++ compiler **ARTIFICIAL INTELLIGENCE** • Fundamentals of Artificial Neural Networks (ANN) • Expert Systems • Introduction to Theory of computations • Introduction to Web development		
Learning Outcomes:	After successful completion of the module, the student should be able to: • Apply different search strategies in computer processing; • Explain how the Turing test works; • Interpret how Artificial Neural Networks is applied in general ; • Analyse Robotics and Expert Systems; • Design and write structured, efficient programs using C++ • Conduct basic program analysis and write medium size programs. • Be familiar with functions, pointers and classes		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	060601

Module Code:	**MCOA012**				
Module Name:	Data Organization and Artificial Intelligence				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1.5	2	0	4
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH012 ; MSTS012				
Assessment Methods:	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.				
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**

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

CURRICULUM INFORMATION	
Department: **Computer Science**	**School:** Science & Technology
Last Revision date: **2**011	**First Year Offered (New):** 2013
Replace this Module existing module(s)? Yes	**If YES, give the module codes:** COSC201

Module Code:	**MC0A021**			
Module Name:	Data Structures			
Module Content:	• Modularization, data encapsulation, information hiding, data abstraction, functional decomposition. • Structure, Array, Queue, Stack, List, Linked list, Binary Search Tree and Files creation • Compiler theory.			
Learning Outcomes:	After successful completion of the module, the student should be able to • Apply advanced concepts of structured programming, debugging and error handling. • Identify and differentiate between a Stack and a Queue; Linear Linked list and a doubly Linked list • Understand basic operations of data structures eg create, store, search, replace, delete, insert and sort. • Creation and manipulation of electronic files processing • Implement data structures in object oriented programming • Acquired skills at using a variety of programming languages • Apply evaluation criteria for choosing an appropriate programming language in a given scenario.			
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**	
	20	3	060702	

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1.5	0	0	6

Module Code:	**MC0A021**				
Module Name:	Data Structures				
Pre-requisite module/s:	MMTH011, MMTH012, MCOA011, MCOB011				
Co-requisite module/s:	MMTA021				
Assessment Methods:	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.				
Assessment Weighting:	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**
Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical	Theory			
	Duration	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department: **Computer Science**		**School:** Science & Technology	
Last Revision date: **2**011		**First Year Offered (New):**	2013
Replace this Module existing module(s)? Yes		**If YES, give the module codes:**	COSC202

Module Code:	**MCOA022**				
Module Name:	Computer Organization & Architecture				
Module Content:	• Basic Concepts: IA – 32 Processor Architecture • Assembly language fundamentals • Data transfers, Addressing and Integer Arithmetic • Procedures, Advance procedures and conditional processing • Structures and Macros • 32 – Bit Windows Programming • High Level language Interface • 16 – Bit MS-DOS Programming • Disk Fundamentals • BIOS – Level and Expert MS-DOS programming				
Learning Outcomes:	• Understanding of the design and operations of the Assembly language. • Interface Assembly language to high level languages. • Write programs in Assembly language.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		060701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1.5	0	0	6
Pre-requisite module/s:	MMTH011, MCOA011, MCOB011				
Co-requisite module/s:	MMTA022				

Module Code:	**MCOA022**				
Module Name	Computer Organisation & Architecture				
Assessment Methods:	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.				
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**

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

CURRICULUM INFORMATION	
Department: Computer Science	**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:** COSC351

Module Code:	**MCOA031**				
Module Name	Database Systems				
Content:	Database Systems; Data Models; Relational Database Model; Relational Algebra; Entity-Relationship Modelling; Advanced Data Modelling; Normalization of Database Tables; SQL; Database Design and Implementation.				
Learning Outcomes:	Knowledge of the following: • Different types of databases, importance of Database design and evolution of Database from file systems • Functions of DBMS and Database components • 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 • Basic concepts and development of relational models • Manipulation of Tables using relational operators • Incorporation of Entity-Relationship modelling into the Database design process • The normalization process • Using both basic and advanced SQL commands for manipulation of tables. • System Development and Database Life Cycles, The role of DBA and navigating through the three stages of Database design				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		060601

Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2	1.5	0	0	8

Module Code:	**MCOA031**				
Module Name	Database Systems				
Pre-requisite module/s:	MCOA021,MCOA022 ,MMTH011, MMTH012				
Co-requisite module/s:	None				
Assessment Methods:	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				
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%			

CURRICULUM INFORMATION			
Department: **Computer Science**		**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:**	COSC361

Module Code:	**MCOB031**				
Module Name:	Operating Systems				
Module Content:	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				
Learning Outcomes:	• Understanding of the concept of a process • Understanding and appreciation of concurrent processing • Knowledge of virtual memory techniques • Understanding of processor scheduling techniques • Appreciation of I/O and File handling strategies • Knowledge and appreciation of embedded systems • Understanding of computer security issues • Knowledge of distributed systems • Appreciation of cloud computing paradigm				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		060999
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2	1.5		0	8
Pre-requisite module/s:	MCOA021,MCOA022, MMTH011, MMTH012				
Co-requisite module/s:	None				
Assessment Methods:	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.				

Module Code:	**MCOB031**				
Module Name:	Operating Systems				
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%			

CURRICULUM INFORMATION			
Department:	**Computer Science**	**School:**	Science & Technology
Last Revision date:	**2**011	**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	COSC372

Module Code:	**MCOA032**				
Module Name:	Artificial Intelligence				
Module Content:	Predicate Calculus Representation, State Space Search Strategies, Heuristic Search, Stochastic Methods, Knowledge Representation, Expert Systems, Probabilistic Reasoning, Machine Learning, Natural Language Understanding and Processing..				
Learning Outcomes:	• Knowledge of predicate calculus representation • Understanding of general state space search techniques • Appreciation and use of stochastic methods • Understanding of knowledge representation schemes • Understanding of structure and role of expert systems • Knowledge of automated and probabilistic reasoning techniques • Knowledge of machine learning strategies and approaches • Knowledge of natural language understanding processes.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		060102
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2	1.5		0	8
Pre-requisite module/s:	MCOA021,MCOA022, MMTH011, MMTH012				
Co-requisite module/s:	None				
Assessment Methods:	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.				
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**

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

CURRICULUM INFORMATION			
Department: Computer Science		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:	COSC382

Module Code:	MCOB032				
Module Name:	Computer Networks				
Content:	Networking Basics; Physical Layer Technologies; Local Area Networks; TCP/IP Internet-Working; Wide Area Networks.				
Learning Outcomes:	At the end of this course students are expected to have mastered the following: • General principle of network design and switching process • Packet and circuit switching • Network Architecture, standardization and classification • Network characteristics and QoS • Data encoding and multiplexing • Ethernet and wireless transmission • TCP/IP Addressing and internet protocol • IP WANS				
Module Information:	SAQA Credits	ITS Course Level Code	CESM Code (3rd Order)		
	16	3	060902		
Periods per week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	2	1.5		0	8
Pre-requisite module/s:	MCOA021,MCOA022, MMTH011, MMTH012				
Co-requisite module/s:	None				
Assessment Methods:	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.				
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	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	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-aqeous titrations, indicators. Colorimetric: Spectrophotometric reagents, elementary visible Spectrophotometry: spectrophotometric titrations.					
Learning Outcomes	▪ Understand the different types of environment and different trends in environmental science. ▪ Describe the composition and structure of the atmosphere. ▪ Identify different types of environmental problems. ▪ Appreciate the impact of humans in managing the environment efficiently through man – environment interactions. ▪ Understand and identify various factors that may bring about changes in the environment. ▪ Understand various methods used in environmental analysis and Identify limitations of these methods. ▪ Explain reasons why contaminants should be avoided during sampling and various sources of these contaminants. ▪ Give examples of different types of precipitate and crystal formation. ▪ Identify various instruments used for environmental sampling and analysis.. ▪ Ability to operate and use spectrophotometers for environmental samples.					
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**			
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
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			60 40
	Min Final mark to pass to pass (%)					50
Summative assessment Paper:		Paper 1	Paper 2			
	Theory/Practical					
	Duration					
	Sub minimum					

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 202**				
Module name	Environmental Management				
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	▪ Define and understand environmental management and planning. ▪ Appreciate the need for Environmental Management in South Africa. ▪ Identify some elements of environmental management and principles. ▪ Describe the role and functions of Environmental Managers. ▪ Integrate the role of International Institutions and Non-Governmental Organizations. ▪				
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**		
Periods per week	Classes	Practicals	Tutorial	Seminars	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:	**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	**EHS 201**
Module name	Fundamentals of Environmental Health Science
	Definition of Environmental Health, Environmental Effects on Health, Cleanliness, Conservation the Environment and Law, Exposure to Environmental Stressors: Biological, Physical and Ergonomic

Module Content	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.					
Learning Outcomes	• Understand the co-evolution of human civilization, environmental exposures, and disease • Describe environmental hazards in communities and the workplace • Describe surveillance procedures for hazards in communities and the workplace • Understand the basis of genetic and non-genetic susceptibility to environmental disease • Describe the major mechanisms of toxicity • Understand basic principles of toxicokinetic and toxicodynamics • Understand how a risk assessment document is prepared, the information it contains, and how it is used to manage risk to environmental hazards • Describe the major environmental problems caused by solid and hazardous waste, water pollution, air pollution and agriculture • Understand basic principles that underlie climate change and its impact on human and ecological health					
Module information	**SAQA Credits**		**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012					
Co-requisite module(s)	EMT 201 & EMT202 , EHS 202, 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			60 40
	Min Final mark to pass to pass (%)					50
Summative assessment Paper:		Paper 1	Paper 2			
	Theory/Practical					
	Duration					
	Sub minimum					

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	**EHS 202**
Module name	Food borne Diseases and Human Parasitic Diseases
Module Content	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.
Learning Outcomes	▪ Describe food borne diseases ▪ Understand the epidemiology of food borne diseases. ▪ Identify pathogens causing food borne diseases. ▪ Expolain various ways of managing food borne diseases.

	▪ Describe methods that can be used to prevent food borne diseases. ▪ Identify some common parasites in South Africa. ▪ Understand the importance of managing the parasites.					
Module information	**SAQA Credits**		**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 &MMTH012					
Co-requisite module(s)	EMT 201 , EHS 201 & EHS 202, 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			60 40
	Min Final mark to pass to pass (%)					50
Summative assessment Paper:		Paper 1	Paper 2			
	Theory/Practical					
	Duration					
	Sub minimum					

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	**MICB201**					
Module name	Introduction to Microbiology					
Module 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	▪ Understand the history and development of microbiology ▪ Discuss key concepts in microbiology ▪ Classify and characterize different types of microorganisms ▪ Differentiate between prokaryotic and eukaryotic cells ▪ Describe the nutritional requirements of bacteria ▪ Discuss the nature and uses of different types of bacteria growth media ▪ Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components ▪ Understand and describe different methods for identification of bacteria.					
Module information	**SAQA Credits**		**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012					
Co-requisite module(s)						

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:	**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	**MICB202**				
Module name	Environmental and Fungal Microbiology				
Module Content	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 biodegration 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				
Learning Outcomes	▪ Understand and describe the classification of fungi ▪ Describe the effects of abiotic factors on microorganisms ▪ Measure bacterial numbers in air, biomass and ecosystems ▪ Describe the roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles ▪ Understand and describe ecological aspects of biodegradation ▪ Understand and describe the role of microorganisms in water pollution and treatment. ▪ Understand and describe water quality testing and purification trchnology.				
Module information	**SAQA Credits**	**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	MPHS011& MPHS012 ,MCHM011&MCHM012 , MBIO011 & MZOO012,MMTH011 & MMTH012				
Co-requisite module(s)					
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:	**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	**EHS 301**				
Module name	Human Nutrition in Health and Diseases				
Module Content	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.				
Learning Outcomes	▪ Define basic terminology in human nutrition and diseases ▪ Classify food into groups. ▪ Hygienic methods of food preparation and preservation. ▪ Understand some diseases caused by improper food diet. ▪ Analyse and understand various methods that can be used in managing nutritional diseases. ▪ Identify different microrganisms causing food poisoning.				
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**		
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	EMT 201 & EMT 202, EHS201 & EHS202				
Co-requisite module(s)	EHS302				
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:	**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	**EHS 302**				
Module name	Occupational and Health Safety				
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	▪ Define occupational health ▪ Discuss challenges for the development of occupational health and safety. ▪ Explain the scope of occupational health and safety. ▪ Describe the interrelationship between occupational health and development ▪ Identify the elements of a work environment. ▪ Discuss the three common interactions in the work place. ▪ Explain the interrelationships between work and health				
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**		
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
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:	**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	**EPS 301**
Module name	Community Health and Development
	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 infection, Problem solving in the developing world, Sources of community/public health problems in rural

Module Content	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.				
Learning Outcomes	▪ Describe the difference between community health and public health ▪ Describe the influence of the environment on community health ▪ Distinguish between the impact of community health in developed and less developed countries. ▪ Understand the relationship between malnutrition and infection. ▪ Analyse and understand various methods that can be used in solving problems within the community. ▪ Identify factors that can mitigate agaist health hazards within the community health perspectives. ▪ Appreciate the importance of good environment ▪ Discuss the impact of pollution on community health.				
Module information	**SAQA Credits**	**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	EMT201 & EMT202, EHS201 & EHS202				
Co-requisite module(s)	EHS301 & EHS302, EPS302				
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		60 40
	Min Final mark to pass to pass (%)				50
Summative assessment Paper:		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

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	**EPS 302**
Module name	Environmental Epidemiology
Module Content	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
Learning Outcomes	▪ Use theory, research, and the problem-solving process in examining the health status of people across the life span. ▪ Negotiate outside learning experiences that will enhance the application of health and wellness concepts. ▪ Examine the impact of the health care professional on health care systems at local, state, national, and international levels. ▪ Analyze environmental, sociocultural, and economic factors that influence health care practices across

	cultures. ▪ Explore past, present, and future trends in the health care system and the changing role of selected health care professionals. ▪ Articulate the role of values, beliefs, ethics, and public policy on health and wellness.					
Module information	**SAQA Credits**		**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
Pre-requisite module(s)	EMT 201 & EMT 202, EHS201 & EHS202					
Co-requisite module(s)	EHS301 & EHS302, EPS301					
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			60 40
	Min Final mark to pass to pass (%)					50
Summative assessment Paper:		Paper 1	Paper 2			
	Theory/Practical					
	Duration					
	Sub minimum					

ENVIRONMENTAL MANAGEMENT & TOXICOLOGY - BSCG01

SECTION F: MODULAR INFORMATION REQUIRED			
Department:	**Environmental Management and Toxicology**	**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
Content:	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-aqeous titrations, indicators. Colorimetric: Spectrophotometric reagents, elementary visible Spectrophotometry: spectrophotometric titrations.
Learning Outcomes:	• Understand the different types of environment and different trends in environmental science. • Describe the composition and structure of the atmosphere. • Identify different types of environmental problems. • Appreciate the impact of humans in managing the environment efficiently through man – environment interactions. • Explain reasons why contaminants should be avoided during sampling and various sources of these contaminants.

	• Give examples of different types of precipitate and crystal formation.					
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order (Six Numbers)**	
	20		2		140503	
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**	
	SMU		Full		2/1ST 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:	EMT202,EHS201,MICB201 & MICB202					
Assessment	**Formative assessment:** • Theoretical and Practical testing at end of Module with feedback. • Draft Portfolio of Environmental Science Theory and Practice assessed mid-year. **Summative assessment:** 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: • Understand and identify various factors that may bring about changes in the environment. • Understand various methods used in environmental analysis and Identify limitations of these methods. Specific educational outcome 2: • Identify various instruments used for environmental sampling and analysis. • Ability to operate and use spectrophotometers for environmental samples.					
Assessment methods	**Formative assessment:** • Theoretical and Practical Assessment. • 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. **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	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			
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 202**				
Module name	Environmental Management				
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:	• Define and understand environmental management and planning. • Identify some elements of environmental management and principles. • Describe the role and functions of Environmental Managers.				
Module Information:	SAQA Credits	ITS Course Level	CESM Code (3rd Order) (Six Numbers)		
	20	2	140503		
Delivery Information:	Campus	Full/Part Time	Period Year/1st/2nd Semester		
	SMU	Contact/Full Time	2/2nd 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: • Theoretical and Practical Assessment. • Draft Portfolio of Environmental Health Theory and Practice assessed mid-year. 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: • Appreciate the need for Environmental Management in South Africa. Specific educational outcome: Explain how vaccines are distributed • Integrate the role of International Institutions and Non-Governmental Organizations.				
Assessment methods	Formative assessment: • Theoretical and Practical Assessment • 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. 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:	**Environmental Management & Toxicology**	**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	**EHS 201**				
Module name	Fundamentals of Environmental Health Science				
Module Content	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.				
Learning Outcomes	• Understand the co-evolution of human civilization, environmental exposures, and disease • Describe environmental hazards in communities and the workplace • Describe surveillance procedures for hazards in communities and the workplace • Understand the basis of genetic and non-genetic susceptibility to environmental disease • Describe the major mechanisms of toxicity • Understand basic principles of toxicokinetic and toxicodynamics • Understand how a risk assessment document is prepared, the information it contains, and how it is used to manage risk to environmental hazards • Describe the major environmental problems caused by solid and hazardous waste, water pollution, air pollution and agriculture • Understand basic principles that underlie climate change and its impact on human and ecological health				
Module information	**SAQA Credits**	**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012				
Co-requisite module(s)	EMT202, EHS201,MICB201,MICB202				
Assessment Methods	Formative tests, Assignments, Summative written examination				
	Min Formative Assessment Mark for exam admission (%)				40
		% Formative Assess Mark			60

Assessment Weighting	Final Mark =		% 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:	**Environmental Management & Toxicology**	**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	**EHS 202**				
Module name	Food borne Diseases and Human Parasitic Diseases				
Module Content	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.				
Learning Outcomes	▪ Describe food borne diseases ▪ Understand the epidemiology of food borne diseases. ▪ Identify pathogens causing food borne diseases. ▪ Expolain various ways of managing food borne diseases. ▪ Describe methods that can be used to prevent food borne diseases. ▪ Identify some common parasites in South Africa. ▪ Understand the importance of managing the parasites.				
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**		
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012				
Co-requisite module(s)					
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		60 40
	Min Final mark to pass to pass (%)				50
Summative assessment Paper:		Paper 1	Paper 2		
	Theory/Practical				
	Duration				
	Sub minimum				

CURRICULUM INFORMATION			
Department:	**Environmental Management & Toxicology**	**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	**MICB201**				
Module name	Introduction to Microbiology				
Module 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	▪ Understand the history and development of microbiology ▪ Discuss key concepts in microbiology ▪ Classify and characterize different types of microorganisms ▪ Differentiate between prokaryotic and eukaryotic cells ▪ Describe the nutritional requirements of bacteria ▪ Discuss the nature and uses of different types of bacteria growth media ▪ Describe the physical organization of bacteria, bacterial chromosomes , cytoplasm, cell wall and bacterial components ▪ Understand and describe different methods for identification of bacteria.				
Module information	**SAQA Credits**	**ITS Course Level Code**	**CESM Code**		
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning
Pre-requisite module(s)	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012				
Co-requisite module(s)					
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:	**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	**MICB202**					
Module name	Environmental and Fungal Microbiology					
Module Content	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 biodegration 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					
Learning Outcomes	▪ Understand and describe the classification of fungi ▪ Describe the effects of abiotic factors on microorganisms ▪ Measure bacterial numbers in air, biomass and ecosystems ▪ Describe the roles of microorganisms in carbon, oxygen, nitrogen, sulphur and phosphorus cycles ▪ Understand and describe ecological aspects of biodegradation ▪ Understand and describe the role of microorganisms in water pollution and treatment. ▪ Understand and describe water quality testing and purification trchnology.					
Module information	**SAQA Credits**		**ITS Course Level Code**		**CESM Code**	
Periods per week	Classes	Practicals	Tutorial	Seminars	Independent Learning	
Pre-requisite module(s)	MZOO011, MZOO012, MCHM011, MCHM012 ,MPHS011& MPHS012,MMTH011&MMTH012					
Co-requisite module(s)						
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			60 40
	Min Final mark to pass to pass (%)					50
Summative assessment Paper:		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:	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.				
Learning Outcomes:	• Classify and characterise hazardous substances in the environment. • Understand different pathways of hazardous substance into food chain. • Describe various disposal methods for hazardous substances				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		130906
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd 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:	EMT 201 AND 202				
Co-requisites modules for module:	No				
Assessment	**Formative assessment:** • Theoretical and Practical Assessment • Draft Portfolio of Environmental ScienceTheory and Practice assessed mid-year. **Summative assessment:** Test, Quiz and Practicals.				
Assessment criteria (see Annex 1 for assessment criteria grid)	Specific educational outcome 1: • Explain how hazardous substance enters into water, soil and plants • List different methods of hazardous disposal Specific educational outcome 2: • Understand and describe the effect of metals in the environment • Describe the adverse effects of metals in humans, plants and animals.				
Assessment methods	**Formative assessment: Theoretical and Practical Exam-** **Summative assessment: Test, Practicals and Quiz**				
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)		40%		
	% Formative Assessment Mark		60%		

		% Summative Assessment Mark	40%
	Minimum final mark to pass (%)		50%

		Paper 1	Paper 2	Paper 3	Paper 4
Summative Assessment Paper:	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:	**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 302**				
Module Name	Pollution Monitoring Techniques and Control				
Content:	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.				
Learning Outcomes:	• Identify and classify different waste management techniques. • List different factors affecting air pollution. • Understand different methods of monitoring air pollution.				
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**
	30		3		140503
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**
	SMU		Full		Year
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	3hours	1		30 hours
Pre-requisite modules for this module:	EMT 201 AND EMT 202				
Co-requisites modules for module:	No				
Assessment	**Formative assessment:** • Practical and Theoretical Assessment **Summative assessment:** 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: • Identify different methods for treating waste water Specific educational outcome 2: • Understand bioremediation techniques used for soil. • List different methods for noise control and techniques.				

Assessment methods			**Formative assessment:** • Theoretical and Practical Assessment • For the practicals students visit a company and understand various processes involve in monitoring pollutants. Students are expected to submit a report. **Summative assessment:** Report on visit to Industrial Companies, Practical, Test and Quiz.
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)		40%
		% Formative Assessment Mark	60%
		% Summative Assessment Mark	40%
	Minimum final mark to pass (%)		50%

		Paper 1	Paper 2	Paper 3	Paper 4
Summative Assessment Paper:	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			
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 303**		
Module Name	Natural Resources Management		
Content:	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.		
Learning Outcomes:	• Identify different natural resources in South Africa. • Describe different ways of managing natural resources. • Understand the impact of population growth on natural resources. •		
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd Order) (Six Numbers)**
	30	3	131207
Delivery Information:	**Campus**	**Full/Part Time**	**Period Year/1st/2nd Semester**

	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	**Formative assessment:** • Theoretical and Practical Assessment. **Summative assessment:** 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: • Describe different ways of conserving natural resources Specific educational outcome 2: • Understand current use and potential use of natural resources. • Understand the techniques involved in resource processing and utilization.				
Assessment methods	**Formative assessment:** • Theoretical and Practical Assessment. • For the practicals students attend visit a natural game reserve and understand various management practices. **Summative assessment:**				

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:	**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 304**
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.

Learning Outcomes:	• Describe basic environmental management principles. • Understand and describe the steps involves in EIA. • Analyse some socio political factors involve in environmental management.					
Module Information:	**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order) (Six Numbers)**	
	30		3		131205	
Delivery Information:	**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**	
	SMU		Full		Year	
Periods per week:	**Classes**	**Practical's**	**Tutorial**	**Seminars**	**Independent Learning**	
	5	3 hours	1		30 hours	
Pre-requisite modules for this module:	EMT 201 and 202					
Co-requisites modules for module:	No					
Assessment	**Formative assessment:** • Practical and Theoretical Assessment • Draft Portfolio of Environmental Science Theory and Practice assessed mid-year. **Summative assessment:** 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: • Understand different concepts in environmental legislation. • Understand the need for environmental sustainability. Specific educational outcome 2: • Explain various methods of environmental administration in South Africa.					
Assessment methods	**Formative assessment:** • Theoretical and Practical Assessment. • 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 **Summative assessment:**					
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

DEPARTMENT: LANGUAGE PROFICIENCY

CURRICULUM INFORMATION			
Department:	**Language Proficiency**	**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:**	N/A

Module Code:	**MHEL000**				
Module Name:	Health Education and Life Competencies I				
Module Content:	Respect for all forms of life Sexual health Safety in my environment Successful scientific communication Successful study skills Computer literacy				
Learning Outcomes:	• List different life forms, list differences between humans and explain how to have respect for all living things • Know the basic male and female reproductive structure and function • Shortly describe pregnancy and human development • List and compare the effectiveness of different methods ofcontraception • Explain what safe sex is and why it isimportant • Know the importance of familyplanning				
Learning Outcomes:	• Know the rights and responsibilities with regard to his/her own body • List different types of abuse, define rape and shortly discuss the causes and the health and social effects of abuse and rape • Know how to ensure safety at home, in the laboratory and in the future place of work • Know some aspects of the South African Occupational Health and Safety Act • Know how to plan for his/her future, including financial responsibilities • Know how to take notes and studyeffectively • Find good quality scientific information on a variety of topics • Write short notes on scientifictopics • Understand plagiarism, its consequences and how to reference in a correct way • Organize & manage activities &observations • Identify & solve problems using critical & creative thinking • Work effectively as a member of agroup • Collect, analyse & organise information • Communicate effectively using scientific language skills in written form and in presentations • Know how to access good scientific information using the internet • Know how to use MS Word to typedocuments • Be able to compile factual, scientific documents using a computer				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	12	2	091305		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min.	1 x 3 h	1	0	2 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	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%)				
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	Practical	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

CURRICULUM INFORMATION			
Department:	**Language Proficiency**	**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:**	N/A

Module Code:	**MHEB012**
Module Name:	Health Education and Life Competencies II
Module Content:	Sexual health Healthy lifestyle My environment influences my health The scientific method Successful scientific communication Information literacy
Learning Outcomes:	• Define infertility, list different causes of infertility and shortly explain how it can be treated • Know what abortion is, and understand the consequences of abortions • List and distinguish between different types of sexual orientation • Define sexually transmitted diseases, list some examples of sexually transmitted diseases and shortly explain the signs and symptoms of these diseases • Explain the effects of HIV on the community and the country • Write short notes on practical advice to living with HIV • Know the importance of being examined for sexually transmitted diseases and what such an examination consists of • Describe the importance of a healthy lifestyle • Know the importance of following a healthy diet and explain what a healthy diet consist of • List and discuss the effects of smoking, alcohol abuse and substance abuse • Understand the importance of exercise and know how often, and which types of exercise to do. • Write short notes on the effects of exposure to sunlight, air pollution and water pollution on the human body • Know what radiation is, list some sources of radiation and shortly describe the effects of radiation on the human body • Review and discuss the scientific method • Find good quality scientific information on a variety of topics • Write short notes on scientific topics • Create slide shows using MS PowerPoint and be able to present such slide shows in class

Learning Outcomes:	• Create tables and graphs from scientific data using MS Exell • Be able to create and interpret tables and graphs depicting scientific information • Organize & manage activities &observations • Identify & solve problems using critical & creative thinking • Work effectively as a member of agroup • Collect, analyze & organize information • Communicate effectively using scientific language skills in written form and in presentations				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		2		091305
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1	0	2 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	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%)				
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	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

CURRICULUM INFORMATION			
Department:	**Language Proficiency**	**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:**	N/A

Module Code:	**MHEL011**
Module Name:	Health Education and Life Competencies I
Module Content:	Respect for all forms of life Sexual health Safety in my environment Successful scientific communication Successful study skills
Learning Outcomes:	• List different life forms, list differences between humans and explain how to have respect for all living things • Know the basic male and female reproductive structure and function • Shortly describe pregnancy and human development • List and compare the effectiveness of different methods of contraception • Explain what safe sex is and why it isimportant • Know the importance of familyplanning

Learning Outcomes:	• Know the rights and responsibilities with regard to his/her own body • List different types of abuse, define rape and shortly discuss the causes and the health and social effects of abuse and rape • Know how to ensure safety at home, in the laboratory and in the future place of work • Know some aspects of the South African Occupational Health and Safety Act • Know how to plan for his/her future, including financial responsibilities • Know how to take notes and study effectively • Find good quality scientific information on a variety of topics • Write short notes on scientific topics • Understand plagiarism, its consequences and how to reference in a correct way • Organize & manage activities & observations • Identify & solve problems using critical & creative thinking • Work effectively as a member of a group • Collect, analyse & organise information • Communicate effectively using scientific language skills in written form and in presentations

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	2	091305

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1	0	2 hrs

Pre-requisite module/s:	None
Co-requisites module/s:	None
Assessment Methods:	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%)

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	Practical	Theory		
	Duration	3 hrs	3 hrs		
	Sub minimum	40%	40%		

CURRICULUM INFORMATION			
Department:	**Language Proficiency**	**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:**	N/A

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

Learning Outcomes:	• Define infertility, list different causes of infertility and shortly explain how it can be treated • Know what abortion is, and understand the consequences of abortions • List and distinguish between different types of sexual orientation • Define sexually transmitted diseases, list some examples of sexually transmitted diseases and shortly explain the signs and symptoms of these diseases • Explain the effects of HIV on the community and the country • Write short notes on practical advice to living with HIV • Know the importance of being examined for sexually transmitted diseases and what such an examination consists of • Describe the importance of a healthy lifestyle • Know the importance of following a healthy diet and explain what a healthy diet consist of • List and discuss the effects of smoking, alcohol abuse and substance abuse • Understand the importance of exercise and know how often, and which types of exercise to do. • Write short notes on the effects of exposure to sunlight, air pollution and water pollution on the human body • Know what radiation is, list some sources of radiation and shortly describe the effects of radiation on the human body • Review and discuss the scientific method • Find good quality scientific information on a variety of topics • Write short notes on scientific topics • Be able to create and interpret tables and graphs depicting scientific information • Organize & manage activities & observations • Identify & solve problems using critical & creative thinking • Work effectively as a member of a group • Collect, analyse & organize information • Communicate effectively using scientific language skills in written form and in presentations

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	2	091305

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1	0	2 hrs

Pre-requisite modules:	None
Co-requisites modules :	None
Assessment Methods:	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%)

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**

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

Module Information:		**SAQA Credits**		**ITS Course Level**		**CESM Code (3rd Order (Six Numbers)**
		20		2		131205
Delivery Information:		**Campus**		**Full/Part Time**		**Period Year/1st/2nd Semester**
		SMU		Contact		Year
Periods per week:		**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
		5	3 hours	1		30 hours
Pre-requisite modules for this module:		MZOO011, MZOO012, MCHM011, MCHM012				
Co-requisites modules for module:		No				
Assessment		**Formative assessment:** • Theoretical and Practical Assessment **Summative assessment:** Test, Quiz and Practicals.				
Assessment criteria (see Annex 1 for assessment criteria grid)		Specific educational outcome 1: • Understand and describe ecological aspects of biodegradation • Understand and describe the role of microorganisms in water pollution and treatment. Specific educational outcome 2: • Understand and describe water quality testing and purification technology				
Assessment methods		**Formative assessment:** • Theoretical and Practical Assessment • For the practicals students will write a practical exam and submit a report on research carried out during the course. **Summative assessment:** 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.				
Mark Structure:	Minimum Form Assessment Mark for exam admission (%)	40%				
	% Formative Assessment Mark	60%				
	% Summative Assessment Mark	40%				
	Minimum final mark to pass (%)	50%				

		Paper 1	**Paper 2**	**Paper 3**	**Paper 4**
Summative Assessment Paper:	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	
Department: Applied Mathematics	**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:** AMAT101

Module Code:	**MAPA011**
Module Name:	Introduction to Applied Mathematics
Module Content:	**Calculus of real function:** Domain, range, limit, continuity of a function, The derivative of a function, The Definite and indefinite integral of a function, Fundamental Theorem of calculus. Complex numbers, the definition of complex number with its operations. The conjugates, modulus and division of complex numbers. **Lines and planes in space and linear systems:** Lines and planes, Systems of linear equations resulting from their equations, Gauss elimination, Matrix operations and properties, Inverses of square matrices and determinants, Properties and uses of these determinants. **Further integration and its applications**: The fundamental theorem of calculus, Integration techniques, Trigonometric substitutions, Integration by partial fractions, Area between two curves. **Vectors with constant component:** Definition, Magnitude**,** Position in space**,** Addition, Multiplication**,** Dot and cross product**,** Impotent vector properties. **Vector function:** Calculus such as**;** limits, Continuity and derivative at a point (product rule, chain rule and quotient rule), Integral on an interval. **Application of vectors to moving particles:** Connecting particles in plane surfaces, Work, energy and Power, Projectiles**,** Motion in a circle.
Learning Outcomes:	After successfully completing the module, the student should be able to: ▪ Obtain limits of a function in single variable at any point ▪ Identify continuous functions and differentiable functions ▪ Evaluate definite and indefinite integral of a function between points under the curve ▪ Know and represent vectors with constant components in space ▪ Apply and solve problems in mechanics using various laws of motion in the following situations: ❖ Connecting particles in horizontal surface ❖ Connecting particles in incline plane ❖ Work, energy and power ❖ Projectiles ❖ Motion in a circle

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	150201

Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	2	0	4

Pre-requisite module/s:	Admission criteria
Co-requisites module/s:	MMTH011 and MMTH012
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals and Tests. Summative theory assessment will be done at the end of the module.
	Min Summative Assessment mark for exam admission (%) **40**

Assessment Weighting:	**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: **Applied Mathematics**	**School:** Science & Technology
Last Revision date: **2**011	**First Year Offered (New):** 2013
Replace this Module existing module(s)? Yes	**If YES, give the module codes:** AMAT102

Module Code:	**MAPM012**				
Module Name:	Computational Mathematics				
Module Content:	**Numerical algorithm of functions in one variable: Review of calculus,** Algorithm and convergence, The bisection method, Fixed point iteration, Newton's method and its extensions, Error analysis for iterative method, Muller's method. **Using numerical method to determine: Lagrange polynomials, Divided differences, Hermite interpolation, and spline interpolation.** Direct methods for solving linear system; elimination method, substitution method, Gauss elimination method and Gauss-Jordan elimination, Matrix operation, Inverse matrices, Properties of matrix Operation, Determinant, LU factorization. Iterative methods; The Jacobi and Gauss-Siedel iterative Techniques, relaxation techniques for solving linear systems.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Solve single variable equation using bisection method, fixed point method and Newton's method. • Determine the error on these iterations. • Solve systems of linear equations using direct. • Solve systems of linear equations using iterative method. • Solve system of nonlinear equations.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		3		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1	2	0	4
Pre-requisite module/s:	Admission criteria				
Co-requisite module/s:	MMTH011 and MMTH012				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals 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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	**Mathematics and Applied Mathematics**	**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:**	AMAT201

Module Code:	**MAPA021**				
Module Name:	Ordinary and Partial Differential Equations				
Model Content:	Introduction to differential equations; Classification of ODE's: first order linear homogeneous and nonhomogeneous ODE's: Integrating factor, constant variation method, separation of variable method; solutions of exact Differential equations; Higher order ODEs: undetermined coefficient method, Power series method; Laplace transforms and applications; Linear Systems of Ordinary Differential Equations: Resolvent matrix, Eigenvalue method and fundamental system; Introduction to PDEs				
Learning Outcomes:	At the end of the module students should be able to: • Distinguish between linear and non-linear ODEs. • Understand the difference between the order and the degree of ODEs and PDEs. • Solve first order ODEs using the following methods/techniques: separation of variables, integrating factor, Bernoulli, exact. • Solve second order ODEs using the following methods: undetermined coefficients and variation of parameters. • Define a Laplace Transform and derive elementary Laplace transforms formulas. • Use Laplace transforms to solve boundary value problems. • Use the properties of Laplace transforms to solve first and higher order ODEs. • Solve systems of Differential equations. • Recognise the difference between parabolic, hyperbolic and elliptic PDEs.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	3	150201		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	2	0	6
Pre-requisite module/s:	MAPM011, MAPM012, MMTH011 and MMTH012				
Co-requisites module/s:	MMTA021				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals 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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	**Applied Mathematics**	**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:**	AMAT202

Module Code:	**MAPA022**				
Module Name:	Numerical Analysis II				
Model Content:	Interpolation: Lagrange, Newton interpolation, splines; Limitation of polynomial interpolation; Numerical differentiation; Numerical integration: Trapezium, mid-points and Simpson rules, Gaussian quadrature's; Numerical solution of Initial Value Problems for ODEs: Euler method, Range Kutta methods, Extrapolation methods				
Learning Outcomes:	At the end of the module, a learner will be able to: • Apply interpolation of various type to approximate functions on a given interval, • Approximate derivative using forward, backward and central difference method; • Evaluate integrals numerically by means of trapezium rules, Simpson rule as well as quadrature rules. • Apply various techniques to solve Initial Value Problems for Ordinary Differential Equations including Euler method, Range Kutta order 2 and 4, and method of extrapolation				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1	2	0	6
Pre-requisite module/s:	MMTH011, MMTH012, MAPM011 and MAPM012				
Co-requisites module/s:	MMTA022				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals 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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	**Applied Mathematics**	**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:**	AMAT301

Module Code:	**MAPA031**
Module Name:	Fluid Mechanics
Model Content:	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. Constitutive equations; Continuity equations; Navier-Stokes equations; Vorticity Transport equations; Energy equation; Boundary layer equations; Von-Karman equations; Coutte flow; Poiseuille flow; Flow between two rotating cylinders.

Learning Outcomes:	At the end of the module a student should be able to: • Demonstrate knowledge of the Lagrangian and Eulerian approaches to describing fluid. • Distinguish and define, the terms: inviscid, irrotational, incompressible, vorticity, and circulation. • Derive the equation of conservation of mass (equation of continuity), and, for incompressible fluids and Euler's equation of motion, given standard assumptions. • State and apply Bernoulli's equation for steady incompressible flow. • Understand stream function, some elementary flows; Potential flows; Vortex dynamics; Kelvin theorem and related theorems. • Distinguish between Constitutive equations; Continuity equations; Navier-Stokes equations; Vorticity Transport equations; Energy equations, Boundary layer equations; Von-Karman equations and related equations. • Distinguish and define between Coutte flow, Poiseuille flow, flow between two rotating cylinders, and related flows.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150201		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite module/s:	MMTA021, MMTA022, MAPA021 and MAPA022				
Co-requisite module/s:	MAPA032				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals 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%			

CURRICULUM INFORMATION	
Department: **Applied Mathematics**	**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:	**MAPA032**
Module Name:	Numerical Methods
Content:	Revision of some important concepts continuous functions and interpolation; Taylor's expansion and difference quotients; numerical approximation of derivatives using difference quotients; numerical integration; Taylor's integral Theorem; Error bounds and iterative refinements; the conjugate gradient method; fixed points and stability ; application of these approximations to the solution of first and second order differential equations (i.e. parabolic, elliptic and hyperbolic equations); application also to systems of ordinary differential equations.
Learning Outcomes:	At the end of this module, students will be able to • Understand Taylor's expansion and its use in derivation of the various difference quotients (i.e. forward, backward and central difference quotients) • Used difference quotients to approximate derivatives • Evaluate integrals numerically • Conduct error analysis to determine bounds over approximate solutions • Understand how to determine the fixed points using an iterative process • Determine the stability criterion associated with numerical solutions

	• Estimate numerical solution of ordinary differential equation • Estimate numerical solutions of systems of ordinary differential equations.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		150201
Delivery Information:	**SMU**		**Full**		**Period (1Sem)**
	SMU		Contact-Full Time		1st Semester
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite modules for this module:	MMTA021, MMTA022, MAPA021 and MAPA022				
Co-requisites modules for module:	MAPA031				
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	2 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: **Applied Mathematics**	**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:** AMAT302

Module Code:	**MAPA033**				
Module Name:	Mathematical Theory of Electromagnetism				
Module Content:	**Mathematical Theory of Electromagnetism:** 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. **Special Relativity:** 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.				
Learning Outcomes:	At the end of the module a student should be able to: • 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 • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8

Pre-requisite module/s:	MMTA021, MMTA022, MAPA021 and MAPA022				
Co-requisites module/s:	MAPA034				
Assessment Methods:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, Practicals and Tests. Summative assessment will be done at th e end of the module.				
Assessment Weighting:	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
Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

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

Module Code:	**MAPA034**				
Module Name:	Introduction to Financial Mathematics				
Content:	Introduction to markets and instruments. Futures and options trading strategies, exotic options, arbitrage relationships, binomial option pricing method, Interest rates models, Mortgage backed securities				
Learning Outcomes:	At the end of the module a student should be able to: • Understand some dynamics of financial markets and financial instruments. • Understand interest rates and bond markets • Price simple financial instruments.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite modules for this module:	MMTA021, MMTA022, MAPA021 and MAPA022				
Co-requisites modules for module:	MAPA033				
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	2 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: Mathematics	**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:** MATH101, FMH010M

Module Code:	**MMTH000**				
Module Name:	Pre-Calculus and Differential Calculus.				
Module Content:	Laws of exponents, roots and radicals and logarithmic functions. Basic ideas concerning functions and their graphs, algebraic properties of functions including composite functions and different types of functions. Limits and their properties one sided limits, infinite limits and limits at infinity and asymptotes, continuity at a point and over an interval. Differential Calculus of a single variable function, rules of differentiation i.e. power, sum, product, quotient and the chain rule. The Mean Value Theorem, the rule of L'Hopital and indeterminate forms. Derivatives of exponential, logarithmic, hyperbolic, inverse trigonometric functions. Implicit differentiation. Higher order derivatives. Riemann Sums, definite and indefinite integrals, Mean Value Theorem for integrals, Fundamental Theorem of Calculus, techniques of integration by substitution, parts, partial fractions and trigonometric substitution				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Simplify expression containing exponents, roots and logarithmic functions • Define a function and determine domain and range • Sketch functions and understand the algebra and operations of functions, the composite and inverse trigonometric functions • Understand limit concept and representation of one sided limits and continuity of functions • Understand infinite limits, limits at infinity and asymptotes • Understand the derivative of a given function from first principles • Understand relationship between differentiability and continuity • Be able to apply the rules of differentiation including the chain rule • Prove the Mean Value theorem for differential calculus • Approximate a definite integral to within any desired degree of accuracy by a Riemann Sum • Recognise anti-differentiation (indefinite integral) as the reverse of differentiation • Evaluate integrals of some algebraic, exponential and trigonometric functions • Recognise the Fundamental Theorem of Calculus and use it for evaluating definite integrals • Prove the Mean Value Theorem for integrals • Be able to use different techniques of Integration				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	24	3	150101		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	6	0	4	0	4
Pre-requisite module/s:	Admission criteria				
Co-requisite module/s:	None				
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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: Mathematics	**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:** MATH101, FMH010M

Module Code:	**MMTB000**				
Module Name:	Introductory Algebra				
Module Content:	Principle of Mathematical Induction; Binomial Theorem and its application to expand powers of binomials and determine particular term of an indicated binomial expansion; Pascal Triangle arrangement of binomial coefficients. Systems of Linear Equations; Gaussian Elimination and the Gauss Jordan Elimination method to solve systems of linear equations; Operations with Matrices; properties of Matrix operations; matrix multiplication, matrix addition; the inverse of a matrix; adjoint method; Determinants and their properties; row reduction method and the Cramer's Rule. Complex numbers; operations of complex numbers; Complex conjugates; Polar form and DeMoivre's theorem Set Theory relationship in sets; set constructions; set algebra; Cartesian products; Power Sets.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Describe and construct (sets; relationships between sets; Cartesian products; power sets; set algebra; relations; relation types). • Understand mathematical induction, proof and apply binomial theorem and binomial expansions, evaluate permutations and combinations. • Deal with conjugates and division of complex numbers, polar form and De Moivre's Theorem, powers and roots, and polynomial equations. • Evaluate (matrix operations; inverse matrices; properties of matrix operations; determinants) • Solve linear equations using (elimination method; substitutions method; Gauss elimination method and Gauss-Jordan elimination method; Cramer's rule). • Understand and evaluate logic operators, negations and methods of proof. • Define and identify the examples of a vector space.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	24	3	150101		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	6	0	4	0	4
Pre-requisite module/s:	Admission criteria				
Co-requisite module/s:	None				
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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: Mathematics	**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:**

Module Code:	**MMTH011**
Module Name:	Differential & Integral Calculus
Content:	Basic ideas concerning functions and their graphs, algebraic properties of functions including composite functions and different types of functions. Investigating limits and their properties, one sided limits, infinite limits and limits at infinity and asymptotes, continuity at a point and over an interval. Differential Calculus of a single variable function, rules of differentiation i.e. power, sum, product, quotient and the chain rule. The Mean Value Theorem, the rule of L'Hopital and indeterminate forms. Derivatives of exponential, logarithmic, hyperbolic, inverse trigonometric functions. Implicit differentiation. Higher order derivatives. Riemann Sums. Definite and indefinite integrals, Mean Value Theorem for integrals, Fundamental Theorem of Calculus, techniques of integration by substitution, parts, partial fractions and trigonometric substitution
Learning Outcomes:	After successfully completing the module, the student should be able to: • Define a function and determine domain and range • Sketch functions and understand the algebra and operations of functions, the composite and inverse trigonometric functions • Understand limit concept and representation of one sided limits and continuity of functions • Understand infinite limits, limits at infinity and asymptotes • Understand the derivative of a given function from first principles • Understand relationship between differentiability and continuity • Be able to apply the rules of differentiation including the chain rule • Prove the Mean Value theorem for differential calculus • Approximate a definite integral to within any desired degree of accuracy by a Riemann Sum • Recognise anti-differentiation (indefinite integral) as the reverse of differentiation • Evaluate integrals of some algebraic, exponential and trigonometric functions • Recognise the Fundamental Theorem of Calculus and use it for evaluating definite integrals • Prove the Mean Value Theorem for integrals • Use techniques of Integration

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	150101

Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4	0	4	0	4

Pre-requisite module/s:	Selection criteria
Co-requisite module/s:	None
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 Summative Assessment mark for exam admission (%)		**40**
	Final Mark =	% Summative Assessment Mark	**60**
		% Summative Assessment Mark	**40**
	Min Final Assessment mark to pass (%)		**50**

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

CURRICULUM INFORMATION	
Department: **Mathematics**	**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:**

Module Code:	**MMTH012**				
Module Name:	Linear and Introductory Abstract Algebra				
Content:	Principle of Mathematical Induction, Binomial Theorem and its application to expand powers of binomials and determine particular term of an indicated binomial expansion, Pascal Triangle arrangement of binomial coefficients. Systems of Linear Equations, Gaussian Elimination and the Gauss Jordan Elimination method to solve systems of linear equations. Operations with Matrices, properties of Matrix operations, matrix multiplication, addition, the inverse of a matrix, adjoint method. Determinants and their properties, row reduction method and the Cramers' Rule. Set Theory ,relationship in sets, constructions, set algebra, Cartesian products, the Power Sets.				
Learning Outcomes:	At the end of the module students should be able to: • To use the principle of mathematical Induction as a method of proof and use it to prove mathematical statements • To be able to recognise, prove and apply the Binomial theorem to expand powers of binomials. • Solve a system of linear equations using different methods • Demonstrate when a system has no solution, unique and infinitely many solutions • have good knowledge of matrix algebra and theory related to matrices • find determinants of matrices and their properties • use the Cramers' Rule to solve a system of linear equations • Describe and construct (sets; relationships between sets; Cartesian products; power sets; set algebra; relations; relation types).				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	12	3	150101		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4	0	4	0	4
Pre-requisite module/s:	Selection criteria				
Co-requisite module/s:	None				
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 Summative Assessments mark for exam admission (%)				**40**
	Final Mark =		% Summative Assessment Mark		**60**
			% Summative Assessment Mark		**40**
	Min Final Assessment mark to pass (%)				**50**

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

CURRICULUM INFORMATION			
Department:	**Mathematics**	**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:**	MATH201

Module Code:	**MMTA021**				
Module Name:	Advanced Calculus				
Module Content:	Infinite sequences and series of real numbers: limit of a sequence, bounded and monotonic sequences, theorems on convergence, Cauchy sequence and Cauchy criterion, tests for convergence and divergence for series, absolute convergence; Vectors in two dimensions: vector functions, arc length; Functions of Two variables: definition, domain and range, limits and continuity, partial derivatives, chain rule, gradient and directional derivative , transformations and Jacobian; Double integrals: Fubini's theorem, double integrals in polar coordinates; Line integrals: line integral with respect to arc length, Green's theorem; First order Differential Equations: separable equations, linear equations, exact equations.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Define convergent sequence and several other given definitions. • Test convergence of various sequences. • Apply various tests of convergence to a wide range of infinite series. • Understand the concept of vector function with one variable. • Differentiate, integrate, find limits of vector functions and determine the arc length. • Understand definitions of limits and continuity of functions of two variables. • Determine the limit of functions of two variables. • Determine directional derivative of a function with the aid of definition and in terms of gradient vector. • Evaluate double integrals for a wide range of functions. • Understand the concept of line integrals and evaluate line integrals. • Evaluating line integrals using Green's Theorem. • Understand the basic concepts and ideas of first order differential equations. • Solve separable, linear and exact equations.				
Module Information:	**ITS Course Level Code**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	3	150101		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	2	0	6
Pre-requisite module/s:	MMTH011 and MMTH012 OR MMTH000 and MMTB000				
Co-requisites module/s:	None				
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	3 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION	
Department: Mathematics	**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:** MATH212

Module Code:	**MMTA022**				
Module Name:	Linear Algebra				
Content:	Definition and examples of Vector spaces, Subspaces, Bases and dimension. Linear transformations, Rank-nullity theorem, Algebra of linear transformations, Isomorphism, Matrix representation, Linear functionals, Annihilator, Double dual, Transpose of a linear transformation. Eigen values and Eigen vectors of linear transformations, Diagonalizability, Cayley-Hamilton theorem, invariant subspaces, Cyclic subspaces and annihilators.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Understand bases for null space and range of a linear transformation. • Solve eigenvalue problems and diagonalize a given square matrix. • Handle the abstract concepts of vector space properties and linear transformations with confidence. • Find a matrix representing a linear transformation relative to any set of given bases. • Find Determine an orthogonal bases for an inner product space using the Gramm-Schmidt process. • Find the matrix representing a quadratic and bilinear form. • Find bases for dual spaces and annihilators of subspaces.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	3	150102		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	2	0	6
Pre-requisite module/s:	MMTH011 and MMTH012 OR MMTH000 and MMTB000				
Co-requisite module/s:	None				
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 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 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	**Mathematics**	**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:**	MATH341

Module Code:	**MMTA031**				
Module Name:	Mathematical Analysis I				
Content:	Sequence and series of functions: Pointwise and Uniform convergence of sequence and series of functions, term by term integration and term by term differentiation of sequence and series of functions, Power series, convergence of power series, Radius of convergence and Interval of convergence, Taylor and McLaurin series; Riemann Integrals: definition and existence of the Riemann integral, properties of the integral, Fundamental theorem of Calculus, Riemann Stieljes integral, existence and properties				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Apply different convergent criteria to determine the convergence or divergence of sequence or series of functions. • Determine term by term differentiability and term by term integrability of sequence and series of functions. • Determine Radius of convergence and Interval of convergence of power series. • Determine Taylor and McLaurin series for given functions. • Define and understand Riemann integral and Riemann Stieljes integrals. • Understand and prove the properties of the integrals.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150103		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite module/s:	MMTA021 and MMTA022				
Co-requisites module/s:	MMTB031				
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%			

CURRICULUM INFORMATION					
Department: Mathematics				**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:**	MATH351
Module Code:	**MMTB031**				
Module Name:	Abstract Algebra				
Module Content:	Groups: Definition and examples of groups including permutation groups and quaternion groups, elementary properties of groups. Subgroups and examples of subgroups, product of subgroups. Cyclic groups, permutation groups, normal groups and their properties. Cosets, Lagrange's theorem, quotient groups, group homomorphism, Cayley's theorem, Isomorphism theorems. Rings and Fields: Rings, integral domains, fields, subrings, ideals, quotient rings, ring homomorphisms, isomorphism theorems, ring of polynomials, polynomials over $\mathbb{Z}$, $\mathbb{Q}$and $\mathbb{R}$. Factoring polynomials and division algorithm, field extension, extension of $\mathbb{Q}$. Geometric Construction, constructible points and numbers, constructibility and extension of $\mathbb{Q}$,				
Learning Outcomes:	At the end of the module a student should be able to: rite down a clear and coherent proof of a mathematical statement. Identify various mathematical structures as various groups or rings. • State and prove theorems and apply the concepts in problems • Understand the properties of various groups • Define homomorphism and isomorphism between groups • Apply homomorphism and isomorphism concepts in problems • Apply first, second and third isomorphism theorems in problems				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		3		150102
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite module/s:	MMTA021 and MMTA022				
Co-requisite 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 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	2 hrs			
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department:	**Mathematics**	**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:**	MATH372

Module Code:	**MMTA032**				
Module Name:	Complex Analysis				
Module Content:	Complex numbers: Preliminaries and Algebraic properties, Polar representation, Powers, roots and the quadratic formula, Curves, regions and domains in the plane; Complex functions: limits and continuity; Analytic and harmonic functions: Cauchy- Riemann equations; Complex integrals: Curves and contours, Cauchy's theorem for a contour, Cauchy's Integral Formula, Cauchy's Integral Formula for Derivatives, Power series: Taylor and Laurent's series, singularities.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • Deal confidently with problems involving complex numbers. • Use Cauchy-Riemann equations to check the differentiability of complex functions. • Determine analytic and entire functions. • Find analytic function if the conjugate is given. • Evaluate complex functions using Cauchy's integral formula and formula for derivatives. • Locate singularities and determine their type.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150101		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite module/s:	MMTA021 and MMTA022				
Co-requisites module/s:	MMTB032				
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**

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

CURRICULUM INFORMATION	
Department: Mathematics	**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:	**MMTB032**				
Module Name:	Mathematical Analysis II				
Module Content:	Preliminary concepts of sets and functions. Definition and examples of Metric spaces. Open balls and open sets.Convergence, Convergent sequences, Limit and cluster points, Cauchy sequences and Completeness, Closed sets, Bounded set and dense sets, boundary of a set in Metric spaces. Continuity and continuous functions, Open and Closed maps, Homeomorphisms in Metric spaces. Connectedness and connected spaces, Path connected spaces, Compactness and Compact spaces, Continuous functions on compact spaces, Characterization of compact Metric spaces.				
Learning Outcomes:	After successfully completing the module, the student should be able to: • .understand different operations of sets. • have clear idea on various functions, also their products and compositions. • define continuity and homeomorphisms on general Metric spaces. • define connectedness and provide examples. • state and prove results of continuity on connectedness in general Metric spaces. • define Compactness and provide examples. • state and prove results of continuity on Compactness in general Metric spaces.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150103		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0	2	0	8
Pre-requisite module/s:	MMTA021 and MMTA022				
Co-requisites module/s:	MMTA032				
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	
Department: Physics	**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:** FPHS010

Module Code:	**MPHS000**
Module Name:	Introduction to General Physics 1A
Module Content:	**Measurements** – Physical quantities and vectors, scientific method, unit conversions, significant figures, measuring tools and uncertainty, operational definitions, proportional reasoning with mass and volume. **Mechanics:** 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. **Energy and temperature** - Thermal interactions, mixing water, specific heat capacity, mixing other substances, phase transition, latent heat, proportional reasoning with energy and temperature, and energy transfer mechanisms. **Properties of matter:** Elasticity, fluid Mechanics and Thermal Physics **Modern Physics:** Atomic Structure and Nuclear Physics
Learning Outcomes:	After successfully completing this module students should be able to: • Transfer learning from one context to another • Understand when a certain formula can be applied and when it cannot be applied. • Demonstrate an understanding of underlying ideas and concepts (the basic principles of physics) • Understand operational definitions of physics concepts • Do unit conversions • Understand the concept of uncertainty in measurements • Demonstrate basic laboratory skills • Analyse forces acting on an object and predict their effects. • State, explain and apply the laws of Newton in solving problems. • Differentiate between work, energy and power and be able to apply the three concepts in real-life situations • Define and show understanding of vector and scalar quantities, and differentiate between them. • Differentiate between heat and temperature • Discuss the atomic nuclei structure, atomic forces and nuclear energy • Carry out calculations involving the relationship between energy and mass loss for fission and fusion reactions.

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	24	03	140701

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hour

Pre-requisite module/s:	None		
Co-requisite module/s:	None		
Assessment Methods:	Continuous assessments: tests and assignments; Practical assessments. Summative assessment: one theory examination at the end of the year		
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: Physics	**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:** FPHH010M

Module Code:	**MPHB000**				
Module Name:	Introduction to General Physics 1B				
Module Content:	**Electricity and Magnetism** – Electrostatics, charging process, charge distributions, potential difference, Ohm's law, resistors in parallel and series, internal resistance and Electromagnetism. **Oscillations and Waves**: Simple Harmonic Motion, Mechanical Waves, Acoustics, Electromagnetic Waves **Optics**: Nature and Propagation of Light and Geometrical Optics				
Learning Outcomes:	After taking this module students should be able to: • Demonstrate an understanding of underlying ideas and concepts of electricity • Define Coulomb's law and apply it for interaction of stationery charges • Know how to calculate work, energy and electric potential of a charge • Know how a capacitor works and solve circuits with capacitors connected in series and in parallel • Define correctly electric current and apply Ohm's law to emf and Kirchhoff circuits • Know the originality of magnetism and calculate current in different types of conductors • Understand the Hall Effect in metals and semiconductors • Understand Hooke's law and the oscillations in a simple pendulum • Differentiate between transverse and longitudinal waves • Understand the application of the Doppler Effect to sound • Understand the nature of light and know the difference between reflection and refraction • Understand how images are formed in mirrors, lenses and cameras				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	24		03		140701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	2 x 1 hrs	0	1.25 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	Continuous assessments: tests and assignments Summative assessment: one theory examination at the end of the year				
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: Physics	**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:	**MPHS011**				
Module Name:	General Physics 1A				
Module Content:	**Mechanics:** Units, Physical quantities and vectors, Kinematics, Dynamics, Statics, Work and Mechanical Energy, Impulse and momentum, and Rotational Motion **Properties of matter:** Elasticity, Fluid Mechanics and Thermal Physics **Modern Physics:** Atomic Structure and Nuclear Physics				
Learning Outcomes:	After successfully completing this module students should be able to: • Use SI units of all physical quantities • Distinguish between fundamental and derived physical quantities • Measure mass, time, length and temperature • Define and classify vector and scalar quantities • Carry out calculations involving work done, potential energy, kinetic energy and power • Analysis of falling objects, thrown objects, projected objects • Discuss energy conservation • Explain the impulse and relate it to momentum • Carry out calculations involving density, mass and volume • Describe the principles of a method for measuring the density of air • Carry out calculations involving pressure, force, density, depth and area • Explain hydrostatic and hydrodynamic principles and discuss their applications • Explain temperature, heat and heat capacity • Discuss applications of heat flow and head transfer • Discuss the atomic nuclei structure, atomic forces and nuclear energy • Carry out calculations involving the relationship between energy and mass loss for fission and fusion reactions				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	12	3	140701		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1 x 45 min		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 × 3 hour 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: Physics	**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:	**MPHS012**				
Module Name:	General Physics 1B				
Module Content:	**Electricity and Magnetism:** Electrostatics, Current electricity, Electromagnetism; **Oscillations and Waves**: Simple Harmonic Motion, Mechanical Waves, Acoustics, Electromagnetic Waves **Optics**: Nature and Propagation of Light and Geometrical Optics				
Learning Outcomes:	After taking this module student should be able to: • Define Coulomb's law and apply it for interaction of stationery charges • Know how to calculate work, energy and electric potential of a charge • Know how a capacitor works and solve circuits with capacitors connected in series and in parallel • Define correctly electric current and apply Ohm's law to emf and Kirchhoff circuits • Know the originality of magnetism and calculate current in different types of conductors • Understand the Hall Effect in metals andsemiconductors • Understand Hooke's law and the oscillations in a simple pendulum • Differentiate between transverse and longitudinal waves • Understand the application of the Doppler Effect to sound • Understand the nature of light and know the difference between reflection and refraction • Understand how images are formed in mirrors, lenses and cameras				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	12	3	140701		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	1 x 3 hrs	1 x 45 min		2.4 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH012				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours 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**

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

CURRICULUM INFORMATION	
Department: Physics	**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:** PHS201M

Module Code:	**MPHA021**				
Module Name:	**Classical Mechanics**				
Module Content:	Vector Analysis, Kinematics, Lagrangian and Hamiltonian mechanics, Central force motion, Oscillations and Rigid bodies.				
Learning Outcomes:	After completion of this module students are expected to: • Use mathematical models to solve physical systems problems. • Solve real problems using ideal problems formulation. • Make a correlation between theoretical and practical nature of mechanics. • Solve and analyze rigid-body problems and problems in non-inertial frames. • 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.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	10	03	140799		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		2.6 hrs
Pre-requisite module/s:	MPHS011 and MPHS012				
Co-requisite module/s:	MPHB021,MMTA021				
Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours 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: Physics	**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:** PHYS202

Module Code:	**MPHB021**				
Module Name:	Modern Physics				
Module Content:	Special and general relativity, Quantization of electromagnetic radiation, Wave-particle duality, Atomic Physics, Nuclear structure, Radioactivity, Nuclear reactions, Radiation and matter, and Elementary particles.				
Learning Outcomes:	After completing this module, students should be able to: • Differentiate between Galilean Relativity and Special Relativity • Correctly calculate time dilation and length contraction effects • Perform Lorentz Transformations between reference frames • Describe where classical physics fails to explain aspects of, Atomic Spectra, Photoelectric Effect, Blackbody Radiation, Heat Capacities of Solids, Atomic Theory and Electrical Conduction				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	10	03	140799		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		2.6 hrs
Pre-requisite module/s:	MPHS011 and MPHS012				
Co-requisite module/s:	MPHA021 and MMTA021				
Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours 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**

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

CURRICULUM INFORMATION	
Department: Physics	**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:** PHYS203

Module Code:	**MPHA022**				
Module Name:	Electrodynamics and Electronics				
Module Content:	**Electrodynamics**: Electrostatic fields in vacuum and in matter, Magnetostatic fields in vacuum and in matter. **Electronics**: Electronic Circuits, Semiconductors and Introduction to Solid State Physics.				
Learning Outcomes:	After completing this module, students should be able to: • Solve problems in electrostatics and magnetostatics. • Demonstrate the ability to use Gauss's law and Amperes law to find electric and magnetic fields in symmetric situations. • Demonstrate the ability to calculate electric and magnetic fields in the presence of matter which can be electrically and magnetically polarized, • Understand electronic circuits • Identify the fundamental mechanisms and models of controlling the operation of semiconductor devices.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	10		03		140799
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		2.6 hrs
Pre-requisite module/s:	MPHS011 and MPHS012				
Co-requisite module/s:	MPHB022 and MMTA022				
Assessment Criteria:	Describe, explain and apply in a logical manner the principles, concepts and facts related to **Electrodynamics**: Electrostatic fields in vacuum and in matter, Magnetostatic fields in vacuum and in matter. **Electronics**: Electronic Circuits, Semiconductors and Introduction to Solid State Physics.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 Hours 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: Physics		**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:	**MPHB022**				
Module Name:	**Waves and Physical Optics**				
Module Content:	**Waves**: General wave properties; Simple, damped, forced and coupled oscillators; Transverse wave motion and Fourier methods. **Physical Optics**: Waves in optical systems, Interference and diffraction theory and Polarization.				
Learning Outcomes:	After taking this module students should be able to: • Describe wave properties • Describe oscillators and their behavior when an external force acts • Understand wave phenomena such interference and diffraction.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	10	03	140799		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		2.6 hrs
Pre-requisite module/s:	MPHS011; MPHS012				
Co-requisite module/s:	MPHA022,MMTA022				
Assessment Criteria:	Describe, explain and apply in a logical manner the principles, concepts and facts related to **Waves**: General wave properties; Simple, damped, forced and coupled oscillators; Transverse wave motion and Fourier methods. **Physical Optics**: Waves in optical systems, Interference and diffraction theory and Polarization.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hour 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: Physics	**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:	**MPHA031**				
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: • describe the wave nature and particle nature of particles and radiation. • solve problems concerning particles in various potentials. • make a connection between quantum mechanics and high energy physics experiments.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd 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 and MMTA022				
Co-requisite module/s:	MPHB031,				
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: Physics	**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:	**MPHB031**
Module Name:	Thermodynamics and Statistical Mechanics
Module Content:	**Thermodynamics:** Fundamental concepts, Ideal and real gases, 1st, 2nd and 3rd laws of thermodynamics and Thermodynamic potential. **Statistical Mechanics:** Classical statistical Physics and Quantum Statistics

Module Code:	**MPHB031**				
Module Name:	Quantum Mechanics				
Learning Outcomes:	After taking this module student should be able to: • Coherent and critical understanding of the fundamental concepts of Thermodynamics • Explain the macroscopic properties of a gas, such as its pressure and its temperature, in terms of the behavior of the molecules that make itup. • Coherent and critical understanding of the laws of Thermodynamics • Apply statistical methods toparticles.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		03		140799
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		10.2 hrs
Pre-requisite module/s:	MPHA022, MPHB022, MPHA021, MPHB021,MMTA021 and MMTA022				
Co-requisite module/s:	MPHA031,				
Assessment Criteria:	Describe, explain and apply in a logical manner the principles, concepts and facts related to Fundamental concepts, Ideal and real gases, 1st, 2nd and 3rd laws of thermodynamics and Thermodynamic potential. Classical statistical Physics and Quantum Statistics				
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: **Physics**		**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:**	PHYS303

Module Code:	**MPHA032**
Module Name:	Solid State Physics
Module Content:	Atomic structure of matter, Crystallography, X-ray diffraction theory, Thermal vibrations, Free electrons in crystals and the band theory.
Learning Outcomes:	After taking this module students should be able to: • Describe the crystal structure ofsolids. • Determine the reciprocal lattice from the real space lattice for cubic structures and appreciate the importance of unit cells in eachcase. • Coherent and critical understanding of the concept of translational invariance and point symmetry of crystals.

Module Code:	**MPHA032**				
Module Name:	Solid State Physics				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		04		140799
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		10.2 hrs
Pre-requisite module/s:	MPHA022, MPHB022, MPHA021, MPHB021, MMTA021, MMTA022				
Co-requisite module/s:	MPHB032				
Assessment Criteria:	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.				
Assessment Methods:	Summative: Tests, Practicals, Tutorials and/or Assignments. Summative: 1 × 3 hour 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**

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

CURRICULUM INFORMATION	
Department: Physics	**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:** PHYS304

Module Code:	**MPHB032**		
Module Name:	Electrodynamics and Electronics		
Module Content:	Electronics: Diodes, Transistors, Amplifiers and Oscillator circuits. Electrodynamics: Electromotive force, Faraday's law, Potential formulation of electrodynamics, Energy and momentum.		
Learning Outcomes:	After taking this module student should be able to: • Apply the techniques of AC theory in a complex representation; • Describe the operation of simple semiconductor devices: junction diode, bipolar transistor, field-effect transistor, *etc.*; • Analyse the operation of a range of basic analogue electronic circuits involving transistors and/or operational amplifiers; • Perform design calculations for such circuits; • Demonstrate an understanding of the basic principles and concepts related to electrodynamics		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	16	03	140799

Module Code:	**MPHB032**				
Module Name:	Electrodynamics and Electronics				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1		10.2 hrs
Pre-requisite module/s:	MPHA021, MPHA022, MPHB021, MPHB022,MMTA021 and MMTA022				
Co-requisite module/s:	MPHA032				
Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, Practicals, Tutorials and/or Assignments. Summative (40%): 1 × 3 hour 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%			

DEPARTMENT: STATISTICS & OPERATIONS RESEARCH

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

Module Code:	**MSTS000**		
Module Name:	Descriptive Statistics		
Module Content:	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.		
Learning Outcomes:	• Find point and interval estimates of the mean, proportion and variance; • Test hypotheses on the mean, proportion and variance; • Compare several means and proportions; Fit a simple linear regression model and calculate the correlation coefficient; Analyse a time series data. • Calculate different indices.		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	150301

Module Code:	**MSTS000**				
Module Name:	Descriptive Statistics				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0.5	1	0	4
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH011				
Assessment Criteria:	A student should be able to demonstrate that s/he has the ability to organize and summarize data and have basic knowledge of probability.				
Assessment Methods:	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.				
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: **Statistics and Operation Research**	**School:** Science & Technology
Last Revision date: 2012	**First Year Offered (New):** 2013
Replace this Module existing module(s)? No	**If YES, give the module codes:**

Module Code:	**MSTS011**				
Module Name:	Introduction To Statistics				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Distinguish the different types of data; • Organize and summarize data by using tabular and graphical methods; • Compute values of different descriptive statistics; • Evaluate probabilities of events; • Use elementary probability distribution functions.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		3		150301
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0.5	1	0	4
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH011				
Assessment Criteria:	A student should be able to demonstrate that s/he has the ability to organize and summarize data and have basic knowledge of probability.				

Module Code:	**MSTS011**				
Module Name:	Descriptive Statistics				
Assessment Methods:	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.				
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: **Statistics and Operation Research**	**School:** Science & Technology
Last Revision date: 2012	**First Year Offered (New):** 2013
Replace this Module existing module(s)? No	**If YES, give the module codes:**

Module Code:	**MSTS012**				
Module Name:	Introduction To Statistical Inference				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Find point and interval estimates of the mean, proportion and variance • Test hypotheses on the mean, proportion and variance • Compare several means and proportions • Fit a simple linear regression model and calculate the correlation coefficient; Analyse a time series data • Calculate different indices.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		3		150301
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0.5	1	0	4
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTH012				
Assessment Criteria:	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.				
Assessment Methods:	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.				

Module Code:	**MSTS012**				
Module Name:	Introduction To Statistical Inference				
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: **Statistics and Operation Research**	**School:** Science & Technology
Last Revision date: 2012	**First Year Offered (New):** 2013
Replace this Module existing module(s)? No	**If YES, give the module codes:**

Module Code:	**MSTA021**				
Module Name:	Theory of Distributions				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Know the basic concepts of probability. • Identify the important distribution functions. • Derive distributions of random functions.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		150302
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	6	0.5	2	0	8
Pre-requisite module/s:	MMTH011, MMTH012, MSTS011, MSTS012				
Co-requisite module/s:	MMTA021				
Assessment Criteria:	A student should be able to demonstrate that s/he has a satisfactory knowledge of the theory of statistical distributions.				
Assessment Methods:	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.				

Module Code:	**MSTA021**				
Module Name:	Theory of Distributions				
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: Statistics and Operations Research	**School:** Science and 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:	**MSTA022**				
Module Name:	Statistical Inference				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Know the important sampling distributions. • Estimate parameters. • Conduct statistical tests.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	12		3		150302
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	6	0.5	2	0	8
Pre-requisite module/s:	MMTH011, MMTH012, MSTS011, MSTS012				
Co-requisite module/s:	MMTA022				
Assessment Criteria:	A student should be able to demonstrate that s/he has a satisfactory knowledge of statistical inference.				
Assessment Methods:	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.				
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:	**Statistics and Operations Research**	**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:**	STAT351

Module Code:	**MSTB031**
Module Name:	Applied Linear Regression
Module Content:	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
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Fit simple and multiple regression models. • Select appropriate models. • Test for adequacy of models.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150302		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0.5	1	0	7
Pre-requisite module/s:	MMTA022, MSTA021,MSTA022				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	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.				
Assessment Weighting:	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**

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

CURRICULUM INFORMATION			
Department:	**Statistics and Operations Research**	**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:**	STAT342

Module Code:	**MSTB032**				
Module Name:	Multivariate Statistical Methods				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Understand multivariate methods and what they do. • Know when to apply the different multivariate methods. • Analyze a multivariate data set and write a report.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150302		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0.3	1	0	7
Pre-requisite module/s:	MMTA022, MSTA021, MSTA022				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	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.				
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%			

CURRICULUM INFORMATION			
Department:	**Statistics and Operations Research**	**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:**	STAT392

Module Code:	**MSTC032**				
Module Name:	Sampling Theory				
Module Content:	Elements of Sampling, Questionnaire Design, Simple Random Sampling, Stratified Random Sampling, Ratio Estimation, Difference and Regression Estimators, Systematic Sampling.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Design a questionnaire • Design a sample survey • Estimate the parameters and standard errors • Write a report.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	3	150302		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3	0.3	1	0	7
Pre-requisite module/s:	MSTA021, MSTA022				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	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.				
Assessment Weighting:	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**
Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical	Theory			
	Duration	2 hrs			
	Sub minimum	40%			

DEPARTMENT : HUMAN PHYSIOLOGY

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

Module Code:	**MPLA021**
Module Name:	Systems Physiology I
Module Content:	**Introduction**: Cell physiology and homeostasis **Nerve & Muscle**: Types, contraction of skeletal and smooth muscle **Central nervous system**: Spinal cord, motor functions, cortex, limbic system and hypothalamus, brain activity, autonomic nervous system, cerebral blood. **Senses**: Fundamentals and principles, olfaction, gustation, vision, equilibrium and hearing **Transport systems**: 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
Learning Outcomes:	• Define Physiology and explain the concept of homeostasis and give a detailed description of cell membrane physiology • 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 • 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 • Demonstrate an understanding of muscle physiology in humans, and know skeletal muscle mechanics, metabolism, fibre types and the control of motor movement. • 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 • 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

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	20	3	130801

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	2 x 3 Hours	0	0	5 hrs

Pre-requisite module/s :	None
Co-requisites module/s :	MBIA021
Assessment Methods:	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%).

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**

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

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

Module Code:	MPLA022				
Module Name:	Systems Physiology II				
Module Content:	**Respiration**: Functional characteristics, volumes and capacities, gas exchange, transport of gasses, regulation, and pathophysiology **Filtration**: Formation of urine, regulation of body fluids, acid-base balance and micturition, clinical abnormalities and renal disease **Digestive system**: Structure and function, alimentary canal, accessory organs, movements, digestive juices, absorption **Nutrition**: Digestion and metabolism, fat and water soluble vitamins, minerals **Exercise**: Performance, energy, training and recovery, body systems, in exercise, drugs **Endocrine system**: Hormones, hypothalamus, pituitary, thyroid, parathyroid, pineal and adrenal glands, pancreas, endocrine kidney **Male reproductive system**: Testes, duct system, accessory glands, external genitalia, semen **Female reproductive system**: anatomy, menstrual, uterine, vaginal and ovarian cycle **Sexual health**: STD's and HIV, methods of contraception, pregnancy, sexual dysfunction				
Learning Outcomes:	• Understand the respiratory system physiology in humans, including respiratory mechanics, gas exchange, gas transport, the control of respiration and its role in homeostasis • 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 ofhomeostasis • 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. • 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 • 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 • 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				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3rd Order)
	20		3		130801
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4 x 45 min	2 x 3 Hours	0	0	5 Hours
Pre-requisite module/s:	None				
Co-requisite module/s:	MBIA021				
Assessment Methods:	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%)				
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: **Human Physiology**		**School:** Medicine	
Last Revision date: 2011		**First Year Offered (New):**	2013
Replace this Module existing module(s)? Yes		**If YES, give the module codes:** replaces PHYL200 (in part)	PHY202M

Module Code:	**MPLC031**		
Module Name:	Pathophysiology		
Module Content:	**Chronic diseases of lifestyle**: Mortality patterns, hypertension, smoking, drugs and alcohol, dyslipidemia, obesity, diabetes mellitus, lifestyle induced cancers, stroke, exercise, diet **Sexual health:** PCOS, endometriosis, contraception; risk behaviour; PID and sexual dysfunction **Introduction to occupational health and hygiene** **Anthropometry** **Ergonomics**		
Learning Outcomes:	• List and describe various chronic diseases of lifestyle in terms of risk factors, aetiology, prevalence and complications • Discuss the mortality patterns in South Africa, especially with regard to chronic diseases of lifestyle. • Demonstrate an understanding of the role of smoking, diet, obesity, early life origins and physical inactivity in the development of chronic diseases of lifestyle • Explain the basic concepts of occupational health and hygiene, as well as the types of factors that can affect workers in an occupational setting • Demonstrate an understanding of anthropometry and its applications in various fields • Describe anthropometric evaluation, annual monitoring indicators, collection of anthropometric data through surveys, and the selection of samples • Be able to take some basic anthropometric measurements accurately • Demonstrate an understanding of the basic concepts of ergonomics • Explain designing principles for design for various working positions, human strength, vision and for designing of hand tools • 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		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	32	3	130801

Module Code:	MPLC031				
Module Name:	Pathophysiology				
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4 x 45 min	2 x 3 hrs	0	0	10hrs
Pre-requisite module/s:	MBIA021				
Co-requisite module/s:	MPLCO32				
Assessment Methods:	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%)				
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: Human Physiology	**School:** Medicine
Last Revision date: 2011	**First Year Offered (New):** 2013
Replace this Module existing module(s)? Yes	**If YES, give the module codes:** PHY202M replaces PHYL200 (in part)

Module Code:	MPLC032				
Module Name:	Environmental and Occupational Physiology				
Module Content:	**Occupational toxicology:** introduction to occupational toxicology, toxicokinetics, toxicodynamics, toxicity testing and risk assessments **Environmental toxicology:** radiation pollution, water pollution, air pollution				
Learning Outcomes:	• Demonstrate an understanding of the basic concepts of occupational toxicology • Describe toxicity testing and risk assessment and understand the action and effects of certain toxic agents • Explain the basic principles of environmental toxicology • Demonstrate an understanding of radiation as well as the types, sources and effects of radiation. • Define air pollution and discuss the basic principles of air pollution • Discuss the atmosphere and distinguish between and discuss climate, global warming and ozone loss • List and shortly discuss non-renewable and renewable energy sources • Demonstrate an understanding of the basic principles of water pollution and know basic hydrological principles and water managementaspects				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3rd Order)
	32		3		130906
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	4 x 45 min	2 x 3 hrs	0	0	10 hrs

Module Code:	**MPLC032**				
Module Name:	Environmental and Occupational Physiology				
Pre-requisite module/s:	MBIA021				
Co-requisite module/s:	MPLC031				
Assessment Methods:	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%)				
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%			

DEPARTMENT: PSYCHOLOGY

CURRICULUM INFORMATION			
Department: **Psychology**		**School:** Medicine	
Last Revision date: **2**011		**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	PSYC100

Module Code:	**MPCL011**		
Module Name:	Introduction to Psychology		
Module Content:	Foundations of Psychology Learning Theories Developmental Psychology Personality, Emotions, Motivation & Stress Psychophysiology		
Learning Outcomes	• Students must know and understand the basic principles and perspectives in psychology • 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 • Students must have a basic understanding of human development; personality; emotion; motivation and stress • Students must know and understand the link between mind and body interaction		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	12	3	180101

Module Code:	**MPCL011**				
Module Name:	Introduction to Psychology				
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	2	0	1 hour
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
ASSESSMENT	Assessment will comply in all respects with the University of Limpopo Assessment Policy and the NQF guidelines for validity, reliability, fairness and practicability				
Assessment Criteria:	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				
Assessment Methods:	Examinations, Tests and Assignments				
Assessment Weighting:	Minimum Form 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: Psychology		**School:** Medicine	
Last Revision date: 2011		**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	PSYC100

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

Module Code:	**MPCL012**				
Module Name:	Research, Interpersonal Skills and Social Psychology				
Assessment Criteria	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				
Assessment Methods	Examinations, Tests and Assignments				
Assessment Weighting:	Minimum Form Assessment Mark for exam admission (%)				**40**
	Final Mark =		% Summative Assessment Mark		**60**
			% Summative Assessment Mark		**40**
	Min Final Assessment mark to pass (%)				**50**

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

CURRICULUM INFORMATION			
Department: **Psychology**		**School:** Medicine	
Last Revision date: **2**011		**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	PSYC100

Module Code:	**MPSA021**				
Module Name:	Research, Assessment and Developmental Psychology				
Content:	Research Methods Psychological Assessment Developmental Psychology (Child)				
Learning outcomes	At the end of the module the student will: • Know, understand and apply the basic principles in social research • Know and understand the basic aspects of assessment across cultures and the different steps in social research • Know, understand and integrate the basic concepts and theories in child development • Know and integrate the ethical principles applicable in research, assessment, child development.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		180101
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1	2	0	2 hrs
Pre-requisite module/s:	MPCL011, MPCL012				
Co-requisite module/s:	None				
Assessment criteria	At the end of the module you will: • Name, describe and apply the basic principles in social research • State and explain the basic aspects of assessment across cultures and the different steps in social research • List, describe and apply the basic concepts and theories in child development • List, describe and integrate the ethical principles applicable in research, assessment, child development.				
Assessment methods	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.				

Module Code:	**MPSA021**				
Module Name:	Research, Assessment and Developmental Psychology				
Assessment Weighting:	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			
Department: **Psychology**		**School:** Medicine	
Last Revision date: **2**011		**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	PSYC200

Module Code:	**MPSA022**				
Module Name:	Personality, Medical and Social Psychology				
Model Content:	Social Psychology Personality Theories Medical Psychology				
Learning outcomes	At the end of the module the student will: • Understand and apply the concepts applicable in social psychology. • Know and understand the different personality theories • Know and comprehend the position of medical psychology in within the discipline of psychology • Know and integrate the ethical principles applicable in social psychology, medical psychology and personality theories.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		180101
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1	2	0	2 hour
Pre-requisite module/s:	MPCL011,MPCL012				
Co-requisite module/s:	None				
Assessment criteria	At the end of the module you will: • Name, describe and apply the basic principles in social research • State and explain the basic aspects of assessment across cultures and the different steps in social research • List, describe and apply the basic concepts and theories in child development • Explain and apply different concepts applicable in social psychology. • Name and describe the different personality theories • Recognize and explain the position of medical psychology in within the discipline of psychology • List, describe and integrate the ethical principles applicable in social psychology, medical psychology and personality theories.				
Assessment methods	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.				

Module Code:	**MPSA022**				
Module Name:	Personality, Medical and Social Psychology				
Assessment Weighting:	Minimum Form Assessment Mark for exam admission (%)				**40**
	Final mark =		% Summative Assessment Mark		**60**
			% Summative Assessment Mark		**40**
	Minimum final mark to pass (%)				**50**

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

CURRICULUM INFORMATION			
Department: **Psychology**		**School:** Medicine	
Last Revision date: **2**012		**First Year Offered (New):**	2013
Replace this Module existing module(s)?	Yes	**If YES, give the module codes:**	N/A

Module Code:	**MPSB022**				
Module Name:	Environmental Psychology and Management skills				
Model Content:	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. • Explore management principals • Planning, setting objectives and the benefits of good organisational skills • Organising resources to match the task objectives • Maintaining control – monitoring and assessing • Developing your leadership style • Empowering yourself by perfecting your management skills • Improving problem solving and decision making skills • Developing people skills – maximising effective communication • Leading successful teams – motivation and the importance of trust • Implementing skills and strategies to manage and resolve conflict				
Learning outcomes	• The student must be able to define the basic concepts of Environmental Psychology. • The student must be able describe and apply the basic concepts of Environmental Psychology in the work environment. • The student must be able to describe the role of mental health in the work environment. • The student must be able to define all principles of management • The student must be able to determine and evaluate • his/her own management style • The student must be able to describe and apply the principles of management skills in a work setting				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		3		130201

Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min.	1 x 3 Hour	Per arrangement	0	8 h

Pre-requisite module/s:	MPCL011, MPCL012
Co-requisite module/s:	None

Module Code:	**MPSB022**				
Module Name:	Environmental Psychology and Management skills				
Assessment criteria	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				
Assessment methods	Combination of class tests/quizzes, summative theory assessments, short summative practical assessments, practical reports and summative theory assessment at the end of the module				
Assessment Weighting:	Minimum Form Assessment Mark for exam admission (%)				**40**
	Final mark =		% Summative Assessment Mark		**60**
			% Summative Assessment Mark		**40**
	Minimum final mark to pass (%)				**50**

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

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

Module Code:	**MPSA031**				
Module Name:	Psychopathology, Research and Community Psychology				
Content:	Research Methodology 2; Community Psychology; Psychopathology				
Learning Outcomes	• 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. • 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 & planned community change. They must further have the ability to critically analyse perspectives of different paradigms. • 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. • Students must have knowledge and understating of legal and ethical issues relating to research, community psychology and psychopathology.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	32		3		180101

	Classes	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
Periods per week:	5	1	2	0	3 hour
Pre-requisite modules:	MPSA021,MPSA022				

Module Code:	**MPSA031**
Module Name:	Psychopathology, Research and Community Psychology
Co-requisite modules:	None
Assessment criteria	• 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. • Students must be able to define, describe, discuss, critisise, assess as well as differentiate between 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 & planned community change. They must further have the ability to demonstrate, explain critically analyse and differentiate perspectives of paradigms. • Students must be able to name, describe, demonstrate, define, differentiate, evaluate concepts of psychopathology such as abnormal behaviour in historical context, clinical assessment and
Assessment criteria	• diagnosis, anxiety disorders, somatoform and dissociative disorders, as well 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. • Students must be able to describe, demonstrate responsible legal and ethical values relating to research, community psychology and psychopathology.
Assessment methods	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.

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

Module Code:	**MPSA032**
Module Name:	Statistics, Therapeutic and Development Psychology
Content:	Behavioural Statistics; Therapeutic Psychology; Developmental Psychology (Adolescence and Adulthood)
Learning Outcomes	• 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.

Module Code:	**MPSA032**				
Module Name:	Statistics, Therapeutic and Development Psychology				
Learning Outcomes	• 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. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	32		3		180101
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	1	2	0	3 Hour
Pre-requisite module/s:	MPSA021, MPSA022				
Co-requisite module/s:	None				
Assessment methods	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.				
Assessment Weighting:	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%			

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

CURRICULUM INFORMATION			
Department: Mathematical and Physical Sciences **Discipline:** **Mathematics and Applied Mathematics**		**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:** AMAT701	

Module Code:	**MAPB080**				
Module Name:	Mathematical Modelling with ODEs				
Content:	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.				
Learning Outcomes:	At the end of the module students should be able to: • Define and distinguish between linear and non-linear systems, • Define and distinguish between Hermitian and non-Hermitian systems, • Explain and draw phase diagrams for qualitative systems, • Conceptualise apply the concept of stability, • Explain the concepts used in modeling problems in population dynamics, • Design and solve the SIR epidemiological model				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		6		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	0	0	0	10 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
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 1:1 respectively, to get the final mark. There will be no supplementary assessment				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =		% Formative 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:	**Mathematics and Applied Mathematics**	**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:**	AMAT702

Module Code:	**MAPC080**				
Module Name:	Hydrodynamic Stability				
Content:	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.				
Learning Outcomes:	At the end of the module students should be able to: • Explain the concept of stability • Define and differentiate between absolute, convergence, thermal and parallel instabilities, • Linearise non-linear stability equation • Derive Orr-Sommerfeld and Squires equations • Derive Tollmien-Schlichting's wave equation • Derive the Rayleigh equation • Apply the Rayleigh criterion for instability to solve problems				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	6	150201		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	0	0	0	10 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
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 1:1 respectively, to get the final mark. There will be no supplementary assessment				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =	% Formative 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:	**Mathematics and Applied Mathematics**	**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:**	AMAT703

Module Code	**MAPD080**				
Module Name:	Financial Mathematics				
Content:	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.				
Learning Outcomes:	At the end of the module students should be able to: • Explain the concept of probability, • Understand and use random variables and probability distributions, • Define and differentiate between simple and compound interest, • Distinguish between the present value and the future value, • Define stocks and options, • Valuate options using the binomial tree and the Black-Scholes formula, • Discuss the Geometric Brownian Motion, • Explain and apply Ito's formula, • Understand Arbitrage pricing, • Show an understanding of the functioning of Financial Markets • Use Numerical Schemes for Pricing of Options (The Lattice Tree Method, The Finite Difference Method and The Monte Carlo Simulation).				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	6	150201		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	0	0	0	10 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
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 1:1 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 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:	**Mathematics and Applied Mathematics**	**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:**	AMAT704

Module Code:	**MAPE080**				
Module Name:	Advanced Mathematical Programming				
Content:	Optimization of 1-D functions, Multidimensional unconstrained optimization, Non-linear constrained optimization; Essence of mathematical programming.				
Learning Outcomes:	At the end of the module students should be able to: • Design a simplex algorithms for linear equations with three variables • Apply the simplex algorithm to solve problems • Design the dual simplex algorithm • Apply the dual simplex algorithm to solve problems • Distinguish between various integer programming problems • Formulate Integer programming problems • Use the branch-and-bound methods to solve integer programming problems • Construct the objective function and the decision variables for a goal programming problem • Learn about advanced topics in linear programming • Differentiate between concave and convex functions • Solve non-linear programming problems in one variable • Solve unconstrained maximization and minimization problems with several variables • Understand and apply the Kuhn-Tucker conditions to solve problems • Learn about more advanced topics on non-linear programming				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	6	150201		
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	0	0	0	10 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final Mark =	% Formative 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: Mathematics and Applied Mathematics	**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:** AMAT705

Module Code:	**MAPF080**				
Module Name:	General Theory of Relativity				
Content:	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.				
Learning Outcomes:	At the end of the module students should be able to: • Define the concept of Riemannian Geometry • Derive Einstein Equations • Apply the Weak field approximatio • Derive the Schwarzschild solution to the Einstein equation • Derive the Tolman and the Kerr solutions • Define the concept of cosmology • Explain the concept of non-casual bulk viscosity				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		6		150201
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min	0	0	0	10 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
Assessment Weighting:	Min Formative Assessment mark for exam admission (%)				**40**
	Final mark =		% Formative 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%			

DEPARTMENT: BIOCHEMISTRY

CURRICULUM INFORMATION			
Department:	**Biochemistry**	**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:**	ABIO600

Module Code:	**MBIC080**				
Module Name:	Research Project				
Module Content:	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				
Learning Outcomes:	• After successfully completing the module, the student should be able to: • Construct a research project in Biochemistry • Conduct experiments, compile data and analyse the data constructively • Write a mini-dissertation on research performed in the laboratory • Present the research results obtained using Power Point • Present SAPSE accredited publications during seminar presentations				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	40	6	130201		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	0	Research Project	0	1	Research Project
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
Assessment Methods:	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.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**N/A**
	Final mark =	% Summative 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	Research Project			
	Duration	Y			
	Sub minimum	N/A			

CURRICULUM INFORMATION			
Department:	**Biochemistry**	**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:**	ABIO603
Module Code	**MBIA082**		
Module Name	Advanced Protein Chemistry		

Module Content:	• Protein purification: cell disruption methods, centrifugation, protein and enzyme assays, dialysis, protein precipitation, column chromatography, electrophoresis. • Protein sequencing, mass spectrometry, three-dimensional structure determination.					
Learning Outcomes:	In depth knowledge of the theory and techniques of Advanced Protein Chemistry included in this module					
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**	
	20		6		130201	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**		**Independent Learning**
	9	continuous		2		5 hrs
Pre-requisite module/s:	None					
Co-requisites module/s:	None					
Assessment Criteria:	To test a sound knowledge all the theory and techniques involved in this module					
Module Code:	**MBIA080**					
Module Name:	Advanced Protein Chemistry					
Assessment Methods:	Summative theory assessments; written and power point presentation of assignments; seminars; summative theory assessment.					
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)					**40**
	Final mark =		% Continuous assessment			**60**
			% Summative assessment			**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: **Biochemistry**	**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:** ABIO602

Module Code:	**MBIB082**				
Module Name:	Applied Molecular Biology				
Module Content:	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.				
Learning Outcomes:	In depth knowledge of the theory and techniques of Applied Molecular Biology included in this module				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		6		130203
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	9	continuous	0	2	5 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
Assessment Criteria:	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				

Assessment Methods:	Summative theory assessments Written and power point presentation of assignments Seminars Summative theory assessment.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**40**
	Final mark =		% Continuous assessment		**60**
			% Summative assessment		**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: **Biochemistry**		**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:**	ABIO603

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

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

CURRICULUM INFORMATION					
Department: **Biochemistry**				**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:** ABIO604	
Module Code:	**MBIA081**				
Module Name:	Research Methodology				
Module Content:	Basic research concepts, proposal design, reporting, literature survey, data collection and interpretation, statistical analyses. With special reference to Biochemistry.				
Learning Outcomes:	• To acquire an in depth knowledge of Basic Research Concepts and statistical analyses • To acquire the skills for proposal design, reporting, literature survey, data collection and interpretation.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	6	130201		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	9	continuous		2	5 hrs
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
Assessment Criteria:	To test if all the skills as required by the outcomes set for this module are in place				
Assessment Methods:	Summative theory assessments; written and power point presentation of assignments; seminars; summative theory assessment.				
Assessment Weighting:	Min Continuous Assessment mark for exam admission (%)				**40**
	Final mark =	% Continuous assessment			**60**
		% Summative assessment			**40**
	Min Final Assessment mark to pass (%)				**50**

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

DEPARTMENT: BIOLOGY

CURRICULUM INFORMATION			
Department: Biology		**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:**	BLGY700 MZOO070

Module Code:	**MZOO080**				
Module Name:	Research Project				
Module Content:	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.				
Learning Outcomes:	To perform, write up and present independent research				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	40	6	130601		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	1 day/week & 5 weeks in 2nd semester	Research project	Per arrangement	2	Research Project
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
Assessment Criteria:	The research project has to be presented in: • Written publication format to be evaluated by the relevant lecturer; • Poster format to be evaluated by all staff and the external examiners				
Assessment Methods:	Research Project to be completed. presented in publication format and a poster presentation				
Assessment Weighting:	Min Continuous Assessment mark for exam admission (%)				**N/A**
	Final mark =		% Publication written format		**60**
			% Poster & Presentation		**40**
	Min Final Assessment mark to pass (%)				**50**

Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical				
	Duration				
	Sub minimum				

CURRICULUM INFORMATION			
Department: Biology		**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:**	BLGY701 MZOO071

Module Code:	**MZOA081**
Module Name:	Environmental Biology
Module Content:	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.
Learning Outcomes:	In depth knowledge of: • Environmental (including pollution) factors affecting life • Relationships between man & nature • To get accustomed to all techniques pertaining to this field of study

Module Information:	SAQA Credits	ITS Course Level Code	CESM Code (3rd Order)
	20	6	130605

Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	9 for 5 weeks	continuous		2	5 hrs

Pre-requisite module/s:	None		
Co-requisite module/s:	None		
Assessment Criteria:	Determine if the knowledge obtained complies with the outcomes set		
Assessment Methods:	Summative theory assessments, written, power point and poster presentation of assignments; summative theory assessment.		
Assessment Weighting:	Min Continuous Assessment mark for exam admission (%)		**40**
	Final mark =	% Continuous assessment	**60**
		% Summative assessment	**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: **Biology**	**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:** BLGY703 MZOO072

Module Code:	**MZOA082**
Module Name:	Tick Biology
Module Content:	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.
Learning Outcomes:	• To obtain an in depth knowledge of all aspects of Acarology • To get accustomed to all techniques pertaining to this field of study

Module Information:	SAQA Credits	ITS Course Level Code	CESM Code (3rd Order)
	20	6	130504

Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
	9 for 5 weeks	continuous	0	2	5 hrs

Pre-requisite module/s:	None		
Co-requisite module/s:	None		
Assessment Criteria:	Determine if the knowledge obtained complies with the outcomes set		
Assessment Methods:	Summative theory assessments, written, power point and poster presentation of assignments, summative theory assessment.		
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)		**40**
	Final mark =	% Continuous assessment	**60**
		% Summative assessment	**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%			

MODULE INFORMATION			
Department:	**Biology**	**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:**	BLGY704 MZOB071

Module Code:	**MZOB081**				
Module Name:	Palaeontology and Philosophy of Biological Science				
Module Content:	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 homin ins 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.				
Learning Outcomes:	• To gain an in depth knowledge about vertebrate evolution, in general and specifically human evolution • To get accustomed to all techniques pertaining to this field of study				
Module Information:	**SAQA Credits**	**ITS Course Level Code**		**CESM Code (3rd Order)**	
	20	6		131203	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	9 for 5 weeks	continuous		2	5 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	Determine if the knowledge obtained complies with the outcomes set				
Assessment Methods:	Summative theory assessments, Written, power point and poster presentation of assignments Summative theory assessment.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**40**
	Final mark =	% Continuous assessment			**60**
		% Summative assessment			**40**
	Min Final Assessment mark to pass (%)				**n/a**

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

CURRICULUM INFORMATION			
Department:	**Biology**	**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:**	BLGY705 MZOO072

Module Code:	**MZOB082**
Module Name:	Parasitology
Module Content:	**Fish as host for parasites**. 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.
Learning Outcomes:	• To gain an in depth knowledge of protozoan, trematode, cestode and arthropod parasites occurring on/in fish • To get accustomed to all techniques pertaining to this field of study

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

DEPARTMENT : COMPUTER SCIENCE & INFORMATION TECHNOLOGY

CURRICULUM INFORMATION			
Department:	**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:**	

Module Code:	**CSIT700 (T2, T3 & T4)**				
Module Name:	**RESEARCH PROJECT**				
Module Content:	A research topic from one of several computer science specializations offered in the Department is chosen in consultation with the academic staff member responsible				
Learning Outcomes:	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				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	40		8		060101
Delivery Information:	**Campus**		**Full/Part Time**		**Period (1st/2ndSem)**
	SMU		Contact, Full Time		1st & 2nd Semester
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	0	Research Project	0	1	Research Project
Pre-requisite modules for this module:	None				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	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				

Assessment Methods:	The final mark will be obtained from the research project report and presentation.				
Assessment Weighting:	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%
Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical	Research Project			
	Duration	Year			
	Sub minimum	N/A			

CURRICULUM INFORMATION	
Department: 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:**

Module Code:	**CSIT701 S1(T1 & T2)**				
Module Name:	**ADVANCED DATABASE SYSTEMS DEVELOPMENT**				
Module Content:	• Design, implement and maintain Relational and Object Oriented Databases • LAMP (Linux, Apache, MySQL and PHP) • Server-side programming using PHP • Knowledge of Apache server and how to set it up • Database design using MySql • Integrating PHP and MySQL database • Web page development including HTML and CSS • The use of templates				
Learning Outcomes:	After successful completion of the module, the student should be able to • Apply skills for web-based development and implementation of a database system • Query the database and retrieve decision making information. • Apply knowledge of XML and XSLT • Apply knowledge of styles using CSS in professional designs • Extract hidden knowledge from unstructured data • Develop dynamic database systems				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		8		061002
Delivery Information:	**Campus**		**Full/Part Time**		**Period (1st/2ndSem)**
	SMU		Contact, Full Time		1st Semester
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours
Pre-requisite modules for this module:	COSC311				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	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.				
Assessment Methods:	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				
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			
Department	**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:**	

Module Code:	**CSIT703 S1(T1 & T2)**
Module Name:	**ARTIFICIAL INTELLIGENCE**
Module Content:	Basic Definitions and Concepts of Artificial Intelligence (AI) game engine programming; An AI Engine: the Basic Components and Design; AIsteroids: Our AI Test Bed; Role-Playing Games (RPGs); Adventure Games; Real-Time Strategy (RTS) Games;First-Person Shooters/Third-Person Shooters (FTPS); Platform Games; Shooter Games;Sports Games;Racing Games;Classic Strategy Games; Fighting Games; Miscellaneous Genres of Note; Finite-State Machines; Fuzzy-State Machines (FuSMs);
Learning Outcomes:	At the end of this course students are expected to have mastered the following: • Knowledge of the tools and information developers need to create modern game AI engines. • Knowledge of the four principle elements of game artificial intelligence • Acquiring of actual game development skills going beyond merely discussing how a technique might be used. • Knowledge of the common terminology, the underlying concepts of AI, and discovery of the different parts of the game AI engine. • 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. • 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.

Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	20	8	060102
Delivery Information:	**Campus**	**Full/Part Time**	**Period (1st/2ndSem)**
	SMU	Contact, Full Time	1st Semester

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours

Pre-requisite modules for this module:	COSC211
Co-requisites modules for module:	None
ASSESSMENT:	
Assessment Criteria:	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.
Assessment Methods:	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.

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			
Department	**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:**	

Module Code:	**CSIT705 S2(T3 & T4)**				
Module Name:	**HEALTH INFORMATICS (OBJECT-ORIENTED APPROACH)**				
Module Content:	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.				
Learning Outcomes:	Students should be able to: • Appreciate the rapid pace of growth of the healthcare industry • Understand the most significant changes in the industry as the use of electronic health records increase. • Understand the in-depth and comprehensive view of health information technology by examining healthcare regulatory requirements • Learn about the functions of a healthcare organization and its medical business operations in addition to IT hardware, software, networking, and security.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	20	8	061001		
Delivery Information:	**Campus**	**Full/Part Time**	**Period (1st/2ndSem)**		
	SMU	Contact, Full Time	2nd Semester		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours
Pre-requisite modules for this module:	None				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	A student should be able to demonstrate that s/he has understood the concepts as outlined in the module content and outcomes outlined above.				
Assessment Methods:	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				
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	
Department 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:**

Module Code:	**CSIT706 S2 (T3 & T4)**				
Module Name:	**COMPUTER NETWORKS**				
Module Content:	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				
Learning Outcomes:	After successful completion of the module, the student should be able to: • Understand and appreciate the hands-on analysis of packets from different protocols and client-server operations • Use Open-Source and free protocol analysers available: Wireshark, NAST, Zenmap, Capsa, Zenoss, and NetworkMiner • Understand the different network architectures (tiered) • Distinguish between stand-alone and client-server computing • Design networks and their subnets for an organisation • Appreciate the power of cloud computing				
Module Information:	**SAQA Credits**	**ITS Course Level Code**		**CESM Code (3rd Order)**	
	20	8		060902	
Delivery Information:	**Campus**	**Full/Part Time**		**Period (1st/2ndSem)**	
	SMU	Contact, Full Time		2nd Semester	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours
Pre-requisite modules for this module:	None				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	A student should be able to demonstrate that s/he understands the concepts of as outlined in the module content and outcomes.				
Assessment Methods:	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.				
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%			

SECTION F: MODULAR INFORMATION REQUIRED			
Department:	**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:**	

Module Code:	**CSIT708 S2(T3 & T4)**				
Module Name:	**COMPUTER SECURITY**				
Content::	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				
Module Outcomes:	At the end of this course students are expected to: • Demonstrate an understanding of network security concepts and applications • Identify network security threats and determine mechanisms to counter them • Implement common Encryption and Cryptographic algorithms • Analyse and design network security protocols • Demonstrate knowledge of information security governance and the associated legal and regulatory issues				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		8		060903
Delivery Information:	**Campus**		**Full/Part Time**		**Period (1st/2ndSem)**
	SMU		Contact, Full Time		2nd Semester
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	0	1	0	10 Hours
Pre-requisites for this module:	None				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	A student should be able to demonstrate application of computer security techniques.				
Assessment Methods:	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.				
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%			

SECTION F: MODULAR INFORMATION REQUIRED			
Department:	**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:**	

Module Code:	**CSIT709 S2(T3 & T4)**				
Module Name:	**MOBILE APPLICATION DEVELOPMENT(INTERMEDIATE)**				
Module Content::	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				
Module Outcomes:	At the end of this course students are expected to: • Acquire thorough knowledge of mobile application development using Open Source environment and Objective-C programming • Acquire practical application skills in developing third part phone apps • Integrate business topics into the world of app development				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		8		060799
Delivery Information:	**Campus**		**Full/Part Time**		**Period (1st/2ndSem)**
	SMU		Contact, Full Time		2nd Semester
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours
Pre-requisites for this module:	COSC321				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	A student should be able to demonstrate the concepts outlined in the module content and outcomes above.				
Assessment Methods:	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.				
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%			

SECTION F: MODULAR INFORMATION REQUIRED			
Department:	**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:**	

Module Code:	**CSIT710 S1 or S2**				
Module Name:	**SPECIAL TOPICS**				
Content::	The content will be generic based on the expertise of visiting lecturer or researcher over a period of not less than a term.				
Module Outcomes:	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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		8		069999
Delivery Information:	**Campus**		**Full/Part Time**		**Period (1st/2ndSem)**
	SMU		Contact, Full Time		Semester
Periods per week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	5	2	1	0	10 Hours
Pre-requisites for this module:	None				
Co-requisites modules for module:	None				
ASSESSMENT:					
Assessment Criteria:	A student should be able to demonstrate application of information technology aspects as presented by the expert.				
Assessment Methods:	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.				
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%			

DEPARTMENT: CHEMISTRY

CURRICULUM INFORMATION			
Department:	**Chemistry**	**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:**	CHEM750

Module Code:	**MCHM080**
Module Name:	Research Project
Module Content:	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.

Learning Outcomes:	By the end of this module students will have : • Acquired laboratory skills necessary for independent research • Developed further skills in operating different types of instrumentation. • Developed computational and data-processing skills related to chemical information and data. • Be aware of the techniques required for successful information retrieval from primary and secondary sources.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	40		06		140499
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
		Res Project		3	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	A combination of seminar presentations, mini desertation and summative assessment in the form of a project presentation.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**N/A**
	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	Research Project			
	Duration	Year			
	Sub minimum	N/A			

CURRICULUM INFORMATION			
Department: **Chemistry**		**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:**	CHEM711

Module Code:	**MCHA081**				
Module Name:	Advanced Organic Chemistry				
Module Content:	Functional Group Interconversion. Retrosynthetic analysis. Advanced Organic Synthesis: Strategy and Control. Advanced Organic Spectroscopy. **Miscellaneous Topics:** Heteroatom-stabilised carbanions, neighbouring participation, peptide synthesis, natural products.				
Learning Outcomes:	• 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 device syntheses of molecules of varying structural complexity using this knowledge. • 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. • Know the principles that govern chemical reactivity and use them to make predictions about the mechanisms and outcomes of chemical reactions. • Determine molecular structures from Nuclear Magnetic Resonance (NMR) and other organic spectroscopic techniques.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		06		140404
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 × 90 min	None	None	None	12.9 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				

Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, 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: **Chemistry**	**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:** CHEM721

Module Code:	**MCHB081**				
Module Name:	Advanced Inorganic Chemistry				
Module Content:	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]. **Miscellaneous Topics:** Aqueous and non-aqueous solutions; Nanomaterials, nanoscience and nanotechnology.				
Learning Outcomes:	• Students should be able to demonstrate advanced and critical knowledge of aqueous and non-aqueous solutions. • Know and apply key reactions in catalysis • On the basis of electronic structure, interpret electronic spectra and magnetic properties of d-metal complexes • Demonstrate a clear understanding of Organometallic Chemistry and its application to important industrial reactions • Be familiar with the concepts of inorganic chains, cages and clusters; nanomaterials, nanoscience and nonotechnology.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		06		140403
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 × 90 min	None	None	None	12.9 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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 nonotechnology.				
Assessment Methods:	Summative (60%): Tests, Tutorials and/or Assignments. Summative (40%): 1 × 3 h written examination.				
	Min Summative Assessment mark for exam admission (%)				**40**

Assessment Weighting:	**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 h			
	Sub minimum	40			

CURRICULUM INFORMATION	
Department: **Chemistry**	**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:** CHEM732

Module Code:	**MCHA082**				
Module Name:	Advanced Physical Chemistry				
Module Content:	Catalysis on surface (Surface chemistry); Statistical Thermodynamics; **Miscellaneous Topics:** 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].				
Learning Outcomes:	At the end of this module, students should be able to: ● Describe the structure, electronic and mechanical properties of polymers. ● Describe colloidal systems and how different types of micelles are formed. ● Be familiar with techniques used in the study of material properties. ● Describe the structures of solids in terms of crystal lattices and unit cells. ● Master the techniques for studying crystal structures. ● Describe the Bragg method and the Debye-Scherrer method of X-ray structural analysis. ● Index reflections and identify the unit cell from X-ray diffraction patterns. ● Understand and satisfactorily describe the dynamics of molecular motion, particularly in thegas phase. ● Be able to derive the rate laws, and apply the steady state approximation to derive rate laws for complex reactions.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		06		140405
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 × 90 min	None	None	None	12.9 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, 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			

DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

CURRICULUM INFORMATION	
Department: **Mathematics**	**School:** School of 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	**MMTH080**				
Module Name:	Research Project				
Module Content:	The student, in consultation with supervisor, selects a research topic in mathematics, does independent research and writes a report.				
Learning Outcomes:	After successful completion of the module, the student should be able to • Select a research topic. • Do independent research. • Write a research report. • Give a presentation to the Department.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**	**CESM Code (3rd Order)**	
	40		6	150101	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	0	Res Project	0	1	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	A student should be able to demonstrate that s/he has the ability to do independent research in mathematics.				
Assessment Methods:	The final mark will be obtained from an extended project essay or research paper				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**N/A**
	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	Research Project			
	Duration	Semester			
	Sub minimum	N/A			

CURRICULUM INFORMATION			
Department:	**Mathematics and Applied Mathematics**	**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:**	MATH710

Module Code:	**MMTA081**				
Module Name:	Group and Field Theory				
Module Content:	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. **Fields:** Field extensions, splitting fields, Main Theorem of Galois, solution of polynomial Equations by radicals.				
Module Content:					
Learning Outcomes:	After successful completion of the module, the student should • have a clear understanding ofgroups. • be able to determine whether a group is cyclic or not. • have a good understanding of freegroups. • have a good understanding of Galois 'stheory.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150101		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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:	**Mathematics & Applied Mathematics**	**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:**	MATH720

Module Code:	**MMTB081**				
Module Name:	General Topology				
Module Content:	Metric spaces, topological spaces, continuous functions, weak topologies, quotient spaces, convergent sequences, separation axioms, normal spaces, countability, compact spaces, metrization,				
	connectedness and uniform spaces.				
Learning Outcomes:	After successful completion of the module, the student should be able to • construct, independently, non-routine mathematical proofs. • verify whether a given collection of subsets of a set X forms a topology on X. • to investigate from third mathematics which results in metric spaces are translatable to topological spaces. • justify why some examples do not satisfy certain properties.				
Learning Outcomes:	• to construct a subspace topology. • determine whether a topological space is connected, compact, normal • understand the concepts of separation axioms, and how these axioms relate to one another • have a sound understanding of nets and filters in a topological space.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150105		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3 x 1 hours	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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:	**Mathematics Applied Mathematics**	**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:	**MMTC081**				
Module Name:	Complex Analysis				
Module Content:	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				
Learning Outcomes:	• 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. • Students should be able to critique given mathematical proofs on complex analysis and affirm their validity or invalidity. • Students should be able to use complex methods to evaluate real definite integrals. • Students should be able to prove the relationship between infinite products and uniform convergence. • Students should be able to apply complex analysis' techniques in other branches of mathematics like Number Theory..				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150199		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	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.				
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:	**Mathematics and Applied Mathematics**	**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:**	MATH740

Module Code:	**MMTD082**				
Module Name:	Functional Analysis				
Module Content:	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. **Hilbert spaces:** Orthogonal complement and direct sums, Riesz representative theorem, Hilbert Adjoint, self-adjoint, unitary and normal operators, spectral theory of bounded self-adjoint operators.				
Learning Outcomes:	• To have a good understanding of introductory topics in analysis which will form a sound basis for students to advance in this field. • To develop problem solving skills in the area of analysis and communicate clearly their knowledge and ideas. • To develop the ability to learn and advance independently				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150103		

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs

Pre-requisite module/s:	None		
Co-requisite module/s:	None		
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.		
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 Hours			
	Sub minimum	40%			

CURRICULUM INFORMATION					
Department:	**Mathematics and Applied Mathematics**			**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:**	MATH730

Module Code:	**MMTD081**				
Module Name:	Measure Theory and Integration				
Module Content:	Algebra of sets and limits; set functions. Outer and inner measure; extension of measure; σ - finite measures, Lebesque measure, Riemann-Stieltjies Measure, Measurables functions, Measure space, convergence in measure. Lebesque integrable functions, convergence in mean, properties in integrals. Countable additive set functions, Hahn and Jordan decomposition, Radon-Nikodyn theorem. Differentiation: Functions of bounded vation, Vitali's theorem.				
Learning Outcomes:	• 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. • Students should be able to critique given mathematical proofs on measure theory and affirm their validity or invalidity. • 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. • Students should be able to prove the relation between types of convergence. • Students should be able to calculate Lebeque integrals and see it as a generalization of the Riemann integral.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		6		150199
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	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.				
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:	**Mathematics and Applied Mathematics**	**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:**	MATH750

Module Code:	**MMTE082**				
Module Name:	Category Theory				
Module Content:	Abstract and Concrete categories, The duality principle. **Properties of morphisms**: Sectiosns, retractions, monomorphisms, epimorphisms, bimorphisms and isomorphisms. **Properties of special objects**: initial and terminal objects, zero objects and quotients. **Properties of functors**. **Universal construction:** Equalizers, regular and extremal monomorphisms and epimorphisms, (Co)products, mono-sources and epic-links, (Co)limits and pullbacks' pullouts.				
Learning Outcomes:	• To have a good understanding of categorytheory. • To develop problem solving skills in the area of category theory and communicate clearly their knowledge and ideas. • To develop the ability to learn and advance independently				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150101		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTA071 and MMTB071				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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:	**Mathematics and Applied Mathematics**	**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:**	MATH750

Module Code:	**MMTF082**
Module Name:	Combinatorics
Module Content:	Permutations and Combinations, Pigeonhole Principle, Binomial Coefficients, Principle of Inclusion – Exclusion, Recurrence relations, Generating functions, Combinatorial structures, Discrete probability.
Learning Outcomes:	• Be able to able apply combinatorial methods to solve counting problems. • Apply combinatorial techniques in other mathematical fields.

Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		6		150101
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	3 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTA071 and MMTA072				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)				**40**
	Final mark =		% Summative ment 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:	**Mathematics and Applied Mathematics**	**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:**	MATH760

Module Code:	**MMTG082**				
Module Name:	Number Theory				
Module Content:	Prime Number Theorem, Partition Function, Sequences with Arithmetic Progression, Sums & Differences, Products & Divisibility, Riemann Zeta Function				
Learning Outcomes:	• Understand the Prime number theorem and its applications • Understand the Riemann Zeta Function and its relationship to other areas of mathematics • Understand the complexity of the Riemann's Hypothesis • Understand the properties of primes				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		6		150101
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTC072 and MMTB071				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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**

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

CURRICULUM INFORMATION			
Department:	**Mathematics and Applied Mathematics**	**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:**	MATH780

Module Code:	**MMTH082**				
Module Name:	Ring Theory				
Module Content:	Ideals & Quotient Rings, Modules, Properties of Rings, Unique Factorisation Theorem				
Learning Outcomes:	• Understand the algebraic structure of rings and their applications in related algebraic areas • Understand the Unique Factorisation Theorem.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150101		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTC072 and MMTB071				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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**

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

CURRICULUM INFORMATION			
Department:	**Mathematics and Applied Mathematics**	**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:**	

Module Code:	**MMTC082**		
Module Name:	Approximation Theory		
Module Content:	Best Approximations, Existence of Approximations, Possibility of Approximation, Uniqueness of Approximations, Muntz Theorem		
Learning Outcomes:	• Understand the main approximation theory techniques/theorems and their applications in general mathematical analysis		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	16	6	150101

Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTC072 and MMTB071				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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:	**Mathematics and Applied Mathematics**	**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:	**MMTA082**				
Module Name:	Graph Theory				
Module Content:	Graphs, Planar graphs, Platonic graphs, Colouring, Genus of a graph, Euler Walks & Hamilton Walks				
Learning Outcomes:	• Be able to identify the various types of graphs • Understand the relationship between Graph Theory & Combinatorics • Be able to draw the different types ofgraphs				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	16		6		150101
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTC072 and MMTB071				
Assessment Criteria:	Continuous summative assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
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:	**Mathematics and Applied Mathematics**	**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:	**MMTB082**				
Module Name:	Potential Theory				
Module Content:	Harmonic Functions, Subharmonic Functions, Potentials, Polar Sets, Equilibrium Measures, The Generalized Laplacian, The Dirichlet Problem, Capacity, Applications of Potential Theory				
Learning Outcomes:	• Understand potential theory in the complex plane. • Apply potential theoretic techniques in solving analytic problems				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	16	6	150101		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	2 x 1 hrs	0	1	0	10 hrs
Pre-requisite module/s:	None				
Co-requisite module/s:	MMTC072 and MMTB071				
Assessment Criteria:	Continuous assessment based on Quizzes, Tutorials, Assignments, 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 1:1 respectively, to get the final mark. There will be no supplementary assessment.				
Assessment Weighting:	Min continuous 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%			

DEPARTMENT: PHYSICS

CURRICULUM INFORMATION			
Department:	**Physics**	**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:**	PHYS700

Module Code	**MPHS080**
Module Name:	Research Project
Module Content:	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.

Module Code	**MPHS080**				
Module Name:	Research Project				
Learning Outcomes:	By the end of this module students will have : • Acquired laboratory skills necessary for independent research • Developed further skills in operating different types of instrumentation. • Developed computational and data-processing skills related to chemical information and data. • Be aware of the techniques required for successful information retrieval from primary and secondary sources.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	40	06	140701		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
		14 hrs		3/module	2 hrs
Pre-requisite module/s:	MPHA031,MPHB031,MPHA032 and MPHB032				
Co-requisite module/s:	None				
Assessment Criteria:	Demonstrate proficiency in writing a proposal, performing literature review, referencing, collecting data, analysing data, writing the research report, presenting results.				
Assessment Methods:	A combination of seminar presentations, mini dissertation and summative assessment in the form of a project presentation.				
Assessment Weighting:	Min Summative Assessment mark for exam admission (%)			n/a	
	Final mark =	% Summative Assess Mark	**40** (10% seminars:30% project presentation)		
		% Summative Assess Mark	**60** (Evaluation of project write-up)		
	Min Final Assessment mark to pass (%)				
Summative Assessment Paper:		**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
	Theory / Practical	Res Project			
	Duration				
	Sub minimum	40%			

CURRICULUM INFORMATION			
Department: **Physics**		**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:**	PHYS711

Module Code:	**MPHA081**
Module Name:	Quantum Mechanics
Module Content:	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.
Learning Outcomes:	Students should be able to: • Describe the formal principles of quantum mechanics and apply these to some atomic systems • Describe general methods for solving atomic systems with emphasis on the significant quantum properties • Use perturbation methods to analyze more complex situation • Solve mathematical problems

Module Code:	**MPHA081**				
Module Name:	Quantum Mechanics				
Module Information:	**SAQA Credits**		**ITS Course Level Code**	**CESM Code (3rd Order)**	
	20		06	140701	
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min		1 x 45 min	1 x semester	12.9 hrs
Pre-requisite module/s:	MPHA031,MPHB031,MPHA032 and MPHB032				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Summative Tests; Tutorials; Assignments. Summative 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**

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

CURRICULUM INFORMATION	
Department: **Physics**	**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:** PHYS721

Module Code:	**MPHB081**
Module Name:	Statistical Mechanics
Module Content:	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.
Learning Outcomes:	After completing this module, the student should be able to: • describe the role of statistical concepts in understanding macroscopic systems; • deduce the Boltzmann distribution for the probability of finding a system in a particular quantum state; • apply statistical theory to determine the magnetisation of a paramagnetic solid as a function of temperature; • deduce the Einstein and Debye expressions for the heat capacity of an insulating solid and compare the theory with accepted experimental results; • deduce the equation of state and entropy for an ideal gas; • deduce the Fermi-Dirac and Bose-Einstein distributions; • describe superfluidity in liquid helium and Bose-Einstein condensation • deduce the heat capacity of an electron gas.

Module Code:	**MPHB081**				
Module Name:	Statistical Mechanics				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		06		140701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min		1 x 45 min		12.9 hrs
Pre-requisite module/s:	MPHA031,MPHB031, MPHA032 and MPHB032				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Summative Tests; Tutorials; Assignments. Summative 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: **Physics**		**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:**	PHYS732

Module Code:	**MPHA082**
Module Name:	Electrodynamics
Module Content:	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.
Learning Outcomes:	• At the end of the course the student will be able to: • Apply Maxwell's equation to variety of physical systems • Describe electromagnetic phenomena with the aid of potentials • Demonstrate understanding how electric potential and fields transform • Solve problems applying potential formalism and understand that the results are independent of the approaches one used • Demonstrate understanding of the process of electromagnetic radiation • Relate electrodynamics with relativity • Solve the time-independent Maxwell equations using standard mathematical techniques for boundary value problems • Solve the time-dependent Maxwell equations for elementary problems including the propagation of plane electromagnetic waves • Understand guided waves

Module Code:	**MPHA082**				
Module Name:	Electrodynamics				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	20		06		140701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min		1 x 45 min		12.9 hrs
Pre-requisite module/s:	MPHA031,MPHB031,MPHA032 and MPHB032				
Co-requisite module/s:	None				
Assessment Criteria:	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. Bremstrahlung. Scattered radiation. Coherence of radiation. Scatter in X-rays. Developments of opto-electronic properties of matter.				
Assessment Methods:	Tests, Tutorials and/or Assignments. Summative 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: **Physics**		**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:**	PHYS742

Module Code:	**MPHB082**		
Module Name:	Solid State Physics		
Module Content:	**Core Topics** **Defect Solid State**: classifications of imperfections, point defects and ordering, dislocations, elasticity, Burger's vectors and energy of alloys. **Miscellaneous Topics**: **Electron Microscopy:** Interactions of electrons with matter, kinematical theory of electron diffraction, electron diffraction patterns and indexing. **Semiconductor Physics:** Semiconductor theory; p-n junction devices; BJTs; FETs. Silicon Processing and IC fabrication; Lasers.		
Learning Outcomes:	After completion of this course students are expected to: describe various one, two, and three dimensional defect types describe forces and energies involved in dislocation interactions explain the various crystal structures from the given diffraction patterns Understand electron microscopy Understand what semiconductor physics is all about		
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**
	20	06	140701

Module Code:	**MPHB082**				
Module Name:	Solid State Physics				
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	4 x 45 min		1 x 45 min		12.9 hrs
Pre-requisite module/s:	MPHA031,MPHB031,MPHA032 and MPHB032				
Co-requisites module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Summative (60%): Tests, 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 %			

DEPARTMENT: STATISTICS & OPERATIONS RESEARCH

CURRICULUM INFORMATION	
Department: **Statistics & Operations Research**	**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:	**MSTA081**				
Module Name:	Probability Theory				
Content:	• 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.				
Learning Outcomes:	After learning this course the students will be able to • Describe mathematical models and stochastic processes • Demonstrate knowledge of advanced probability methods • Model life random processes using appropriate statistical distributions. • Compute the reliability of different stochastic systems • Apply the knowledge of random processes in signal processing operations research.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTA082**				
Module Name:	Statistical Inference				
Content:	• 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.				
Learning Outcomes:	Upon successful completion of the requirements of this course, students should have the knowledge and skills to: • Explain in detail the notion of a parametric model and point estimation of the parameters of those models. • 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. • Demonstrate the plausibility of pre-specified ideas about the parameters of the model by examining the area of hypothesis testing. • 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. • Demonstrate computational skills to implement various statistical inferential approaches				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: **Statistics & Operations Research**	**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:	**MSTB081**				
Module Name:	Sampling Theory				
Content:	• Review of Simple and Stratified Random Sampling, Sampling with Probability Proportional to size, Systematic Sampling, Multistage Sampling, Sources of Errors.				
Learning Outcomes:	After learning this course the students will be able to • Demonstrate advanced knowledge in • Gain more advanced insight into stratified random sampling; systematic and cluster sampling. • Demonstrate understanding of estimation of the sample size; ratio and regression estimation; sampling with unequal probabilities; complex surveys. • Explain and offset cases of non-response in surveys.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTC081**				
Module Name:	Biostatistics				
Content:	• 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.				
Learning Outcomes:	After learning this course the students will be able to • Apply parametric and nonparametric statistical methods to numerical data from the life sciences. • Understand different aspects of survival analysis as data analysis methodology. • Analyse a wide spectrum of problems on time to event data. • Demonstrate understanding of Survival Analysis and its multitude of applications in the fields of health, engineering, economics, biology and the physical sciences. • Describe the distribution of failure times (time to event), analysis times and Hazard models (Parametric & Semi-parametric), Censoring, truncation and the recording of survival data. • 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.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTB082**				
Module Name:	Non-Parametric Statistics				
Content:	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				
Learning Outcomes:	After learning this course the students will be able to • Demonstrate knowledge of different aspects of nonparametric regression as an explorative tool and non-linear relationships in a wide variety of applications. • Understand the differences between parametric and nonparametric regression and the difference between model driven and data driven approaches. • Explain nonparametric density estimation in practice and theory for univariate and multivariate analyses as well as models for nonparametric regression and the smoothing parameters. • Demonstrate understanding of advanced tools such as semi-parametric regression, additive models and in particular generalised additive models are also included.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTD081**				
Module Name:	Multivariable Analysis				
Content:	• Review of matric 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.				
Learning Outcomes:	After learning this course the students will be able to • Apply matrix notation and theory extensively. • Demonstrate knowledge of multivariate distributions in the families of the normal, gamma, beta, t, and F distributions. • Demonstrate understanding of concepts of jointly distributed random variables, marginal distributions, moments, conditional distributions, and independence as well as characteristic functions. • Demonstrate understanding of multivariate normal distribution and its properties, as well as spherical and elliptical distributions. • Demonstrate knowledge of the Jacobean of transformations • Describe mathematical philosophies of the Wishart and multivariate beta distributions.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTC082**				
Module Name:	Stochastic Processes				
Content:	• 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.				
Learning Outcomes:	After learning this course the students will be able to • Understand the mathematical bases of probability; conditional probability and conditional expectation. • Demonstrate understanding of Markov chains. • Exponential distribution and the Poisson Process. • Continuous time Markov chains.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTE081**				
Module Name:	Categorical Data Analysis				
Content:	• Distribution and inference for Categorical Data, Two-Dimensional Tables: Test of Independence, Test of Homogeneity, Relative Risk and the Odds Ration, 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				
Learning Outcomes:	• Upon successful completion of this module, the students should have knowledge and skills • Analyse categorical (or count) responses and categorical or continuous predictor variables • Analyse two-way and multi-way tables • Demonstrate theoretical and applied knowledge of logistic regression • Apply deviance tables to real problems • Apply CDA to bio-data and business environments				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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	
Department: Statistics & Operations Research	**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:	**MSTS080**				
Module Name:	Research Project (Statistics)				
Content:	• The student, in consultation with supervisor, selects a research topic in Statistics, does independent research and writes a report.				
Learning Outcomes:	• Students completing this module successfully will be able to • Plan and conduct statistical research under supervision. • Present the findings of the research in an appropriately structured written research report. • Adopt a critical and ethical approach to conducting statistical analysis and research. • Report on research conducted, both in their own work and in that of others.				
Module Information:	**SAQA Credits**	**ITS Course Level**	**CESM Code (3rd 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. • A summative assessment will consist of one three-hour paper. • 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.				
Assessment methods:	• Assignments • Practical's • Case Studies • Tests • examinations • presentations 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			
Department:	**Mathematics and Applied Mathematics**	**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:**	AMAT800

Module Code:	**MAMA090**				
Module Name:	Master of Science in Applied Mathematics				
Module Content:	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.				
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		150201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res Project	N/A	2 per year	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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				
Assessment Methods:	Dissertation evaluated or assessed by internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: BIOCHEMISTRY

CURRICULUM INFORMATION			
Department: Biochemistry		**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:**	BIOC800

Module Code:	**MBIA090**				
Module Name:	Master of Science in Biochemistry				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		130201
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research project	N/A	2	Research project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	Internal and external evaluation				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: BIOLOGY

CURRICULUM INFORMATION			
Department: Biology		**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:**	BLGY808

Module Code:	**MZOA090**				
Module Name:	Master of Science in Zoology				
Module Content:	The Master of Science in Zoology comprises a dissertation based on the research results of an				
Module Content:	Approved supervised research project in the field of Zoology, presented in a form suitable for publication.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		130601
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research project	N/A	2	Research project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	Internal and external evaluation				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT :CHEMISTRY

CURRICULUM INFORMATION			
Department: Chemistry		**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:**	CHMY800

Module Code:	**MCHA090**				
Module Name:	Master of Science in Chemistry				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • to operate different types of instrumentation.				
	• to operate different types of instrumentation. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		140401
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research project	N/A	1	Research Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Dissertation evaluated / assessed by internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: MATHEMATICS & APPLIED MATHEMATICS

MODULE INFORMATION			
Department: Mathematics & Applied Mathematics		**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:**	MAH808

Module Code:	**MMAA090**				
Module Name:	Master of Science in Mathematics				
Module Content:	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.				
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		150101
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research Project	N/A	2 per year	Research Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Dissertation evaluated or assessed by internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: PHYSICS

MODULE INFORMATION	
Department : Physics	**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:** PHYS800

Module Code:	**MPHA090**				
Module Name:	Master of Science in Physics				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • to operate different types of instrumentation. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		140701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research project	N/A	1	Research project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Dissertation evaluated / assessed by internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: STATISTICS and OPERATIONS RESEARCH

MODULE INFORMATION			
Department:	**Statistics and Operations Research**	**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:**	STAT800

Module Code:	**MSTA090**				
Module Name:	Master of Science in Statistics				
Module Content:	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.				
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	180		8		150302
Delivery Information:	**Campus**		**Full/Part Time**		**Period**
	SMU Campus		Contact, Full Time or Part Time		Minimum 2 years
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res Project	N/A	2 per year	Research Project
Pre-requisite module/s:	None				
Co-requisites module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Dissertation evaluated / assessed by internal and external assessors.				
Assessment Weighting:	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 *the specific Discipline*	**Qualification Code:**	PHD in *the specific Discipline*
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			
Department:	**Mathematics and Applied Mathematics**	**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:**	AMAT900

Module Code:	**MAMA100**				
Module Name:	Doctor of Philosophy in Applied Mathematics				
Module Content:	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.				
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	360	10	150201		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res Project	N/A	2 per year	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT: BIOCHEMISTRY

MODULE INFORMATION			
Department: Biochemistry		**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:** ABIO909	

Module Code:	**MBIA100**				
Module Name:	Doctor of Philosophy in Biochemistry				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report				
	• to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • 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.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	360	10	130201		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res project	N/A	2	Res project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	Thesis evaluated and assessed by both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50%

DEPARTMENT: BIOLOGY

CURRICULUM INFORMATION			
Department: Biology		**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:**	BLGY990

Module Code:	**MZOA100**				
Module Name:	Doctor of Philosophy in Zoology				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • 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.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	360	10	130601		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res project	N/A	2	Res project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Methods:	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50%

DEPARTMENT: CHEMISTRY

MODULE INFORMATION			
Department: Chemistry		**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:**	CHEM900

Module Code:	**MCHA100**				
Module Name:	Doctor in Philosophy in Chemistry				
Module Content:	The Doctor of Philosophy in Chemistry comprises a thesis based on the research results of an				
Module Content:	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.				
Learning Outcomes:	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:				
	• to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • to operate a variety of instrumentation. • 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.				
Module Information:	**SAQA Credits**	**ITS Course Level Code**	**CESM Code (3rd Order)**		
	360	10	140401		
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Research project	N/A	1	Research Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50%

DEPARTMENT : MATHEMATICS AND APPLIED MATHEMATICS

CURRICULUM INFORMATION			
Department:	**Mathematics and Applied Mathematics**	**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:**	MATH900

Module Code:	**MMAA100 (T2, T3 & T4)**				
Module Name:	Doctor of Philosophy in Mathematics				
Module Content:	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.				
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	360		10		150101
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res Project	N/A	2 per year	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Thesis evaluated and assessed by both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT : PHYSICS

CURRICULUM INFORMATION			
Department: Physics		**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:**	PHYS900

Module Code:	**MPHA100**				
Module Name:	Doctor of Philosophy in Physics				
Module Content:	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.				
Learning Outcomes:	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: • to design experiments and sampling programmes • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. • to operate a variety of instrumentation. • 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.				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	360		10		140701
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res project	N/A	1	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Thesis evaluated and assessed by both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50

DEPARTMENT : STATISTICS AND OPERATIONS RESEARCH

MODULE INFORMATION			
Department: Statistics and Operations Research		**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:**	STAT900

Module Code:	**MSTA100 (T2, T3 & T4)**
Module Name:	Doctor of Philosophy in Statistics
Module Content:	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.
Learning Outcomes:	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: • to plan and conduct a research project, including written and verbal presentations of the research proposal and research report • to access, extract and synthesize scientific information from multimedia sources • to critically interpret and evaluate published scientific information. 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.

MODULE INFORMATION			
Department: Statistics and Operations Research		**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:**	STAT900

Module Code:	**MSTA100 (T2, T3 & T4)**				
Module Name:	Doctor of Philosophy in Statistics				
Module Information:	**SAQA Credits**		**ITS Course Level Code**		**CESM Code (3rd Order)**
	360		10		150302
Periods per Week:	**Classes**	**Practicals**	**Tutorial**	**Seminars**	**Independent Learning**
	N/A	Res Project	N/A	2 per year	Res Project
Pre-requisite module/s:	None				
Co-requisite module/s:	None				
Assessment Criteria:	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.				
Assessment Methods:	Thesis evaluated and assessed by an assessment panel, consisting of both internal and external assessors.				
Assessment Weighting:	Min Final Assessment mark to pass (%)				50