THE DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS & PHYSICS (CMP)

MPhil/PhD Degrees

Entry Requirements

MPhil Candidates require at least an Upper-Second Class Honours degree with a strong background in the discipline into which entry is being sought. All research students must register initially for the MPhil degree but may later, with suitable progress, be upgraded to register for the PhD degree. In cases where the candidate already has an MPhil degree (or equivalent), direct entry to the PhD is possible.

Availability of Expertise and Resources

Admission is contingent upon whether candidates have a thesis proposal compatible with the expertise and resources available in the Department of Computer Science, Mathematics and Physics (CMP).

Areas of Study

Major research interests of staff members in this department are: -

Computer Science

- Optical Communication, Digital Signal Processing, Sensor Technology and Mobile Applications
- Climate Modelling, Visualisation and Mobile Applications
- Network and Computer Security, Machine Learning, and Wireless Networks
- Machine Learning and Human Computer Interaction improving accessibility and preserving heritage
- Distributed Computing with focus on High Performance Computing (including Clusters and Grid Computing), Security in ad hoc Mobile Networks
- Algorithms and Complexity, Distributed Systems and Grid Computing
- Believable Agents, Cognitive AI, AI in Games, Database Integration
- Lifestyle Technologies, Mobile Apps for Health, Health Informatics, Software Engineering, Software Quality Assurance, Software Testing. Smart Technologies and IoT
- Frameworks and methodologies for Computer Science Education Computer-Assisted Education
- Visual Complexity Analysis, Distributed Systems, Self-stabilizing Algorithms, Applied Graph Theory
- Computers in Education, E-commerce, Computer Gaming in Education and Computer Vision

Electronics

- Robotics, Microcontroller, Renewable Energy and Optical Sensors
- Error-control Coding for a Digital Communication System

Mathematics

- Mathematical Diffraction Theory, Pisot Substitutions & Cut and Project Schemes
- Visible Point Sets, Lattice Substitution Systems
- Iterated Function Systems & Hausdorff Measures
- Kolakoski-Sequences
- Diagnostic Statistics in Medicine, Multiple Factor Analysis
- Estimator Theory- Special focus in Cross Validation and Cp Estimates of Prediction Error
- Bayes Inference and MCMC, Applied Machine learning- focus on supervised and unsupervised learning
- Statistical Learning - Focus on Data Mining and Applied Prediction Models,

- Penalized regression - Special focus on datasets with high attrition rates.
- Design and Analysis of Experiments, Dimension Reduction - Special focus on High Dimensional Data.
- Structural Equation Modelling, Martingales.
- Mathematical Statistics, Lasso Regression

Physics

- Electro-optical properties of Liquid Crystals and Liquid Crystal Polymer blends, Control Electronics, Improving Solar Cell efficiency
- Statistical Mechanics. Phase transitions applied to Biological systems and evolution. Analytical &
- Computational works
- Renewable Energy Technologies
- Fluid Mechanics

Meteorology

- Numerical Weather Prediction
- Aerosols and Air Quality
- Tropical Meteorology
- Hydro-meteorology
- Statistical Forecasting
- Remote Sensing
- Short and Long-term Forecasting
- Climate Variability
- Climate Change

Course of Study

Students in the MPhil and PhD degree programmes are required to successfully:

1. Complete a minimum of six credits of coursework for MPhil/nine credits of coursework for PhD,
2. Present seminars (2 for MPhil/3 for PhD), and
3. Submit a thesis.

Courses

Students in the MPhil and PhD degree programmes should discuss with their Supervisor suitable courses which would satisfy the credit requirements. Courses should be completed in the first year.

Compulsory Seminar Presentations

For each seminar, candidates are required to write and present a paper to be photocopied and distributed beforehand on a topic arising out of their research, as well as to field questions put to them afterwards.

Thesis

Candidates are required to present and defend a Thesis of acceptable scope and qualify for the degree. The Thesis must follow the guidelines set out in the University's Thesis guide.

Award of the Degree

The successful completion of the required coursework, the compulsory Seminar presentations and the Thesis will lead to the award of the Degree.

LIST OF COURSES

Compulsory for All Students

FPAS 6000	Scientific Literature Review

Available to All Students as necessary

FPAS 6010	Basic Statistics for Graduates
FPAS 6020	Writing a Scientific Paper
FPAS 6030	Research Methods

Compulsory for All Students depending on their Programme

GRSM 6001	MPhil Research Seminar 1
GRSM 6002	MPhil Research Seminar 2
COMP 6000	MPhil Computer Science
ELET 6000	MPhil Electronics
MATH 6002	MPhil Mathematics
METE 6900	MPhil Meteorology
PHYS 6000	MPhil Physics
GRSM 8001	PhD Research Seminar 1
GRSM 8002	PhD Research Seminar 2
GRSM 8003	PhD Research Seminar 3
COMP 8000	PhD Computer Science
ELET 8000	PhD Electronics
MATH 8000	PhD Mathematics
METE 8000	PhD Meteorology
PHYS 8000	PhD Physics

Research Students may also be permitted (with the approval of their Supervisor) to take courses from other offerings within the Faculty.

COURSE DESCRIPTIONS

Courses are listed here in alphanumeric order by Course Code – i.e. Subject Code followed by Course Number. Descriptions for all Subject codes are given in the next section.

COURSE CODE: COMP 6000
TITLE: MPhil Computer Science
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 50,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: COMP 8000
TITLE: PhD Computer Science
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 80,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: ELET6000
TITLE: MPhil Electronics
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 50,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: ELET 8000
TITLE: PhD Electronics
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 80,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: FPAS 6000
TITLE: Scientific Literature Review
CREDITS: 3

Description
The course will formally teach MPhil and PhD students how to prepare an extensive review of the literature pertaining to a scientific topic. This will guide students on how to study and evaluate the literature on a given topic and write a comprehensive essay on it. The course will also demonstrate the use of pertinent search engines, discipline-specific traditional reference sources, as well as software for managing reference lists and creating bibliographies.

Assessment
Pass/Fail based on satisfactory attendance at the lectures and computer laboratory classes and on the adequacy of the written literature review and research proposal.

COURSE CODE: FPAS 6010
TITLE: Basic Statistics for Graduates
CREDITS: 3

Description
This course will acquaint postgraduate students that have not majored in Mathematics or Statistics with the fundamental ideas of modern applied statistic and provide an opportunity for the students to use a computer language in the study of this subject.

This course will be one of the course options for the postgraduate research students in the Faculty of Science and Technology. Students in Science and Technology outside BSc in Mathematics are not required to take Statistics courses in their undergraduate studies. This course then provides these students with basic statistical knowledge/skills needed for their research which they would not have had previous knowledge of.

Assessment
50% Coursework; 50% Final Examination

COURSE CODE: FPAS 6020
TITLE: Writing a Scientific Paper
CREDITS: 3

Description
This course is a "How to" type. It will equip MPhil and PhD postgraduate students with the knowledge, skills and experience to enable them to write a scientific paper from their own results. More importantly, this course is a guide to the steps in the process of writing clear and effective scientific papers. The evaluation is based on the scientific paper produced at the end of the course.
This course is one of the course options for the postgraduate students in the Faculty of Science and Technology and is available to all **research** postgraduates. The Scientific Literature Review course focuses on developing the literature review needed for the thesis. This course will support and equip the postgraduate students with the knowledge, skills and practical experience to enable them to write a complete scientific article that can be potentially submitted to a refereed journal for publication. If students do not have results/data at the time of enrollment of the course, raw data can be provided for them by their individual supervisor.

Assessment
100% Coursework

COURSE CODE: FPAS 6030
TITLE: Research Methods
CREDITS: 3

Description
This course introduces postgraduate students to the basic ideas about conduction research. Students will learn methods for reading technical papers, selecting research topics, devising research questions, planning research, project management and ethics. The evaluation is based on the assignments throughout the course and a final project report and presentation.

This course is available to all **research** postgraduates in the Faculty of Science & Technology. These courses help to provide the students with the knowledge, skills and practical experience to develop and manage their research. Conceptualizing and implementing novel research can be an overwhelming task. Postgraduate students are more often just injected into current research interest of their supervisor. The student is unaware of what was involved in getting the project started from conceptualizing idea, designing the research question, designing the experiments to best answer the questions, ethical research standards, and project management.

Assessment
100% Coursework

COURSE CODE: GRSM 6001 (common to all MPhil students)
TITLE: MPhil Research Seminar 1
CREDITS: 0

Description
This is the first of two research seminars to be presented by the MPhil student.

Assessment
Pass/Fail

COURSE CODE: GRSM 6002 (common to all MPhil students)
TITLE: MPhil Research Seminar 2
CREDITS: 0

Description
This is the second of two research seminars to be presented by the MPhil student.

Assessment
Pass/Fail

COURSE CODE: GRSM 8001 (common to all PhD students)
TITLE: PhD Research Seminar 1
CREDITS: 0

Description
This course is the first of three research seminars to be presented by the PhD student.

Assessment
Pass/Fail

COURSE CODE: GRSM 8002 (common to all PhD students)
TITLE: PhD Research Seminar 2
CREDITS: 0

Description
This is the second of three research seminars to be presented by the PhD student.

Assessment
Pass/Fail

COURSE CODE: GRSM 8003 (common to all PhD students)
TITLE: PhD Research Seminar 3
CREDITS: 0

Description
This is the last of three research seminars to be presented by the PhD student.

Assessment
Pass/Fail

COURSE CODE: MATH 6002
TITLE: MPhil Mathematics
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 50,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: MATH 8000
TITLE: PhD Mathematics
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 80,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: METE 6900
TITLE: MPhil Meteorology
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of approximately 50,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail

COURSE CODE: METE 8000
TITLE: PhD Meteorology
CREDITS: 0

Description
Students are required to register for this section every semester and are expected to produce a thesis of

approximately 80,000 words under the supervision of a member of Faculty.

Assessment
Pass/Fail