

MSc Information and Communication Technologies - E531

1. Introduction

The Programme is established with the purpose of educating candidates capable of meeting society's growing demand for Information and Communication Engineers.

Information and Communication Technologies (ICT) are being called nowadays to play a critical role in the socio-economic transformation of Mauritius. ICT are powerful tools to serve humanity. They are revolutionising life as no other technology has ever done before.

ICT have deep influence on almost all facets of modern life making it cheaper, more pleasant and more enjoyable. In a surprisingly short time span, ICT have emerged as the fastest growth sector in the world and will no doubt have a positive impact on the Mauritian economy as a whole, on culture, on the educational system, on travel, on medicine, on agriculture, on social interaction amongst many other areas.

The need for professionals in Mauritius with advanced knowledge and skills in ICT is therefore being felt at all levels and it is in this vein that such a specialised MSc Programme has been designed, more specifically for graduates in IT related fields such as Electrical, Electronic, Computer Science and Mechatronic Engineering.

Lecturers in this Programme of Studies will be mainly from the Faculty of Engineering and from overseas Universities with whom the Faculty has long established link arrangements.

2. Aim and Objectives

Aim

The aim is to increase the appreciation and critical understanding of the principles of communication engineering and information theory with a view to allow the graduates of the Programme to effectively design, implement and maintain communication systems, computer networks and related technologies.

Objectives

The Programme fulfils this aim by teaching students to:

- a) know, understand and apply basic theory and practice of data communication, information theory and digital signal processing systems;
- b) know and understand the principles of mobile and wireless communication systems;
- c) know, understand and design modern communication systems including the maintenance of security, integrity and confidentiality of data;
- d) be able to analyse a particular communication problem and use latest, state of the art information and communication technology to design solution(s) to the problem; and
- e) show critical and analytical thinking in the application of knowledge and/or research in a particular communication system.

3. General Entry Requirements

Successful completion of an undergraduate degree with

- at least a Second Class or 50%, whichever is applicable or
- a GPA not less than 2.5 out of 4 or equivalent, from a recognised higher education institution.

OR alternative qualifications acceptable to the University of Mauritius.

4. Programme Requirements

At least a Second Class Degree in Electrical, Electronics, Mechatronics, Computer Science and/or Computer Engineering from a recognised University or GPA not less than 2.5 or alternative qualifications acceptable to the University of Mauritius.

Preference will be given to candidates with at least two years of relevant work experience.

5. Programme Duration

The Programme will be offered on a part-time basis. The duration of the Graduate Programme should normally not exceed 4 years (8 semesters).

	Normal	Maximum
Master's Degree:	4 Semesters	8 Semesters
Postgraduate Diploma:	4 Semesters	8 Semesters

6. Credits per Semester: Minimum 3 credits subject to Regulation 5.

7. Minimum Credits Required for the Award of

Master's Degree:	36
Postgraduate Diploma:	24

Breakdown as follows:

	Minimum Core Taught Modules	Project	Electives/ Optional Modules
Master's Degree:	18 credits	9 credits	9 credits
Postgraduate Diploma:	18 credits		6 credits

8. Assessment

Each module will carry 100 marks and will be assessed as follows (unless otherwise specified):

Written examination of 3-hour duration and continuous assessment of 10% to 30% of total marks.

Continuous assessment can be based on laboratory work, assignments and/or 1 class test.

For a student to pass a module, a minimum of 30% should be attained in both of Continuous Assessment and Written Examination separately, with an overall total of a minimum of 40% in that module.

All modules carry equal weighting.

The Project carries 9 credits.

Submission Deadlines for Dissertation:

First Draft: End of July of Final Year.

Final Copy: Last working day of August of Final Year.

9. Plan of Study

Students are required to submit at the end of Semester 1 a Plan of Study for their whole Programme of Studies, indicating the list of elective modules and in which semester each of them will be taken.

The University reserves the right not to offer a given elective module if the critical number of students is not attained and/or for reasons of resource constraints.

10. Programme Structure

The Programme consists of taught modules and a research thesis. Each module takes place during the first 15 weeks of each semester and examinations are held at the end of the semester. Each student is required to take at least 8 taught modules – out of which 5 would be core modules. These core modules set the framework for Information and Communication Engineering and will be offered during the first two semesters. The elective modules offered in the third and fourth semester are aimed at covering particular areas in more depth. The contact hours for each 3-credit module will be 45 hours (i.e. 3 hours/week) and the proposal is to run the course over the equivalent of 1½ days/week. The total contact (taught) hours of the course (excluding practicals) therefore will be 360 hours. The Research Project will involve 180 working hours including direct supervision by a member of academic staff and/or an external supervisor.

A minimum of 6 contact hours is scheduled per week (3 hours on a weekday and 3 hours on Saturday). However candidates are expected to attend daily, for a period of two weeks, normally after 4.00 p.m., those modules, which are taught by visiting lecturers.

The Faculty reserves the right to change the order in which the modules are offered and the right not to offer certain of the elective modules.

11. Important Note

The rules as stipulated in this Programme Structure and Outline Syllabus will replace all other rules and regulations found in previous Programme Structures.

12. List of Modules

CORE MODULES

Code	Module	Hrs/Wk	Credits
		L+P	
ELEC 6111	Data Communication and Computer Networks	3+0	3
ELEC 6116	Communication Theory	3+3	4.5
ELEC 6203	Digital Signal Processing	3+0	3
CSE 6208	Network Administration and Programming	3+3	4.5
ELEC 6217	Mobile and Wireless Communication	3+0	3

PROJECT

ELEC 6000	Project	-	9
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ELECTIVES

CSE 6311	Introduction to Multimedia Communications	3+0	3
ELEC 6318	DSP Application In Communication Systems	3+0	3
CSE 6312	Network Security and Control	3+0	3
ELEC 6313	Microwave Engineering	3+0	3
ELEC 6319	Advanced Information Theory	3+0	3

ELEC 6421	Satellite Communications	3+0	3
ELEC 6422	Communication Systems Management	3+0	3
ELEC 6423	Speech and Image Processing	3+0	3
ELEC 6424	Wireless Technology	3+0	3
ENGG 6201	Management Information Systems	3+0	3

13. Programme Plan – MSc Information and Communication Technologies

YEAR 1							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
ELEC 6111	Data Communication and Computer Networks	3+0	3	CSE 6208	Network Administration and Programming	3+3	4.5
ELEC 6116	Communication Theory	3+3	4.5	ELEC 6203	Digital Signal Processing	3+0	3
				ELEC 6217	Mobile and Wireless Communication	3+0	3

YEAR 2							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
CORE				CORE			
ELEC 6000	Project	-	-	ELEC 6000	Project	-	9
ELECTIVES				ELECTIVES			
CSE 6311	Introduction to Multimedia Communication	3+0	3	ENGG 6201	Management Information Systems	3+0	3
CSE 6312	Network Security and Control	3+0	3	ELEC 6423	Speech and Image Processing	3+0	3
ELEC 6313	Microwave Engineering	3+0	3	ELEC 6421	Satellite Communications	3+0	3
ELEC 6318	DSP Application In Communication Systems	3+0	3	ELEC 6424	Wireless Technology	3+0	3
ELEC 6319	Advanced Information Theory	3+0	3	ELEC 6422	Communication Systems Management	3+0	3

Note 1: Students are required to register at the Faculty for modules that they intend to follow in a given semester on a date specified by the Faculty. However, students will be allowed to withdraw from a module without penalty within 4 weeks from the first day of the semester.

Note 2: An elective will be provided only if sufficient number of students have opted for it and depending on availability of resource persons.

Note 3: In order to be allowed to register on the project (ELEC 6000), students must pass in at least four core (4) modules in Year 1

14. Outline Syllabus

CORE MODULES

ELEC 6111 - DATA COMMUNICATION AND COMPUTER NETWORKS (L/P – 3+0, Credits – 3)

Introduction, the OSI model, Network Configurations, Data Communications Systems, The Internet and latest Development, Digital Audio/Video broadcasting techniques, HDTV, 3D-TV, data services in TV broadcasting.

ELEC 6116 - COMMUNICATION THEORY (L/P – 3+3, Credits – 4.5)

Digital Communications, Introduction to source and channel coding, Digital modulation techniques, Spread spectrum, Cryptography.

CSE 6208 - NETWORK ADMINISTRATION AND PROGRAMMING (L/P – 3+3, Credits – 4.5)

Introduction to Unix, Internet Protocols and Services, Interprocess Communication, Basic Socket Programming, Remote Procedure Calls, IP Routing, DN Applications, Mail, Web-Based Programming.

ELEC 6203 - DIGITAL SIGNAL PROCESSING (L/P – 3+0, Credits – 3)

Discrete processing of continuous-time signals, overview of discrete-time signals and systems, DTFT, DFT, FFT, filter structures, IIR filter design, FIR filter design, DSP hardware and software.

ELEC 6217 - MOBILE AND WIRELESS COMMUNICATION (L/P – 3+0, Credits – 3)

Inverse Fourth power, shadowing and Rayleigh fading losses, Narrow band system performance, Wide band system principles, Equalisation, Multiple access techniques for wireless communications, GSM system, CDMA, Recent advances in mobile radio Communications.

ELEC 6000 - PROJECT

Objectives:

1. To develop an ability to undertake research analysis, design, simulation and/or implementation given an appropriate level of supervision;
2. To develop objectives and program of work;
3. To collect information, assess it and present it in an orderly and coherent form; and
4. To be able to work a document, which presents clearly findings, related to the study.

ELECTIVE MODULES

CSE 6311 - INTRODUCTION TO MULTIMEDIA COMMUNICATIONS (L/P – 3+0, Credits – 3)

Standards, Compression Methods: MPEG, JPEG, MB3, MP4, Video Conferencing Techniques and standards, Codecs, Video-on Demand, Multimedia over the Internet.

CSE 6312 - NETWORK SECURITY AND CONTROL (L/P – 3+0, Credits – 3)

Cryptography, Firewalling, Authentication, Network Control mechanisms, Physical Security Measure and Backups, Hazards, System Administration Rules and Procedures.

ELEC 6313 - MICROWAVE ENGINEERING (L/P – 3+0, Credits – 3)

Generation, propagation and control of microwave signals. Transmission lines, wave guides, resonators, scattering microwave signals, scattering parameters, Smith Charts, measuring techniques, instruments, microwaves devices, microwave communications systems and design.

ELEC 6318 - DSP APPLICATION IN COMMUNICATION SYSTEMS (PR: ELEC 5203) (L/P – 3+0, Credits – 3)

DSP in telephony and wireless Communication, Advanced Modem and Synchronisation techniques, DSP in Codecs, Vocoders and Image compression.

ELEC 6319 - ADVANCED INFORMATION THEORY (L/P – 3+0, Credits – 3)

Entropy and Source coding, Lossless coding techniques including Huffman codes, Arithmetic codes, Lempel-Ziv coding, Lossy coding techniques, Shannon coding theorem, Channel codes including Linear block codes, Cyclic codes, BCH codes Convolutional codes.

ELEC 6421 - SATELLITE COMMUNICATIONS (L/P – 3+0, Credits – 3)

Satellite systems, Satellite frequency band, Satellite multiple access formats, The Satellite channels, Satellite transponders, FDMA, TDMA, CDMA, Phase coherence in Satellite systems, Optical Satellite communications, Satellite ranging systems.

ELEC 6422 - COMMUNICATION SYSTEMS MANAGEMENT (L/P – 3+0, Credits – 3)

Theoretical Background, Communications technology, roles of CS manager, risk analysis in networks, procurement, telecom standards, role of regulation, legal issues in telecom, ITU resolutions and recommendations terminologies.

ELEC 6423 - SPEECH & IMAGE PROCESSING (L/P – 3+0, Credits – 3)

Human speech model, speech analysis and synthesis, speech compression techniques. Image model, DCT analysis, two-dimensional FIR filters, image enhancement, image compression.

ELEC 6424 - WIRELESS TECHNOLOGY (L/P – 3+0, Credits – 3)

GSM, GPRS, UMTS Technologies, Wireless local area networks, Packet radio systems, Mobile IP, Bluetooth.

ENGG 6201 - MANAGEMENT INFORMATION SYSTEMS (L/P – 3+0, Credits – 3)

Database Management Systems, Database tools, data analysis and tool, IS methodologies, IS Requirements, Project Management tools.