SCHOOL OF SCIENCE & TECHNOLOGY

POSTGRADUATE

**SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY**

2024

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 2023 academic and financial year. The University reserves the right to amend any date, time, rule or provision in this Calendar at any time without prior notice.
No responsibility is accepted for possible inaccuracies.

University Terms 2024

FIRST SEMESTER	:	08 January 2024	-	26 July 2024
AUTUMN Recess(for students)	:	02 April 2024	-	05 April 2024
WINTER Recess(for students)	:	15 July 2024	-	26 July 2024
SECOND SEMESTER	:	29 July 2024	-	13 Dec 2024
SUMMER Recess(University Recess)	:	13 Dec 2024	-	06 Jan 2025

School Correspondence

All School correspondence to be addressed to:

The Dean
Sefako Makgatho Health Sciences University
School of Science & Technology
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PO MEDUNSA
0204

Telegraphic address: Medunsa Campus

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Phumzile.zulu@smu.ac.za   (P.A to the Dean)
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Refilwe.mashilwane@smu.ac.za (Principal Administrator: Undergraduate Studies)

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, the Department of Higher Education and Training (DHET) approved some major fields. They consist of Biotechnology, Environmental Biology, Environmental Toxicology as well as Honours streams in Information and Communication Technology.

There are eight departments in the School namely, *Academic Literacy and Science Communication, Biology and Environmental Sciences, Biochemistry and Biotechnology, Chemistry and Chemical Technology, Computer Science and Information Technology, Mathematics and Applied Mathematics, Physics, Statistical Sciences*.
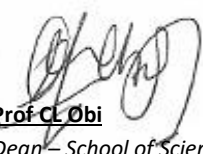
The School provides strong articulation from ECP programmes to doctoral degrees. The School offers training in Science and Technology to students registered in the Schools of Oral Health Sciences, Health Care Sciences, Pharmacy and Medicine. Career/work related prospects for students registered in the 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 spearheaded the establishment of the Centre for Entrepreneurship and Rapid Incubations, predicated on multi-disciplinarily, 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 commercialisation 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

In developing a vision for the university, the institution acknowledges a number of critical aspects, which give the institution its identity. These include a focus on excellence in teaching and learning, developing research and innovation, combining clinical practice and community service and focus on a broad range of fields in the health sciences. The university also has a critical role in contributing to the transformation of the health sciences sector in South Africa while at the same time making a meaningful contribution to the needs of the community it serves and South Africa as a whole.

With these components in mind, the institution has adopted as its vision the following: Transforming health services through excellence and innovation

MISSION

The mission statement highlights that the institution provides a comprehensive range of qualifications across a broad range of health sciences fields. The mission also highlights that the institution combines excellence in teaching and learning with a focus on research and innovation with community engagement at the centre of its approach to all that it does.

The mission statement of the institution is as follows: SMU is a dedicated health sciences university providing professional training and education in a range of fields through excellence in teaching, learning, innovative research and community engagement.

School Committees for Science & Technology

Board of the School

Chairperson : Prof CL Obi (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 : Prof CL Obi (Dean)

Members :

All Heads of Academic Departments in the School

Community Engagement and Marketing Committee

Chairperson : Ms M Masethe

Members :

Departmental representatives
Science outreach co-ordinator
Marketing Department
Student Representative

Examinations Committee

Chairperson : Prof CL Obi (Dean)

Members :

All Heads of Academic Departments
Departmental Representatives
Assistant Registrar
Examinations Dept. Rep

School Research and Innovation Committee

Chairperson : Prof SS. Gololo

Vice-Chairperson(s): Prof M. Aphane
Dr EBE. Moema

Members:

Departmental Representatives

Student Selection & Admission Committee

Chairperson :   Prof CL Obi (Dean)

Members :

All Heads of Academic Department in the school.
Enrolment Dept. Rep
School Administrator
Student Representative

Student Support Committee

Chairperson :   Ms N Ntsoka

Members :

Departmental Representatives

Risk Management Committee

Chairperson :   Dr T Ramarumo

Members :

Departmental Representatives
Marketing & Communications Chairperson

Marketing and Communication Committee

Chairperson :   Ms EM Modise

Members :

Departmental Representatives

Work Integrated Committee

Chairperson :   Prof L.L Mugivhisa

Members :

Departmental Representatives

DATES FOR SCHOOL BOARD MEETINGS = 2024

NB: According to the University General Calendar, only three meetings are scheduled.

Wednesday   27 March 2024

Wednesday   29 May   2024

Tuesday   30 July   2024

MEMBERS OF STAFF

Office of the Dean

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

Academic Departments

Academic Literacy and Science Communication

Head of Department	**Seleka ME,** PhD (UNW)
Senior Lecturer	Nair P, PhD (Univ of Kerala, India)
Senior Lecturer	Hungwe V, PhD (UL)
Senior Lecturer	Marutla GB, PhD(UNW)
Lecturer	Nkgadima GM, MA (UL)
Lecturer	Mamabolo JT MA (UL)

Biochemistry and Biotechnology

Assoc. Prof /Acting HoD	**Gololo SS,** PhD (SMU)
Senior Lecturer	Kgopa AH, PhD (SMU)
Lecturer	Thibane, V, PhD (UKZN)
Lecturer	Makhubela SD, MSc (WITS)
Lecturer	Mathe EH, MSc (VENDA)
Lecturer	Nemukula, M, MSc (SMU)
Lecturer	Vacant
Laboratory Assistant	Shikwambana MH, BSc (Hons) (SMU)
Natural Scientist	Nthai, D, MSc (SMU)

Biology and Environmental Sciences

Professor & Head of Department	**King PH,** PhD (UFS)
Professor	Vacant
Associate Professor	Welman J, PhD (STELLENBOSCH)
Associate Professor	Mugivhisa L, PhD(SMU)
Associate Professor	Mkolo M, PhD (UP)
Senior Lecturer	Moema EBE, PhD (MEDUNSA)
Senior Lecturer	Buthelezi NMD, PhD(UKZN)
Senior Lecturer	Lebepe J, PhD(UL)
Lecturer	Lion GN, MSc (UL)
Lecturer	Mavimbela C,MSc (UL)
Lecturer	Modise EM, MSc (UL)
Lecturer	Modise T, MSc (SMU)
Lecturer	Aina OE, MSc (SMU)
Senior Technical Officer	Mnisi NML, BSc (Hons) (UL)
Senior Laboratory Assistant	Mooki KS,BSc (Hons) (UL)
Technical Officer	Mathole MC, MSc (SMU)

Chemistry and Chemical Technology

Acting Head of Department	**Rapulenyane N,** PhD (NMU)
Senior Lecturer	Debeila MA, PhD (WITS)
Senior Lecturer	Molefe DM,PhD (UP)
Senior Lecturer	Ndawuni P,PhD (UNISA)
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, PhD (SMU)
Senior Technical Officer	Semenya CJ,MSc(SMU)
Technical Officer	Kgasi AN, B.Tech (TUT)
Laboratory Assistant	Mokose R,

Computer Science and Information Technology

Head of Department	**Dandadzi TA,** PhD (UL)
Lecturer	Hungwe T, PhD (SMU)
Lecturer	Mathiba NS,MSc (Southern Univ. USA)
Lecturer	Ndobe TV, Mcom(Information System (WITS)
Lecturer	Masethe MA,M-Tech (TUT)
Junior Lecturer	Sumbana V,BSc (Hons) (UNIVEN)
Junior Lecturer	Masuku NS, BSc (Hons) (UNIZULU)
LaboratoryTechnician	Nkosi MI, BSc (Hons)SMU

Mathematics and Applied Mathematics

Assos. Prof /HoD	**Aphane M,**PhD (UNISA)
Senior Lecturer	Adem K, PhD (North West Univ.)
Senior Lecturer	Chin PWM, PhD (UP)
Senior Lecturer	Tegegn TA, PhD (UP)
Senior Lecturer	Aremu K O, PhD (UKZN)
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)
Lecturer	Bokodisa AT, MSc(SMU)
Junior Lecturer	Kanyane MLS,BSc (Hons)(SMU)
Junior Lecturer	Ndlovu PV, BSc (Hons)(SMU)
Junior Lecturer	Medupe K, BSc(Hons) (SMU)
Junior Lecturer	Ngwepe M.D ,BSc (Hons) (SMU)

Physics

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

Statistical Sciences

Professor & Head of Department	**SeeletseSM,** PhD (OR) (PU for CHO)
Senior Lecturer/Biostatistician	Ntuli TS, PhD (UL)
Lecturer	Ramarumo T, PhD(SMU)
Lecturer	Lekganyane MM, MSc (UL)
Lecturer	Miyambu GR, MSc (UL)
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)

SCHOOL VISION AND MISSION

Vision

Transforming Science and Technology through Interdisciplinary quality education, research, community engagement and innovation for societal development.

Mission

To provide quality training in Science and Technology with the aim of producing global leaders that inspire solutions to societal problems.

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.

CONTENTS

1. POSTGRADUATE PROGRAMMES

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*

BIOLOGY (Qualification: HSCR01)	
MZOO080	Research Project (Zoology)
MZOA081	Environmental Biology
MZOA082	Tick Biology
MZOB081	Palaeontology and Philosophy of Biological Science
MZOB082	Parasitology

BIOCHEMISTRY (Qualification: HSCP01)	
MBIC080	Research Project (Biochemistry)
MBIA081	Research Methodology
MBIB081	Medical Biochemistry
MBIA082	Advanced Protein Chemistry
MBIB082	Applied Molecular Biology

APPLIED MATHEMATICS (Qualification: HSCT01)	
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

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

DEPARTMENT : 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)? 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:	**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 & BIOTECHNOLOGY

CURRICULUM INFORMATION			
Department:	Biochemistry & Biotechnology	**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 & Biotechnology		**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**

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

CURRICULUM INFORMATION		
Department: Biochemistry & Biotechnology	**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				
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 & Biotechnology		**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

CURRICULUM INFORMATION

Department:	Biochemistry & Biotechnology	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%			

DEPARTMENT: BIOLOGY & ENVIRONMENTAL SCIENCES

CURRICULUM INFORMATION			
Department: **Biology & Environmental Sciences**		**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 & Environmental Sciences**		**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 & Environmental Sciences**		**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 & Environmental Sciences	**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**	
Summative Assessment Paper:		Paper 1	Paper 2	Paper 3		Paper 4
	Theory / Practical	Theory				
	Duration	3 hours				
	Sub minimum	40%				

CURRICULUM INFORMATION		
Department: Biology & Environmental Sciences		**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 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 & 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**			
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 & 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/2nd Sem)	
	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 & 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 & 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/2nd Sem)
	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 & 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/2nd Sem)
	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 & 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%			

Department:	Computer Science & 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 & 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 & CHEMICAL TECHNOLOGY

CURRICULUM INFORMATION			
Department: Chemistry & Chemical Technology		**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 & Chemical Technology**		**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 & Chemical Technology	**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.

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 h			
	Sub minimum	40			

CURRICULUM INFORMATION		
Department: Chemistry & Chemical Technology	**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 the gas 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 & Applied 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 & 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				
Module Content:	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.				
Learning Outcomes:	After successful completion of the module, the student should have/be: • A clear understanding of groups. • Able to determine whether a group is cyclic or not. • A good understanding of free groups. • A good understanding of Galois's theory.				
Module Information:	SAQA Credits		ITS Course Level Code		CESM Code (3rd Order)
Module Information:	16		6		150101
Periods per Week:	Classes	Practicals	Tutorial	Seminars	Independent Learning
Periods per Week:	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:** 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:**	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:** 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 category theory. • 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%			

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

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
	Classes	Practicals	Tutorial	Seminars	Independent Learning

Periods per Week:	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)? 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%			

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 of graphs				
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.
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 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**
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:**	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: • Sescribe 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 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 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	

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: STATISTICAL SCIENCES

CURRICULUM INFORMATION			
Department:	**Statistical Sciences**	**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: Statistical Sciences	**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:	**Statistical Sciences**	**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: Statistical Sciences	**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:	**Statistical Sciences**	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:	**Statistical Sciences**	**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%			

Department:	**Statistical Sciences**	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: Statistical Sciences		**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: **Statistical Sciences**		**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
MSTA090	Master of Science in Statistics

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 & BIOTECHNOLOGY

CURRICULUM INFORMATION			
Department: Biochemistry & Biotechnology		**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 & ENVIRONMENTAL SCIENCES

CURRICULUM INFORMATION			
Department:	Biology & Environmental Sciences	**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 & CHEMICAL TECHNOLOGY

CURRICULUM INFORMATION			
Department: Chemistry & Chemical Technology		**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 : COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

MODULE INFORMATION			
Department: Computer Science and Information Technology		**School:**	**Science & Technology**
Last Revision date:	**First Year Offered (New):**		**2022**
Replace this Module existing module(s)? No	**If YES, give the module codes:**		
Module linked to Qualification/s:	**MSC(CSIT)**		
Migration Strategy: No	(If YES, IP05 must also be completed)		

Module Code: (4 alphabetic & 3 numeric)	**CSIT800**		
Module Name:	Master of Science in Computer Science and Information Technology		
Module Content:	The Master of Science (CSIT) comprises a dissertation based on the research results of an approved supervised research project in the field of Computer Science and Information technology, presented in a form suitable for journal 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 Computer Science & Information Technology. 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	0601
Delivery Information:	**Campus**	**Full/Part Time**	**Period (1st/2ndYr)**
	SMU	Contact, Full Time or Part time	1st & 2nd Year
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 an ability and proficiency by means of a comprehensive dissertation, which will be supplemented by an oral presentation of their research proposal and findings. The dissertation will be assessed by an external assessor.				
Assessment Methods:	Dissertation evaluated or 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: STATISTICAL SCIENCES

MODULE INFORMATION			
Department: Statistical Sciences		**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
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 & BIOTECHNOLOGY

MODULE INFORMATION			
Department: Biochemistry & Biotechnology		**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 & ENVIRONMENAL SCIENCES

CURRICULUM INFORMATION		
Department: Biology & Environmental Sciences	**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 & CHEMICAL TECHNOLOGY

MODULE INFORMATION		
Department: Chemistry & Chemical Technology	**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 : STATISTICAL SCIENCES

MODULE INFORMATION			
Department: Statistical Sciences		**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: Statistical Sciences		**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