# MSc Information, Communication and Wireless Technologies (ICWT) – E533

1. **Introduction**

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

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

ICWT have deep influence on almost all facets of modern life making it cheaper, more pleasant and more enjoyable. In a surprisingly short time span, ICWT 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 ICWT 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 ICT related fields such as Electrical, Electronic, Computer Science and Mechatronic Engineering. The job prospects include technical as well as management positions in the field of ICT, Telecommunications, Broadcasting, Regulations, and related fields.

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 and information theory;

   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.

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) , subject to the approval of the Faculty.  However, students wishing to exit before the end of the course may do so as follows:

a)  After successfully completing **five (5)** modules for the award of a **Postgraduate Certificate**.
b)  After successful completion of **nine (9)** modules, for the award of a **Postgraduate Diploma**.

|  | **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: | 27 |
| Postgraduate Certificate: | 15 |

Breakdown as follows:

|  | **Minimum Core Taught Modules** | **Project** | **Electives/ Optional Modules** |
|---|---|---|---|
| Master's Degree: | 18 credits | 9 credits | 9 credits |
| Postgraduate Diploma: | 18 credits |  | 9 credits |
| Postgraduate Certificate: | 15 credits |  |  |

8. **Assessment**

Each module will carry 100 marks and will be assessed as follows (unless otherwise specified): Assessment will be based on a written examination of  3-hour duration and continuous assessment of 30% to 40% of total marks.

Continuous assessment may be based on laboratory work, seminars and should include at least two (2) assignments/tests per year per module.

An overall total of 40% for combined Continuous Assessment (CA) and Written Examination (WE) components would be required to pass the module, without minimum thresholds within the individual CA and WE components.

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 9 taught modules – out of which 6 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 therefore will be 405 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 department 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**

<u>**CORE MODULES**</u>

| Code | Module | Hrs/Wk L+P | Credits |
|------|--------|--------|---------|
| ELEC 6510 | Data Communications | 3+0 | 3 |
| ELEC 6511 | Communication Theory | 3+0 | 3 |
| ELEC 6512 | Wireless Technologies I | 3+0 | 3 |
| ELEC 6513 | Telecommunications Regulations & Policies | 3+0 | 3 |
| ELEC 6514 | Mobile  Communications | 3+0 | 3 |
| ELEC 6515 | Wireless Technologies II | 3+0 | 3 |

<u>**PROJECT**</u>

| Code | Module | Hrs/Wk L+P | Credits |
|------|--------|--------|---------|
| ELEC 6000 | Project | - | 9 |

**ELECTIVES**

| | | | |
|---|---|---|---|
| ELEC 6520 | Network Security | 3+0 | 3 |
| ELEC 6407 | Audio & Video Broadcasting Technologies | 3+0 | 3 |
| ELEC 6522 | ICWT Applications | 3+0 | 3 |
| ELEC 6523 | Satellite Communications | 3+0 | 3 |
| ELEC 6524 | Nanotechnology | 3+0 | 3 |
| CSE 6525 | Management Information Systems | 3+0 | 3 |
| ENGG 6101 | Principles of Project Management | 3+0 | 3 |

## 13. Programme Plan – MSc Information Communication and Wireless Technologies

| YEAR 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester 1** | | | | **Semester 2** | | | |
| Code | Module | Hrs/Wk L+P | Credits | Code | Module | Hrs/Wk L+P | Credits |
| **CORE** | | | | **CORE** | | | |
| ELEC 6510 | Data Communications | 3+0 | 3 | ELEC 6513 | Telecommunications Regulations & Policies | 3+0 | 3 |
| ELEC 6511 | Communication Theory | 3+0 | 3 | ELEC 6514 | Mobile Communications | 3+0 | 3 |
| ELEC 6512 | Wireless Technologies I | 3+0 | 3 | ELEC 6515 | *Wireless Technologies II (PR: Wireless Technologies I) | 3+0 | 3 |

| YEAR 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester 1** | | | | **Semester 2** | | | |
| Code | Module | Hrs/Wk L+P | Credits | Code | Module | Hrs/Wk L+P | Credits |
| **CORE** | | | | **ELECTIVES** | | | |
| ELEC 6000 | Project | - | - | ELEC 6000 | Project | - | 9 |
| | Elective 1 | 3+0 | 3 | | Elective 3 | 3+0 | 3 |
| | Elective 2 | 3+0 | 3 | | | | |

### List of Electives for Year 2, Semester 1 & Semester 2

| ELECTIVES | | | | ELECTIVES | | | |
|---|---|---|---|---|---|---|---|
| ELEC 6520 | Network Security | 3+0 | 3 | ELEC 6523 | Satellite Communications | 3+0 | 3 |
| ELEC 6407 | Audio & Video Broadcasting Technologies | 3+0 | 3 | ELEC 6524 | Nanotechnology | 3+0 | 3 |
| ELEC 6522 | ICWT Applications | 3+0 | 3 | CSE 6525 | Management Information Systems | 3+0 | 3 |
| ENGG 6101 | Principles of Project 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 subject to satisfying the relevant regulations.

**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

**Note 4**: ELEC 6515 has ELEC 6512 as pre-requirement.

**14.     Outline Syllabus**


## CORE MODULES

**ELEC 6510 - DATA COMMUNICATIONS (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 6511 - COMMUNICATION THEORY (L/P – 3+0, Credits – 3)**
Digital Communications, Introduction to source and channel coding, Digital modulation techniques, Spread spectrum, Cryptography

**ELEC 6512 - WIRELESS TECHNOLOGIES I  (L/P – 3+0, Credits – 3)**
Wireless Networking, Radio Frequency Principles, WLAN, WPAN(IrDA, Bluetooth, and ZigBee), WWAN, Design & Implementation of WLAN, Site Survey, Wireless Security

**ELEC 6513** - **TELECOMMUNICATIONS REGULATION AND POLICIES (L/P – 3+0, Credits – 3)**
Interpretation of governmental policies on telecommunications at the local, state, national, and international levels, Identification the current policy issues in deployment of VOIP, Broadband and other telecommunication services, Frequency planning and allocation, Market models and the role of regulation, organizations involved in the Local and Global telecom policy process, International Wireless Regulations.

**ELEC 6514 - MOBILE COMMUNICATIONS (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 6515 - WIRELESS TECHNOLOGIES II (L/P – 3+0, Credits – 3)**

Network and Transport Protocols, Mobile Ad-hoc Networks, WiMAX, RFID, Service Discovery, Mobility Management, Mobile IP, 3G Technology, Next Generation Mobile Networks, HSDPA, LTE

ELEC 6515  has  ELEC 6512 as pre-requirement.


**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


**ELEC 6520 – NETWORK SECURITY (L/P – 3+0, Credits – 3)**
Cryptography, Firewalling, Authentication, Network Control mechanisms, Physical Security Measure and Backups, Hazards, System Administration Rules and Procedures.

**ELEC 6407 - AUDIO & VIDEO BROADCASTING TECHNOLOGIES (L/P – 3+0, Credits – 3)**
Conventional FM Broadcasting, MPEG and MP3 audio layers, Digital Audio Broadcasting (DAB) techniques.

Analog TV transmission, NICAM Audio, MPEG transmission layer, orthogonal Frequency Division Multiplexing (OFDM), Digital Terrestrial TV Broadcasting (DTTB) techniques , Single Frequency Networking (SFN), Digital Satellite TV Broadcasting (DVB-S and ISDB), Digital Cable TV transmission. Interactive TV, 3D-TV, Teletext, Data Services. New Standards - DAB, DAB+, DRM, HD Radio


**ELEC 6522- ICWT APPLICATIONS(L/P – 3+0, CREDITS – 3)**
Wireless LANs case study – Applications in University campus, health care institutions, warehouses. Enterprise Case study, Manufacturing Case Study, Wireless Case Studies in the Process Industry, Patient Monitoring Using Personal Area Networks, IEEE 802.11n Applications in University campus.


**ELEC 6523 - SATELLITE COMMUNICATIONS (L/P – 3+0, Credits – 3)**
Satellite systems, Satellite frequency band, Satellite multiple access formats, The Satellite channels, Satellite transponders, link models, FDMA, TDMA, CDMA, Phase coherence in Satellite systems, Optical Satellite communications, Satellite ranging systems.

**ELEC 6524– NANOTECHNOLOGY  (L/P – 3+0, Credits – 3)**
Introduction to Nano-technology; Quantum Mechanics basics; Magnetic, Chemical, Mechanical, Electrical and Optical Properties Nano-Materials; Devices and Systems; Characterisation; Fabrication; Nano Structures; Applications: Nanoelectronics, Nanosensors and actuators, NEMS.


**CSE 6525 - MANAGEMENT INFORMATION SYSTEMS (L/P – 3+0, Credits – 3)**
IS and Businesses, Enterprise applications: ERP, SCM, CRM, Knowledge Management, Decision Support Systems, E-commerce, Databases and Information Management, Change Management, Business Process Reengineering, Outsourcing, Securing Information System, System Building Approaches, Quality Assurance Tools, Project Management, Managing Global Systems.


**ENGG 6101 - PRINCIPLES OF PROJECT MANAGEMENT(L/P – 3+0, Credits – 3)**
Introduction to Principles of Project Management. Planning and Programming. Procurement Budgeting and Estimating. Project Control. Quality Management. Risk Management. Strategic Management. Project Appraisal. Project Completion Report. Case Studies

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